RAMCO INSTITUTE OF TECHNOLOGY

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Achievements of Faculty Members

Academic Year 2022-2023

S.No.	Parameter	Count/Amount
1.	Number of Research Papers published in Journals	**137**
2.	Number of Papers published in National Conferences	**-**
3.	Number of Papers published in International Conferences	**77**
4.	Number of Patents granted	**02**
5.	Number of Books authored	**05**
6.	Number of Book Chapters authored	**14**
7.	Number of new externally funded research projects received	**08**
8.	Fund received during this academic Year	**Rs. 1,64,000**
9.	Other achievements	**115**

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Achievements of Faculty Members

Academic Year 2022-2023

Number of Research Papers published in Journals: **137**

S.No.	Name of the Department	No. of Journal Publications
1.	Civil Engineering	03
2.	Computer Science and Engineering	21
3.	Electrical and Electronics Engineering	13
4.	Electronics and Communication Engineering	35
5.	Mechanical Engineering	17
6.	Artificial Intelligence and Data Science	36
7.	Chemistry	07
8.	Mathematics	05
	Total publications	**137**

Achievements of Faculty Members

Academic Year 2022-2023

Department of Civil Engineering – Journal Publications

1. Dharmar S., Soundarapandian, N.**Assessment of the characteristics of ferro-geopolymer composite box beams under flexure**(2023) *Advances in Concrete Construction*, 15 (4), pp. 251-267. **(SCI with IF: 2.580)**
2. Chockalingam, T., Vijayaprabha, C., Leon Raj, J.**Experimental study on size of aggregates, size and shape of specimens on strength characteristics of pervious concrete**(2023) *Construction and Building Materials*, 385, art. no. 131320, . **(SCI with IF: 7.693)**
3. Subha C., ArunKumar, P., Jeyakumar, R.B. **Effect of organic loading on bioelectricity generation potential of dual-chambered microbial fuel cell treating chocolaterie wastewater** (2023) *Environmental Progress and Sustainable Energy*, . **DOI:** 10.1002/ep.14081 **(SCI with IF: 2.824)**

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Assessment of the characteristics of ferro-geopolymer composite box beams under flexure

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Abstract. In this paper, an experimental investigation is carried out to assess the inherent self-compacting properties of geopolymer mortar and its impact on flexural strength of thin-walled ferro-geopolymer box beam. The inherent self-compacting properties of the optimal mix of normal geopolymer mortar was studied and compared with self-compacting cement mortar. To assess the flexural strength of box beams, a total of 3 box beams of size 1500 mm × 200 mm × 150 mm consisting of one ferro-cement box beam having a wall thickness of 40 mm utilizing self-compacting cement mortar and two ferro-geopolymer box beams with geopolymer mortar by varying the wall thickness between 40 mm and 50 mm were moulded. The ferro-cement box beam was cured in water and ferro-geopolymer box beams were cured in heat chamber at 75°C - 80°C for 24 hours. After curing, the specimens are subjected to flexural testing by applying load at one-third points. The result shows that the ultimate load carrying capacity of ferro-geopolymer and ferro-cement box beams are almost equal. In addition, the stiffness of the ferro-geoploymer box beam is reduced by 18.50% when compared to ferro-cement box beam. Simultaneously, the ductility index and energy absorption capacity are increased by 88.24% and 30.15%, respectively. It is also observed that the load carrying capacity and stiffness of ferro-geopolymer box beams decreases when the wall thickness is increased. At the same time, the ductility and energy absorption capacity increased by 17.50% and 8.25%, respectively. Moreover, all of the examined beams displayed a shear failure pattern.

Keywords: box beam; ferro-cement; ferro-geopolymer; flexural behavior; self-compacting mortar

1. Introduction

m Human activities that release carbon dioxide into the atmosphere, like as the burning of fossil fuels, the production of cement, and deforestation, must end entirely if we are to stop global warming. The longer it takes, the hotter the world will become. Given the slow decarbonization pace, panic over the climate problem is understandable (Pierrehumbert 2019). Technological, institutional, and socioeconomic actions all contribute to environmental degradation. As the natural resources of Earth are exhausted, degradation takes place. Water, air, and soil are some of these resources that are impacted. The degradation affects wildlife, plants, animals, and microorganisms as well as ourselves. Numerous factors influence the environment, including urbanization, population growth, intensified agriculture, increased energy consumption, increased transportation, high levels of secondary pollutants and exhaust gases, a large number of industries, chemical effluents, and unplanned land use policies. Water pollution and scarcity, air pollution, solid and hazardous waste, soil degradation, deforestation, loss of bio diversity, and atmospheric changes are only a few of the significant environmental issues that have an impact on both productivity and health. The 3R's-Reducing, Reusing, and Recycling-are a sustainable and renewable way to live ecologically.

Resource efficiency is the ratio of added product value to the value of the resources used in production or a process thereof. The resource efficiency of a process can be separated from the resource efficiency of a product when materials, parts, and components are swapped only on the basis of their cost and usefulness. The percentage of the value of stressed resources included into a service or product that is returned after it has reached the end of its useful life is known as circularity (Francesco *et al*. 2017). Concrete's durability is defined as its ability to survive abrasion, chemical attack, and weathering while maintaining the appropriate engineering properties. Different concretes require differing degrees of durability depending on the exposure environment and targeted attributes (Portland Cement Association 2019).

A simply supported reinforced concrete beam has two zones, one, above the neutral axis which is known as the compression zone and the other, below the neutral axis, known as the tension zone. Steel reinforcements are placed in the tension zone because concrete is weak in tension. Between the compression and tension zones, the concrete below the neutral axis serves as a stress transfer medium. Concrete that is located below the neutral axis experiences the least amount of stress and is known as sacrificial

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Experimental study on size of aggregates, size and shape of specimens on strength characteristics of pervious concrete

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ARTICLE INFO

Keywords:
Size effect
Pervious concrete
Specimen size
Specimen shape
Aggregate size

ABSTRACT

Pervious concrete has a wide range of applications including pervious pavements, rigid drainage layers and water-free floor. In this paper, the influence of aggregate size, shape, and size of specimens on the mechanical properties of pervious concrete has been investigated. Tests on pervious concrete include direct compression on cubes and cylinders, splitting tension, and flexural tests on respective cylinders and prisms were carried out on three different mixes with aggregate sizes of 10, 12.5, and 20 mm. The height of specimens was kept as the primary variable whereas the aspect ratio was kept constant. Experimental results indicated that when aggregate size and height of specimen increases, compressive, splitting tensile and flexural strength decreases. Using Size effect models such as Linear model, Bažant's Size Effect Law and Modified Size Effect law, an approach is proposed to predict non-standard specimen strength from known standard specimen strength with high accuracy.

1. Introduction

Pervious concrete is made of cement, water, coarse aggregate, and meager or no fine aggregate which leads to a highly porous and permeable concrete structure. It is an alternative material for pavements that can mitigate many of the environmental issues caused by urban surface water runoff from built-up areas [1–3]. Usage of pervious concrete pavements could be a viable solution to overcome the skidding problem [4]. Some of the influencing parameters of pervious concrete were as follows: aggregate-to-cement ratio, water-to-cement ratio, aggregate density, cement content, size of aggregate, porosity, chemical admixtures, and supplementary cementitious materials [5–14]. The compressive strength increased when admixtures including polypropylene fiber, basalt fiber, water-reducing agent, fly ash, silica fume, copper slag, sugarcane bagasse ash and straw ash were added to the pervious cement concrete [10,15–19]. Further, binary blended aggregate had showed the best structural and functional properties required for pervious concrete mixtures [20].

For conventional concrete, the compressive strength tests on cylindrical shaped core samples prepared as per IS 516 (Part 4):2018 [84] shall manifest the grade of concrete of a particular structural member or pavements [22]. The core specimens obtained from the constructed site will be in different height-to-diameter ratios. Therefore, a correction factor was proposed in code for being the equivalent strength of a cylinder having a height-to-diameter ratio of 2.0 which is termed corrected cylinder strength. Also, the code specified the equivalent cube strength of concrete is 1.25 times of corrected cylinder strength. The size and shape of the test specimens are different in laboratory and at construction site. In Indian Standard (BIS) specifications, the specimens used to study the mechanical properties of concrete and the dimensions of various standard specimens are shown in Table 1. IS516:2018 [21], IS5816:1999 [23].

Methods of testing listed for conventional concrete are also used for pervious concrete, and this has posed a few problems among researchers because of the differences in the composition of the material [24]. The size range studied by previous researchers were as follows: cylindrical specimens - Φ50 × 100 mm [25] to Φ200 × 400 mm [26]; cube specimens – 50 × 50 × 50 mm [25] to 200 × 200 × 200 mm [27]; and prisms – 150 × 150 × 300 mm to 450 × 450 × 900 mm [28]. According to the classical theory of elasticity or plasticity, the nominal strength was independent of specimen size when geometrically similar structures were

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ORIGINAL RESEARCH

Effect of organic loading on bioelectricity generation potential of dual-chambered microbial fuel cell treating chocolaterie wastewater

Subha Chandrasekarabarathi, Priya ArunKumar, Rajesh Banu Jeyakumar

First published: 10 January 2023
https://doi.org/10.1002/ep.14081

Abstract

Microbial fuel cells (MFC) are recent advancements in treating wastewater and generating power simultaneously. In the present study, chocolaterie wastewater rich in organic content was the substrate in a dual-chambered MFC. Activated Carbon Fiber Felt (ACFF) electrodes (anode and cathode) were separated by Nafion 117 proton exchange membrane in the dual-chambered reactor. The primary goal was to investigate the impact of organic loading on MFC efficiency in treating chocolaterie wastewater and carrying out microbial analysis. 1, 2, 3, and 4 gCOD/L were the organic loadings of the reactor. MFC performance increased till the optimum value, and after that, it declined. A total of 2 gCOD/L was the optimum organic loading. At this optimum organic loading, dual-chambered MFC removed 79% of total chemical oxygen demand (TCOD), 70% of soluble chemical oxygen demand (SCOD), and 67% of total suspended solids (TSS). At 2 gCOD/L organic loading, the maximum power density was 99 mW/m^2. Coulombic efficiency was 58% at 1 gCOD/L and 30% at 2 gCOD/L organic loadings. Microbial analysis revealed the presence of *Ochrobactrum* and *Pseudomonas* sp. as dominant exoelectrogens in the anodic biofilm. These species were proven for the contaminant degradation efficiency and potential for power generation. Hence dual-chambered MFCs can treat high-strength chocolaterie wastewaters efficiently at optimum operating conditions.

CONFLICT OF INTEREST

The authors declare that there is no competing interest.

Open Research

Department of Computer Science and Engineering – Journal Publications

1. Erana Veerappa Dinesh Subramaniam , Valarmathi Krishnasamy, **Hybrid Optimal Ensemble SVM Forest Classifier for Task Offloading in Mobile Cloud Computing** (2023) *Computer Journal,* https://doi.org/10.1093/comjnl/bxad059**(SCI with IF: 1.762)**
2. Shenbagalakshmi, G., Shenbagarajan, A., Thavasi, S., Gomathy Nayagam, M., Venkatesh, R.**Determination of water quality indicator using deep hierarchical cluster analysis**(2023) *Urban Climate*, 49, art. no. 101468.**(SCI with IF: 6.663)**
3. Poojary, R., Bhat, A.K., Karantha, M.P., Arumugam, S., Gutman, I.**Characterizing Graphs with Nullity n−4**(2023) *Match*, 89 (3), pp. 631-642. **(SCI with IF: 2.633)**
4. Sabitha, R., Gopikrishnan, S., Bejoy, B.J., Anusuya, V., Saravanan, V. **Network Based Detection of IoT Attack Using AIS-IDS Model** (2023) *Wireless Personal Communications*, 128 (3), pp. 1543-1566. **(SCI with IF: 2.017)**
5. Vijayalakshmi, B., Ramya, T.S., Ramar, K. **Multivariate Congestion Prediction using Stacked LSTM Autoencoder based Bidirectional LSTM Model** (2023) *KSII Transactions on Internet and Information Systems*, 17 (1), pp. 216-238. **(SCI with IF: 0.972)**
6. Swarna Sudha M., Krishnasamy, V. **Anomaly Detection in Social Media Texts Using Optimal Convolutional Neural Network** (2023) *Intelligent Automation and Soft Computing*, 36 (1), pp. 1027-1042. **(SCI with IF: 3.401)**
7. Nayagam, M.G., Vijayalakshmi, B., Somasundaram, K., Mukunthan, M.A., Yogaraja, C.A., Partheeban, P.**Control of pests and diseases in plants using IOT Technology** (2023) *Measurement: Sensors*, 26, art. no. 100713. (Scopus)
8. Jothi Thilaga, P., Kavipriya, S., Vijayalakshmi, K. **Predictions of confirmed and death caused by COVID-19 in India** (2022) *International Journal of Health Sciences*6(S8), pp 5401-5407.(Scopus)
9. Arivazhagan, N., Venkatesh, J., Somasundaram, K., Vijayalakshmi, K., Priya, S.S., Suresh Thangakrishnan, M., Senthamilselvan, K., Lakshmi Dhevi, B., Vijendra Babu, D., Chandragandhi, S., Ashine Chamato, F. **An Improved Machine Learning Model for Diagnostic Cancer Recognition Using Artificial Intelligence** (2022) *Evidence-based Complementary and Alternative Medicine*, 2022, art. no. 1078056, . **(SCI with IF: 2.650)**
10. Vignesh Saravanan, K., Kavi Priya, S., Jothi Thilaga, P., Vijayalakshmi, K., Samyuktha Vikashini, Nivethitha, **Mule: Multiclass Email Classification for Forensic Analysis Using Deep Learning**(2022)*Telematique,* 21(1), pp 4670-4686. (ESCI)
11. Jothi Thilaga P., Kavi Priya S., Vignesh Saravanan, K., Vijayalakshmi, K., Harshini, A.S., Sowmiya S. **Detection and Classification of Covid-19 on X-Ray Images using Convolutional Neural Network**(2022)*Telematique,* 21(1), pp 4628-4643. (ESCI)

12. Bhola, J., Shabaz, M., Dhiman, G., Vimal, S., Subbulakshmi, P., Soni, S.K. **Performance Evaluation of Multilayer Clustering Network Using Distributed Energy Efficient Clustering with Enhanced Threshold Protocol** (2022) *Wireless Personal Communications*, 126 (3), pp. 2175-2189. **(SCI with IF: 2.017)**
13. Robinson, Y.H., Vimal, S., Julie, E.G., Lakshmi Narayanan, K., Rho, S. **3-Dimensional Manifold and Machine Learning Based Localization Algorithm for Wireless Sensor Networks** (2022) *Wireless Personal Communications*, 127 (1), pp. 523-541. **(SCI with IF: 2.017)**
14. Poongodi, M., Hamdi, M., Malviya, M., Sharma, A., Dhiman, G., Vimal, S. **Diagnosis and combating COVID-19 using wearable Oura smart ring with deep learning methods** (2022) *Personal and Ubiquitous Computing*, 26 (1), pp. 25-35. (Scopus)
15. Panigrahi, R.R., Mishra, M., Nayak, J., Vimal S., Naik, B., Jung, Y.-A. **A power quality detection and classification algorithm based on FDST and hyper-parameter tuned light-GBM using memetic firefly algorithm** (2022) *Measurement: Journal of the International Measurement Confederation*, 187, art. no. 110260, . **(SCI with IF: 5.131)**
16. Shashirangana, J., Padmasiri, H., Meedeniya, D., Perera, C., Nayak, S.R., Nayak, J., Vimal, S., Kadry, S. **License plate recognition using neural architecture search for edge devices** (2022) *International Journal of Intelligent Systems*, 37 (12), pp. 10211-10248. **(SCI with IF: 8.993)**
17. Karpagarajesh, G., Santhana Krishnan, R., Harold Robinson, Y., Vimal, S., Kadry, S., Nam, Y. **Investigation of digital video broadcasting application employing the modulation formats like QAM and PSK using OWC, FSO, and LOS-FSO channels**(2022) *Alexandria Engineering Journal*, 61 (1), pp. 647-657. **(SCI with IF: 6.626)**
18. Singh, P., Khari, M., Vimal, S. **EESSMT: An Energy Efficient Hybrid Scheme for Securing Mobile Ad hoc Networks Using IoT** (2022) *Wireless Personal Communications*, 126 (3), pp. 2149-2173. **(SCI with IF: 2.017)**
19. M.SwarnaSudha, S.Manjula, A.Vaishnavi, **Deep Learning Technique For Identifying Replay-Attacks In A Face Liveness System** (2023) *Journal of Advanced Engineering Science,* 54(2) *pp.* (UGC/Others)
20. R.Venkatesh and C.A.Yogaraja, **Recommendation of Crop and Fertilizer Rotation Timing to Enhance the Yield of Crop**(2023) *International Journal of Research and Analytical Reviews*, 10(2), pp 106-117 (UGC/Others)
21. N.Gowri, DavidA.Kalarkop,S.Arumugam, **On γ-free,γ-totally-free and γ-fixed sets in graphs** (2023) *Communications in Combinatorics and Optimization,* DOI:10.22049/CCO.2023.28525.1600

OXFORD

The Computer Journal, 2023, 1–12
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Original Article

Hybrid Optimal Ensemble SVM Forest Classifier for Task Offloading in Mobile Cloud Computing

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Abstract

Mobile devices (MDs) are becoming more prevalent and their battery life is optimised by offloading tasks to cloud servers. However, communication costs must be considered when offloading tasks. To make task offloading worthwhile, it is important to measure the energy consumed during communication activities. Thus, a heterogeneous framework is developed to enhance the energy efficiency of smartphones by analysing parameters such as task and non-task offloading, local cloudlets, radio access networks and remote cloud servers. This paper proposes a task offloading framework that uses a novel algorithm, the Hybrid Red Fox Flow Direction-based Ensemble SVM Forest Classifier, to enhance the system parameters and schedule tasks in offloading cloud computing conditions. The multi-objective function aims to improve user satisfaction by maximising resource utilisation and minimising function. The framework was tested in the Cloudsim simulation tool and compared with different techniques, with the results demonstrating its superiority in terms of energy efficiency and system performance. The proposed framework can optimise the energy efficiency of MDs and improve battery life.

Keywords: task offloading, support vector machine, random forest, make span, Red Fox, flow direction, energy cost

1. INTRODUCTION

Mobile phones play a vital role in the modern world and cloud computing is employed to provide applications to mobile devices (MDs) through mobile cloud computing (MCC). Mobile cloud apps and services can be established or altered quickly and sent to a variety of devices with different operating systems, computational activities and data storage, enabling users to access applications that would otherwise be unavailable [1]. The mission of MCC is to create online materials that are adaptable and accessible. Cloud resources, including storage, processing and functionality are delivered through mobile networks over the internet [2].

Mobile edge computing (MEC) is a developing computing structural design that ensures the computation process is closer to end-users through strategically placed storage resources. This method differs fundamentally from regular cloud computing [3]. An edge node in an MEC system experiences high load when a significant number of MDs offload their work. When their deadlines expire, offloaded tasks experience processing delays or are possibly abandoned. Some existing studies examine the delay-sensitive, non-divisible and delay-also-edge-load dynamic.

A model-free deep reinforcement learning distribution technique is presented in which each device determines its offloading choice without knowing the task model of other devices [4]. Although the end device is growing more capable, available local resources often fail to meet the demand of various applications, giving rise to a new difficulty known as task offloading, where computation-intensive tasks must be offloaded to more resource-powerful distant devices [5]. MEC in ultra-dense networks is predicted to be an effective opportunity for addressing the minimum latency need. However, scattered computing resources in the edge cloud and energy dynamics in MD batteries make offloading tasks for customers challenging [6]. Task offloading is evaluated in ultra-dense networks using the software-defined network concept, intending to minimise latency while preserving the life of the user's equipment battery. The task offloading issue is formulated as an NP-hard non-linear program [7].

When multiple MDs upload tasks to a MEC server in a single cell and limited resources are assigned to the server, wireless communication is affected. To realise the solving process, the Selecting a Maximum Saved Energy First (SMSEF) approach is suggested [8,9]. However, battery capacity and information processing capability become more challenging, making it difficult to provide sophisticated and high-quality features for customers. User presence inference attacks for MEC invade user privacy by exploiting feature task offloads from users [10]. Existing privacy-preserving approaches established for various apps failed to defeat this attack in MEC, causing disruption in optimal task offloading schedule processes and resulting in significant degradation. To overcome this, the Privacy-Preserving and Cost-Efficient (PEACE) task offloading method follows a generic Lyapunov optimisation framework to ensure the best possible user experience.

This paper proposes a hybrid meta-heuristic algorithm named Ensembled Support Vector Machine Random Forest-based Hybrid Red Fox Flow Direction (HRFFD-ESVMF) algorithm to balance energy consumption and communication cost, thereby improving system parameters to arrange the task.

The significant contribution of the paper is deliberated hereinafter.

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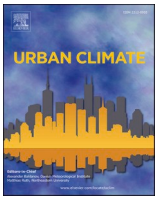

Determination of water quality indicator using deep hierarchical cluster analysis

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ARTICLE INFO

Keywords:
Water quality
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Contaminants
Industrial zones
Clustering
Hydrochemical

ABSTRACT

The past decade has seen notable impact of man on the environment due to first-time increase in population and rapid rate of urbanization with the strengthening and development in agricultural practices. This has lead to progressive and frequent degradation of resources especially ground water. In this paper, we study the features of ground water from the industrial zones around Chennai. The research aims to understand the factors influencing the water quality parameters and determines the water quality index (WQI). To examine whether or not the data on the water quality can be categorized into hydrochemical groups, a hierarchical cluster analysis (HCA) is utilized. The groundwater samples were divided up into significantly distinct subsets by the use of hierarchical cluster analysis. The water standards are considered as inputs to determine the groundwater vulnerability and ranks are determined based on the decision variables. The simulation is conducted form the input collected data using python simulator, and the results are tested in terms of determining the accuracy of classifying the water quality samples. The findings demonstrate that the suggested strategy finds the WQI in the industrial zones with a greater rate of accuracy.

1. Introduction

Water is the resource that is believed to be the most essential when it comes to the maintenance of human life. This is true not only in terms of the consumption of water but also in terms of the cultivation of plant life. As a result of the fact that the quality of the water has an effect on a wide range of elements, such as the soil, agriculture, and the environment, maintaining a high level of water quality is critical to maintaining both the health of people and the integrity of the food supply. The hydrochemical analysis that serves as the primary support the main source of assistance for the assessment of the water quality (Zhi et al., 2021). The World Health Organization (WHO) has made guidelines about the quality of water that should be drank in order to preserve the health of all people. Nitrate and other agricultural chemicals should have a value that is lower than 50 mg per liter, as this is the recommended maximum safe level

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Characterizing Graphs with Nullity $n-4$

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Abstract

The nullity of a graph G, denoted by $\eta(G)$, is the multiplicity of the eigenvalue zero in the spectrum of G. A unified approach is presented for the characterization of graphs of order n with $\eta(G) = n-4$. All known results on trees, unicyclic graphs, bicyclic graphs, graphs with minimum degree 1, and r-partite graphs, for which $\eta(G) = n-4$ are shown to be corollaries of a theorem of Chang, Huang and Yeh that characterizes all graphs with nullity $n-4$.

1 Introduction

Let $G = (V, E)$ be a finite connected simple undirected graph. Its order $|\mathbf{V}|$ and size $|\mathbf{E}|$ are denoted by n and m, respectively. For additional

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Network Based Detection of IoT Attack Using AIS-IDS Model

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Abstract
In recent days Internet of Things attained more familiarity. Although it is a promising technology, it tends to lead to a variety of security issues. Conventional methods such as IoT ecosystem based solutions were not suitable to give dilemmas to the system. A new system model called adaptive and intelligent Artificial Immune System (AIS) imitates the process of human being an immune system that consists of eligible properties of this varying environment. Therefore, it enhanced IoT security. Conventionally classifiers such as Random Forest Classifier, Recurrent Neural Network and K-nearest neighbours are used to classify the signals as normal or abnormal and predict malicious attacks. But unfortunately, these classifiers generated a high false alarm rate. Thus, a framework with maximum accuracy and minimum false alarm rate was required. In this work, the AIS model adopts the benefits of the Hopfield Neural Network (HNN) for classification. HNN classifier has a fixed weight, as it cannot be changed for its backpropagation property. This work optimally selects the fixed weight using Fast- Particle Swarm Optimization (F-PSO) and helps to enhance the accuracy of the HNN classifier. This classifier model then differentiates IoT attacks with a high detection rate and normal signal. Three datasets are taken to execute the proposed model and define its accuracy. The proposed Artificial Immune system using HNN for Intrusion Detection System (AIS-IDS) model exhibits 99.8% accuracy for the first dataset and minimum error value. The false alarm rate was minimized using danger theory and its high activation function; thus, the false alarm rate was minimized by up to 8% more than previous classifiers.

Keywords Artificial immune system (AIS) · Hopfield neural network (HNN) · Fast-particle swarm optimization (F-PSO) · IoT attack · False alarm rate

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Multivariate Congestion Prediction using Stacked LSTM Autoencoder based Bidirectional LSTM Model

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Abstract

In intelligent transportation systems, traffic management is an important task. The accurate forecasting of traffic characteristics like flow, congestion, and density is still active research because of the non-linear nature and uncertainty of the spatiotemporal data. Inclement weather, such as rain and snow, and other special events such as holidays, accidents, and road closures have a significant impact on driving and the average speed of vehicles on the road, which lowers traffic capacity and causes congestion in a widespread manner. This work designs a model for multivariate short-term traffic congestion prediction using SLSTM_AE-BiLSTM. The proposed design consists of a Bidirectional Long Short Term Memory(BiLSTM) network to predict traffic flow value and a Convolutional Neural network (CNN) model for detecting the congestion status. This model uses spatial static temporal dynamic data. The stacked Long Short Term Memory Autoencoder (SLSTM AE) is used to encode the weather features into a reduced and more informative feature space. BiLSTM model is used to capture the features from the past and present traffic data simultaneously and also to identify the long-term dependencies. It uses the traffic data and encoded weather data to perform the traffic flow prediction. The CNN model is used to predict the recurring congestion status based on the predicted traffic flow value at a particular urban traffic network. In this work, a publicly available Caltrans PEMS dataset with traffic parameters is used. The proposed model generates the congestion prediction with an accuracy rate of 92.74% which is slightly better when compared with other deep learning models for congestion prediction.

Keywords: Autoencoder, Bidirectional LSTM, Convolutional neural network, Congestion prediction, Spatio-temporal data, traffic flow forecasting.

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Anomaly Detection in Social Media Texts Using Optimal Convolutional Neural Network

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Abstract: Social Networking Sites (SNSs) are nowadays utilized by the whole world to share ideas, images, and valuable contents by means of a post to reach a group of users. The use of SNS often inflicts the physical and the mental health of the people. Nowadays, researchers often focus on identifying the illegal behaviors in the SNS to reduce its negative influence. The state-of-art Natural Language processing techniques for anomaly detection have utilized a wide annotated *corpus* to identify the anomalies and they are often time-consuming as well as certainly do not guarantee maximum accuracy. To overcome these issues, the proposed methodology utilizes a Modified Convolutional Neural Network (MCNN) using stochastic pooling and a Leaky Rectified Linear Unit (LReLU). Here, each word in the social media text is analyzed based on its meaning. The stochastic pooling accurately detects the anomalous social media posts and reduces the chance of overfitting. The LReLU overcomes the high computational cost and gradient vanishing problem associated with other activation functions. It also doesn't stop the learning process when the values are negative. The MCNN computes a specified score value using a novel integrated anomaly detection technique. Based on the score value, the anomalies are identified. A Teaching Learning based Optimization (TLBO) algorithm has been used to optimize the feature extraction phase of the modified CNN and fast convergence is offered. In this way, the performance of the model is enhanced in terms of classification accuracy. The efficiency of the proposed technique is compared with the state-of-art techniques in terms of accuracy, sensitivity, specificity, recall, and precision. The proposed MCNN-TLBO technique has provided an overall architecture of 97.85%, 95.45%, and 97.55% for the three social media datasets namely Facebook, Twitter, and Reddit respectively.

Keywords: Anomaly detection; convolutional neural network; social networking sites; stochastic pooling; teacher learner-based optimization

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Control of pests and diseases in plants using IOT Technology

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ARTICLE INFO

Keywords:
Smart agriculture
Crop monitoring
Pesticides
Simulation framework
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ABSTRACT

The term "smart agriculture" describes how farming is carried out in the modern day as technology develops. Application of diverse insect protection and agricultural production tactics is crucial for crop monitoring. The structure as it is now has problems. A particular core Graphical Processing Unit (GPU) is used to manage the numerous sensors connected for crop surveillance and pest management. A Parallel and Distributed Simulation Framework (PDSF) with the Internet of Things (IoT) is proposed for pest management and agricultural monitoring tools. It lessens the pressure on a certain GPU, evenly distributes the workload over all available GPUs at simultaneously, and delivers data to the dashboards even when it's broken. The procedure will decrease system performance. In the PDSF multi-threading paradigm, each GPU unit distributes workloads to specific additional cores. To carry out the various tasks, the four levels of this system—crop management, pest identification and control, output activities, and input functional areas—are distributed among them. The information is processed simultaneously and handled in an efficient and controlled manner. The proposed system improves the performance measures of 98.65%.

1. Introduction

The IoT has revolutionized not just how we live our lives but also how we operate. The adoption of IoT is growing quickly across many industries, whether it be agricultural, safety, or healthcare [1]. IoT with robotics and artificial intelligence will increase the complexity of commercial farms while reducing manual workers from 90% to 10%. One of the world's major scientific efforts in agriculture is thought to be happening in India [2]. Agricultural growth has advanced as a result of numerous advancements in modern technology and creativity. Previous research has examined the application of contemporary methods in the agricultural industry, including IoT, sensors, cloud services, mobile computing, and big data analysis [3,4]. According to Ref. [5], a study on an IoT-based process in the context of agriculture, the outcomes were remarkable. The efficiency increased slightly, and what had previously been a human-intensive industry like agriculture has become more scientific [5].

There are numerous different sorts of equipment and machinery on the market today that weren't there in the early 1920s. In-field surveillance and mechanization in the agriculture industry decrease human work and show being helpful [6]. A remote monitoring system that relies on the detection of leaf diseases for detecting precipitation, warmth, and saturation, they utilized sensor networks [7]. Placed detectors around the fields, and the Raspberry PI (RPI) were utilized to manage them all. When a sensor and RPI are interfaced, leaf illness can be identified. Farmers are immediately informed of the condition of a field, such as plant diseases or crop-affecting factors like dryness, warmth, and wetness, via a WiFi host using RPI [8]. The scientists aimed to develop a three-level, robotized process that locates the location of plant disease using IoT. The framework was designed utilizing sensors, including those that measure temperature, moisture, and lighting [9].

For this research, the IoT-node network model was created. Every IoT system interacts with information with the developed framework [10]. It can interact with non-standard items as well, demonstrating effective communication dependability even under challenging circumstances. IoT-node creates a robust platform that meets the

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Predictions of confirmed and death caused by COVID-19 in India

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Abstract---COVID-19 is spreading within the sort of a massive epidemic all over the world. This epidemic affects a lot of individuals in India. The World Health Organization states that COVID-19 could be spread from one person to another at a rapid manner through contact and respiratory spray. On these days, India and all countries worldwide should rise to an effective step to investigate this disease and eliminate the effects of this epidemic. The proposed work presents about the detailed forecasting model and prediction of the number of confirmed, recovered, and death cases in India caused by COVID-19 using machine learning algorithms. The multiple linear regressions and correlation coefficients have been applied for prediction and auto-correlation and auto-regression have been used to improve the accuracy.

Keywords---COVID-19, machine learning, linear regression, prediction, correlation.

Introduction

COVID-19 is a most infectious respiratory disease caused by one of the coronavirus family members, has led to a pandemic situation worldwide in 2020.

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Research Article

An Improved Machine Learning Model for Diagnostic Cancer Recognition Using Artificial Intelligence

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In the medical field, some specialized applications are currently being used to treat various ailments. These activities are being carried out with extra care, especially for cancer patients. Physicians are seeking the help of technology to help diagnose cancer, its dosage, its current status, cancer classification, and appropriate treatment. The machine learning method developed by an artificial intelligence is proposed here in order to effectively assist the doctors in that regard. Its design methods obtain highly complex cancerous inputs and clearly describe its type and dosage. It is also recommending the effects of cancer and appropriate medical procedures to the doctors. This method ensures that a lot of doctors' time is saved. In a saturation point, the proposed model achieved 93.31% of image recognition, 6.69% of image rejection, 94.22% accuracy, 92.42% of precision, 93.94% of recall rate, 92.6% of F1-score, and 2178 ms of computational speed. This shows that the proposed model performs well while compared with the existing methods.

1. Introduction

There are a lot of very complex and unsolvable problems in the medical world today and delays in the treatment of certain diseases and their treatment due to low accuracy from diagnosis to calculation. Cancerous tumors are currently the most important of these diseases. Statistics warn that 8 lakh people are newly diagnosed with cancer every year in India alone [1]. If a small tumor appears on the body, the suspicion that it is a cancer will haunt the mind. Many

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Mule: Multiclass Email Classification for Forensic Analysis Using Deep Learning

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Abstract

In the early 1990s of the previous centuries, as the Internet gained popularity, electronic mail grew to be a crucial means of communication. A typical user now keeps 50% of their vital data in e-mail storage, which has increased over time. Proactive data analysis is required to thwart cyber-attacks and crimes in order to interfere with cyber operations and services. Investigators now face the enormous challenge of extracting the necessary semantic information from the volume of e-mails, which is delaying the investigation process due to the continuing expansion of data communicated via e-mails. Analysis of the email's header and body is necessary to categorize the email in order to conduct email-related crime investigations. The current keyword-based approaches and filtration produce only brief emails that omit important information. We suggested a Long-Short Term Memory (LSTM) for multiclass email classification to get around the aforementioned restriction. This method is applicable to both short and large sequences of more than 1000 characters. To achieve the optimum performance, this technique concentrates on fine-tuning LSTM parameters. In this project, we created a brand-new, effective method for email classification called "E-mailSinkAI." The LSTM effectively extracts useful data from email that can be utilized as evidence in forensic investigations.

Keywords: Deep learning, multiclass e-mail classification, artificial intelligence, and cybersecurity.

1. INTRODUCTION

Electronic mail is referred to as "email." It is a technique for sending messages from one computer to another across the internet. Business, education, technical communication, and document interaction are the main industries where it is used. It makes it possible for people to converse privately all over the world. Emails are sent through email servers, which employ a number of TCP/IP protocols. For instance, IMAP and POP are used to retrieve messages from a mail server, but SMTP, which stands for simple mail transfer protocol, is used to send

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Detection and Classification of Covid-19 on X-Ray Images using Convolutional Neural Network

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Abstract:
The enduring COVID-19 outbreak has placed the world's healthcare systems on edge. To stop the spread of an epidemic or pandemic, prompt and accurate detection is always preferred. Medical imaging techniques have demonstrated excellent potential for more rapid and effective disease transmission control and containment. It is generally known that X-ray imaging and chest computed tomography (CT) are two efficient methods for diagnosing clinical COVID-19 disease. For effective diagnosis, assessment, and therapy, identifying COVID-19 in chest X-Ray (CXR) pictures is favored due to the quicker imaging time and significantly lower cost compared to CT. However, because COVID-19 and pneumonia share many similarities, CXR samples with deep features distributed close to category boundaries are easily misclassified by hyperplanes learnt from sparse training data. In the planned study, patients with COVID-19 and pneumonia will be reliably identified using X-rays, one of the medical imaging modalities used to assess the patient's inflammation. For the detected dataset, the appropriate deep convolutional neural network model is chosen. On the real-world dataset of chest X-ray images, the algorithm can identify COVID-19 patients and patients with pneumonia. For several categories including Normal, COVID-19, and Pneumonia, images are preprocessed and trained. By choosing the right features from photos in each dataset after preprocessing, the disease is detected. The outcome indicates that COVID-19 vs. Normal and COVID-19 vs. Pneumonia were accurately detected. Since ResNet-50 has performed exceptionally well in a number of medical imaging applications, it is used in this situation.

Keywords*:* Deep learning, Coronavirus disease (COVID-19) recognition, ResNet-10, Convolutional Neural Network (CNN), Medical Imaging techniques

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Performance Evaluation of Multilayer Clustering Network Using Distributed Energy Efficient Clustering with Enhanced Threshold Protocol

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Abstract
In this research, pure deterministic system has been established by a new Distributed Energy Efficient Clustering Protocol with Enhanced Threshold (DEECET) by clustering sensor nodes to originate the wireless sensor network. The DEECET is very dynamic, highly distributive, self-confessed and much energy efficient as compared to most of the other existing protocols. The MATLAB simulation provides aim proved result by means of energy dissipation being emulated in the networks lifespan for homogeneous as well as heterogeneous sensor network, which when contrasted for other traditional protocols. An enhanced result has been obtained for equitable energy dissipation for systematized networks using DEECET.

Keywords WSN · DEEC · DEECET · Cluster head · Energy efficient algorithms · Clustering energy

1 Introduction

WSN is mostly recognized as an area, having small shape and simple sensing hardware devices called as wireless sensing nodes. These sensor nodes can senses the area and collects information data from these fields and transferred via wireless links. Data gathered is delivered through different hops towards sink (the base station and also called as controller) being used had locally as well as in the different networks [1–3]. Hence, creating the model for these type networks required full focus on the power consumption and network lifespan. Low cost and low power consumption are the basic requirement of sensor nodes . Therefore these hardware have so many constraints specially data gathering. Hence it is a necessary to search effective protocol for data aggregation [4, 5]. From all these issues, capacity of batteries is very important parameter in the construction of wireless sensor network models. The substitution of set of batteries is difficult, when the nodes are connected. Every sensor has limited power of battery and accordingly, the battery reinstatement cells are not possible. The constraint of

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3-Dimensional Manifold and Machine Learning Based Localization Algorithm for Wireless Sensor Networks

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Accepted: 11 February 2021

Abstract
The minimized amount of Localization accuracy is one of the common issues in Wireless sensor networks. The determination of unknown nodes in a network needs good localization approach. This paper proposes a 3-dimensional Manifold and Machine Learning based Localization algorithm for providing the solution to the localization problem. The Machine Learning uses to identify the faulty nodes in the network for better efficiency and computes the optimal solution to the real-time localization problems in WSNs. The mobility model is deployed within the sensor node and the sensor node is computed to estimate the position of the sensor node. This technique is utilized to identify the position of the unknown nodes according to the transmission range. Machine Learning technique utilizes to identify the faulty nodes from the sensor nodes for obtaining the maximum efficiency. RMSE is used to measure the errors for providing better accuracy and also increase the level of quantization for WSN localization approach. The simulation results prove that the proposed technique has high accuracy, reduced energy consumption compared with the relevant techniques.

Keywords Localization · Manifold · Transmission range · Accuracy · Energy consumption · Machine learning

1 Introduction

The wireless communication utilizes the wireless sensor networks (WSNs) that consists of a huge amount of sensor nodes to provide the self-organizing network with multi-hop transmission, the common functionality of the WSN is to discover the location data [1]. The unknown nodes are randomly deployed within the transmission area and they are unable to locate individually, but need to locate individually, but need to locate through the localization approach. Normally, the localization of the sensor nodes could be classified as the transmission range based classification and transmission range-free localization procedures [2].

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ORIGINAL ARTICLE

Diagnosis and combating COVID-19 using wearable Oura smart ring with deep learning methods

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Abstract
Since the coronavirus (COVID-19) outbreak keeps on spreading all through the world, scientists have been crafting varied technologies mainly focusing on AI for an approach to acknowledge the difficulties of the epidemic. In this current worldwide emergency, the clinical business is searching for new advancements to screen and combat COVID-19 contamination. Strategies used by artificial intelligence can stretch screen the spread of the infection, distinguish highly infected patients, and be compelling in supervising the illness continuously. The artificial intelligence anticipation can further be used for passing dangers by sufficiently dissecting information from past sufferers. International patient support with recommendations for population testing, medical care, notification, and infection control can help fight this deadly virus. We proposed the hybrid deep learning method to diagnose COVID-19. The layered approach is used here to measure the symptom level of the patients and to analyze the patient image data whether he/she is positive with COVID-19. This work utilizes smart AI techniques to predict and diagnose the coronavirus rapidly by the Oura smart ring within 24 h. In the laboratory, a coronavirus rapid test is prepared with the help of a deep learning model using the RNN and CNN algorithms to diagnose the coronavirus rapidly and accurately. The result shows the value 0 or 1. The result 1 indicates the person is affected with coronavirus and the result 0 indicates the person is not affected with coronavirus. X-Ray and CT image classifications are considered here so that the threshold value is utilized for identifying an individual's health condition from the initial stage to a severe stage. Threshold value 0.5 is used to identify coronavirus initial stage condition and 1 is used to identify the coronavirus severe condition of the patient. The proposed methods are utilized for four weighting parameters to reduce both false positive and false negative image classification results for rapid and accurate diagnosis of COVID-19.

Keywords Machine learning · Image acquisition · COVID-19 · Diagnosis · Drug · Artificial intelligence

1 Introduction

The quickly advancing COVID-19 infection epidemic has drastically altered everybody's life everywhere in the world. The fatal spread to in excess of 150 nations has profoundly beeb seen leading to more than 22 million confirmed cases and 780,000 deaths globally as of the third week of August (Aug. 19, 2020) [1, 2]. Compared to the statistics in mid-

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A power quality detection and classification algorithm based on FDST and hyper-parameter tuned light-GBM using memetic firefly algorithm

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IEEE-1159 standard

ABSTRACT

Presently, the issue of power quality (PQ) disturbances in electrical power system has been greater than before owing to increased use of power electronics based nonlinear loads. This work has proposed a hybrid PQ detection and classification algorithm that uses fast-discrete-S-transform (FDST) as feature extraction (FE) technique and memetic firefly algorithm (MFA) based Light-gradient-boost-machine (LGBM) as a classifier. In general, 25 types of PQ signals, comprising both single and multiple disturbances, are studied considering the IEEE-1159 standard. A 3.2 kHz sampling frequency is used on ten cycles of distorted waveforms for the FE. The experimental results clearly proves the effectiveness of the proposed approach with high detection accuracy (99.714% with synthetic data and 99.66% with simulated data), less computational complexity and immune to noisy environments. To end, this work has performed a comparative study with other contemporary FE techniques and classifiers, and in addition with other previously published work.

1. Introduction

1.1. Motivation and incitement

The primary concern of electrical utility customers is the reliability and quality of the electricity supply. The term electric power quality (EPQ) broadly refers to maintaining a sinusoidal power distribution bus voltage at rated magnitude and frequency [1]. Due to the advancement and development of the electrical utility industry, the application of power electronic equipment has been increased correspondingly which is the main source to disturb the 'quality of supply' or 'power quality (PQ)' [2]. The basic PQ problems or PQ disturbances (PQDs) are voltage sag, voltage swell, voltage interruption, harmonics, flicker, and notches, etc. Moreover, a combination of these disturbances can also appear simultaneously. Therefore, the effective detection and recognition of PQDs are important for ensuring the reliability and improvement of EPQ.

1.2. Literature review

Several intelligent methods for automatic recognition of PQDs are reported in the literature [3,4]. In general, these intelligent methods execute their tasks of automatic PQDs recognition in three basic steps: (i) signal assessment and feature extraction (FE); (ii) selection of best suited

Abbreviations: EPQ, Electric power quality; PQ, Power quality; PQD, Power quality disturbance; FE, Feature extraction; STFT, Short-time Fourier transform; WT, Wavelet transform; ST, S-transform; LGBM, Light-gradient boost machine; MFA, Memetic firefly algorithm; FDST, Fast discrete s-transform; EMD, Empirical mode decomposition; HHT, Hilbert Huang transform; ANN, Artificial neural networks; SVM, Support vector machine; DT, Decision tree; KNN, K-nearest neighbor; ELM, Extreme machine leaning; MAT, maximum amplitude versus time; MAF, maximum amplitude versus frequency; XGBM, Extreme Gradient Boosting Machine; GOSS, Gradient-based One Side Sampling; EFB, Exclusive Feature Bundling; η, General parameter; Λ, regularization parametr; $\ell(\cdot)$, loss function; $\hat{y}_j$, predicted class; y_j, original class; f_i, fitness.

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RESEARCH ARTICLE

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License plate recognition using neural architecture search for edge devices

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Abstract

The mutually beneficial blend of artificial intelligence with internet of things has been enabling many industries to develop smart information processing solutions. The implementation of technology enhanced industrial intelligence systems is challenging with the environmental conditions, resource constraints and safety concerns. With the era of smart homes and cities, domains like automated license plate recognition (ALPR) are exploring automate tasks such as traffic management and fraud detection. This paper proposes an optimized decision support solution for ALPR that works purely on edge devices at night-time. Although ALPR is a frequently addressed research problem in the domain of intelligent systems, still they are generally computationally intensive and unable to run on edge devices with limited resources. Therefore, as a novel approach, we consider the complex aspects related to deploying lightweight yet efficient and fast ALPR models on embedded devices. The usability of the proposed models is assessed in real-world with a proof-of-concept hardware design and achieved

Abbreviation: ABC, a black cat; DEF, does not ever fret; GHI, goes home immediately.

Jithmi Shashirangana and Heshan Padmasiri contributed equally to this work.

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Investigation of digital video broadcasting application employing the modulation formats like QAM and PSK using OWC, FSO, and LOS-FSO channels

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KEYWORDS

FSO;
Quality factor;
LOS-FSO;
OWC;
QAM;
PSK;
Bit error rate;
Bandwidth

Abstract The optical communication system is preferred over microwave and radio frequency communication systems because of license free operation. Simulative analysis of 10gbps bandwidth using different optical communication channels have been performed in this paper. The different modulation formats of QAM and PSK have been compared for its performances under all the three optical channels OWC, FSO, and LOS-FSO which are an unguided form of optical communication. The optical channels under these modulation formats are extensively used in Digital Video Broadcasting Communication. The parameters such as Q-factor, BER and Eye height can be obtained by varying the wavelengths in the range of 850 nm 1064 nm, 1330 nm and 1550 nm. From the design and performance analysis, the system with the maximum Q-factor and minimum BER can be found for the wavelength of 1064 nm.

1. Introduction

Free Space Optical (FSO) transmission is an optical correspondence skill that exploits light spreading in free space to transmit data for communication interchanges remotely. Free space infers air, space, vacuum, or something like air.

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EESSMT: An Energy Efficient Hybrid Scheme for Securing Mobile Ad hoc Networks Using IoT

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Accepted: 1 August 2021

Abstract
Mobile ad hoc networks are attaining popularity to its highest currently, as the users need wireless connectivity regardless of their geographical location. Threats of security attacks are growing on the Mobile Ad-hoc Networks (MANETs). MANETs must require a secure mode for communication and transmission which is rather challenging and vigorous issue. With the aim of providing secure transmission and communication, researcher worked explicitly on the security concerns in MANETs. Several secure protocols and security methods within the networks were projected but utmost of the security measures in their designs are not ruminated. Hence, a novel scheme is proposed in this paper for the secure and reliable data transmission in MANETs under black hole attack constructed on amended Ad hoc On-demand Multipath Distance Vector (AOMDV) protocol of our base scheme. This paper comprises AOMDV protocol for the multiple route discoveries along with K-Nearest Neighbor (KNN) for nearest neighbor node selection and use False key-build Advanced Encryption Standard (FAES) encryption scheme for cryptography method. FAES algorithm is used with the aim of securing the IoT devices and data from the hardware and network attacks. Also, the interaction of the scheme with the IoT based concepts making our work even smarter to the users. The proposed scheme performance is stable with higher throughput while that of base scheme. The quality of the proposed scheme is measured in terms of energy consumption, EE-delay and throughput. The results of simulation show that the Variance, EE-delay, energy consumption and throughput of proposed FAES-AOMDV protocol is lower than the original AOMDV protocol. FAES-AOMDV protocol ensures the secure transmission of data with least energy consumption in the presence of malicious nodes.

Keywords Mobile ad hoc network security · Internet of Things · Black hole attack · False key-build AES · K-nearest Neighbor

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Title : DEEP LEARNING TECHNIQUE FOR IDENTIFYING REPLAY-ATTACKS IN A FACE LIVENESS SYSTEM

M.SwarnaSudha1, S.Manjula2, A.Vaishnavi3

Abstract :

Face has recently attracted more attention in a number of fields because to its security features and its simplicity of use. Face-based biometric technologies are widely used in various person identification applications. This is due to the fact that human faces are the most easily identifiable features from day-to-day living and also store the most information. However, despite ongoing attempts to spoof faces, facial recognition systems continue to be vulnerable to attack. The act of damaging or attacking a face recognition system by gaining unauthorized access to the system and exploiting security holes is known as spoofing. This may be accomplished by getting into the system without the agreement of an authorized user. The act of damaging or attacking a face recognition system by gaining unauthorized access to the system and exploiting security holes is known as spoofing. This may be accomplished by getting into the system without the agreement of an authorized user. Attacks that involve faking one's visage provide a persistent risk to face-recognition systems. Our goal is to create a system that will put an end to face spoofing, despite the fact that academics have created a variety of face spoofing detection approaches that have demonstrated to be highly effective. Anyone is capable of fooling a facial recognition system by uploading fake photos or videos of themselves, or by employing some other decoy to stand in for an authorized user's face. The proposed work, which is based on an algorithm for a deep neutral network, suggests the real spoofing prevention method by assessing the liveness of the face. Additionally, it offers defense against spoofing attacks such as image masks, replay assaults, print photo assaults, and mobile photo assaults. The technique has a success rate of 99%, particularly when applying the convolutional neural network (CNN) algorithm. In facial recognition systems, the primary goal is to accurately differentiate between real and fake faces using the CNN approach. This is done to improve accuracy.

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RECOMMENDATION OF CROP AND FERTILIZER ROTATION TIMING TO ENHANCE THE YIELD OF CROP

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Abstract

Tamil Nadu, as a continental shelf, is currently confronted with a number of agricultural uncertainties that have a negative impact on its productivity. These is a vast growth in population we are in need to improve the yield of crop productivity. Due to the drastic climatic changes, farmers cannot expect the monsoon in the exact time. Prediction of rainfall also impacts the yield of crop productivity. In the current situation, it is desirable to have the ability to apply modern technical methods in the sector of agriculture. The majority of contemporary approaches are inefficient and expensive. In the present scenario, machine learning techniques help us to generate forecasts by creating a well-defined model from existing data. As a result, farmers can manage agricultural concerns such as crop forecast, rotation, water requirements, fertilizer requirements, and protection by employing these models. Due to the environments fluctuating climatic elements, it is necessary to have an efficient technique to aid crop cultivation and assist farmers in their production and management. This strategy may assist inexperienced farmers in increasing their agricultural yields. Machine learning techniques can be used to offer a farmer with a model of recommendations to assist them in choosing the most appropriate crop farming for a specific region. We present a machine learning-based agricultural yield prediction system based on the K-Nearest Neighbor (KNN). The work of the proposed system is organized in to three phases: 1. In the first phase, in order to select the most predominant features- the model initially performs an efficient pre-processing technique by KNN. 2. In the second phase, the features selected are fed as an input to the KNN for further processing. 3. In the final phase the proposed K-Nearest Neighbor (KNN) algorithm is analyzed by comparing it with other Machine learning algorithms.

Keywords: Machine Learning, Crop Prediction, KNN, Euclidean distance

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Research Article

On γ-free, γ-totally-free and γ-fixed sets in graphs

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Abstract: Let $G = (V, E)$ be a connected graph. A subset S of V is called a γ-free set if there exists a γ-set D of G such that $S \cap D = \emptyset$. If further the induced subgraph $H = G[V - S]$ is connected, then S is called a *cc*-γ-free set of G. We use this concept to identify connected induced subgraphs H of a given graph G such that $\gamma(H) \leq \gamma(G)$. We also introduce the concept of γ-totally-free and γ-fixed sets and present several basic results on the corresponding parameters.

Keywords: Domination, domination number, γ-set, γ-free set, γ-totally-free set, γ-fixed set

AMS Subject classification: 05C69

1. Introduction

By a graph $G = (V, E)$, we mean a finite, undirected and connected graph with neither loops nor multiple edges. For graph theoretic terminologies we refer to [1]. For domination related concepts we refer to [2].
A subset S of V is called a dominating set of G if every vertex in $V - S$ is adjacent to a vertex in S. The domination number γ of G is the minimum cardinality of a dominating set of G. A dominating set S of G with $|S| = \gamma$ is called a γ-set of G. A

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Department of Electrical and Electronics Engineering – Journal Publications

1. Arun Kumar, A, Veerayan, M.B., Kannan S, **Multi-Objective Based Generation Expansion Planning for Utility Power System of Tamil Nadu State Considering Recuperation of Older Power Plants** (2023) *Electric Power Components and Systems*, **DOI:** 10.1080/15325008.2023.2220317 **(SCI wth IF: 1.276)**
2. Rajasekaran, S., Suresh, S., Karthikeyan, K., Bhuvanesh, A. **Implementation of an A-Source DC–DC Boost Combination Phase-Shifting Full-Bridge Converter for Electric Car Rapid Charging Applications** (2023) *Journal of Electrical Engineering and Technology*, . **DOI:** 10.1007/s42835-023-01382-6 **(SCI with IF: 1.528)**
3. Rajasekaran, S., Suresh, S., Ramkumar, A., Karthikeyan, K.**A Novel Solar Photovoltaic Integrated Modified SEPIC High Gain DC–DC Converter Using Evolutionary Algorithms for Electric Vehicle Battery Applications**(2023) *Journal of Electrical Engineering and Technology*,**DOI:** 10.1007/s42835-023-01459-2**(SCI with IF: 1.528)**
4. Karthikeyan, K., Anitha, P., Kumar, K.K., Kamaraja, A.S. **Smart Emergency Charging of Electric Vehicle with Solar PV-based Backstepping Model-Free and critic RL Control Structure** (2023) *Control Engineering and Applied Informatics*, 25 (1), pp. 69-78. **(SCI with IF: 1.299)**
5. Karunanithi, K., Ramesh, S., Raja, S.P., Sreedhar, R., Kannan, S., Ramudu, V. **Investigations of standalone PV system with battery-supercapacitor hybrid energy storage system for household applications** (2023) *International Journal of Information Technology (Singapore)*, 15 (1), pp. 279-287. (Scopus)
6. Deepa Lakshmi, B., Rajendran, R.S., Suthakorn, J., Pillai, B.M. **Impact of CIGS, CdS and i – ZnO film thickness, temperature on efficiency enhancement of CIGS solar cells** (2022) *Journal of Ceramic Processing Research*, 23 (6), pp. 878-883. **(SCI with IF: 0.636)**
7. Deepa, S., Alexprabu, S.P., Karthik Prabhu, D., Hudedmani, M.G., Eedara, G. **Development of An Embedded Safety System For An Electric Vehicle** (2022) *Journal of Pharmaceutical Negative Results*, 13, pp. 1813-1824. (ESCI)
8. Jeyanthi S, Arun Kumar A, Muthu Rani M M , Rohini M I , Divya Jeyashree V, **IoT Based Food Waste Monitoring and Controlling System** (2023), *Journal of Pharmaceutical Negative Results*,14(3) pp. 586-591 (UGC/Others)
9. G. Praveen, R. Kaliraj, J. Abimanyu, E. Thangam,**LoRa Based Real-Time Electrical Substation Monitoring System**(2023), *International Journal of All Research Education and Scientific Methods* 11(4), pp 928-935
10. Thangam E, Anandhakumar C , Karthik Prabhu D , Meenakshi Sundaravel S , Vigneshwar A S**, Application Of An Automatic Three-Phase Power Supply Phase Selector In The Medical Ventilator**(2022), *Journal of Pharmaceutical Negative Results*, 13(7), pp

11. M. Muthu Krishnan, K. Sathya, E.Thangam,**An Intelligent System to Detect Faults and Condition Monitoring in Transformers** (2022),*International Journal of Advances in Engineering and Management* 4(6) pp: 1534-1544 (UGC/Others)
12. A.Arun Kumar, B.V. Manikandan, S. Kannan, A. Bhuvanesh, **Application of Cognitive Optimization Algorithms to Solve Generation Expansion Planning Problem by Considering the Recuperation for Aged Thermal Plants**, (2022) *NeuroQuantology*20(8) pp 7875-7887**(UGC/Others)**
13. Pullela Kumar, Asan Mohideen Khansadurai, Vrushali G. Raut,Dillip Narayan Sahu, A.S.Vigneshwar, A.Yasmine Begum,**Deep Learning-Based Anticipation of Driver Movement in Semi-autonomous Vehicles** (2022), *Interdisciplinary Journal of Neuroscience and Quantum Physics*, 20(10) pp 4485-4498 **(UGC/Others)**

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Research Article

Multi-Objective Based Generation Expansion Planning for Utility Power System of Tamil Nadu State Considering Recuperation of Older Power Plants

Arun Kumar Athiappan, Manikandan Bairavan Veerayan & Kannan Subramanian

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Abstract

Generation Expansion Planning (GEP) is a problem that comprises multiple contradictory features while planning to construct new generating units. It must be solved by considering cost, reliability and environmental emission. Hence the mathematical representations have been developed to be accurate, and to improve the understanding of the multifaceted and contradictory aspects of the GEP problem. In this study, the Multi-Objective Comprehensive Learning Particle Swarm Optimization

problem. The objectives such as minimization of overall cost, decrement of the pollutant emission and enhancement of reliability have been considered by considering the constraints. The real-world MOGEP problem has been solved for seven-year (from the year 2020 to 2027) and fourteen-year (from the year 2020 to 2034) planning span for the utility power system of Tamil Nadu state, India. The problem is solved for four different cases with the consideration of retirement and recuperation of the older generating units. coal, gas, oil, nuclear, hydel, wind, Solar-photovoltaic (SPV) and biomass power plants were considered in this planning study. The results establish the competence of MOCLPSO to produce well-spread Pareto optimal non-dominated solutions of the MOGEP problem.

Keywords: comprehensive learning particle swarm optimization recuperation generation expansion planning Tamil Nadu

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There is no authorship contribution.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

No participation of humans takes place in this implementation process.

HUMAN AND ANIMAL RIGHTS

No violation of Human and Animal Rights is involved.

Additional information

Notes on contributors

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ORIGINAL ARTICLE

Implementation of an A-Source DC–DC Boost Combination Phase-Shifting Full-Bridge Converter for Electric Car Rapid Charging Applications

S. Rajasekaran[1] · S. Suresh[2] · K. Karthikeyan[3] · A. Bhuvanesh[1]

Received: 14 August 2022 / Revised: 25 December 2022 / Accepted: 5 January 2023

Abstract
In this paper, a DC–DC boost converter is favored at the front ends of the usual power electronic converters for electric car rapid charging purposes utilizing Solar Photovoltaic System, which is included by a full-bridge converter with discontinuous switching designs. The influence of circuitry parasite adds substantially towards power dissipation and lowers efficiency. An effort is made on the overall system by incorporating the A-Source Boost Converter with the Phase Shifted Full Bridge Converters that improve performance with high conversion efficiency and minimize the impacts of network parasitic. The entire structure would be electronically managed, using efficient MPPT, including boosting techniques for solar conversions and zero voltage switching on the full-bridge conversion via comprehensive protective measures. The system's thermal design must be complete to ensure efficient power density. For optimal efficiency, the voltage stability transition is increased from Solar photovoltaic voltage of 25–75 VDC to start charging a rechargeable battery of 48 V with standard system parameters of (200–250) W is focused with an operating frequency of 15 kHz at the boosting stage but also 120 kHz at the full-bridge phase and is simulated using the MATLAB framework. The improved Incremental Conductance MPPT approach improves the system's photovoltaic performance. The 100 W experimental design is produced its technical performance in comparison and examined to demonstrate the technical significance of the suggested converter.

Keywords Continuous conduction cycle · Improved incremental conductance · Maximum power point method · Phase-shifted full-bridge conversion · A-Source boost converters · Zero voltage switching

1 Introduction

Despite escalating toxins produced by greenhouse gases emission from traditional fossil-fuel-powered cars, electric vehicles are gaining popularity because they're not yet more beneficial to the environment and perhaps less expensive than fossil fuel automobiles. Furthermore, regarding EVs, a high electricity on-board minimum-voltage DC–DC converters must transmit power from the high-voltage battery to electrical components and indeed the low-voltage battery [1]. Controlling but also suitable system strategy for such a Hybrids MMC topologies, consisting of a mixture of Full-Bridge with Half-Bridge components in converters divisions, like a power system stage of a back-to-back Modular Multilevel Converter, allowing operations at changeable Grid voltage with a configurable power factor [2]. Unique multiple-stage architecture with voltage control method focused with a dual bus enabling bidirectional isolation DC–AC power converters. A New

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ORIGINAL ARTICLE

A Novel Solar Photovoltaic Integrated Modified SEPIC High Gain DC–DC Converter Using Evolutionary Algorithms for Electric Vehicle Battery Applications

S. Rajasekaran[1] · S. Suresh[2] · A. Ramkumar[3] · K. Karthikeyan[4]

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Abstract
Using MPPT and the Improved Non-Dominated Sorting Genetics (NSGA-II/INSGA-II) algorithm method for constant switching with design optimization, this study prefers a solar photovoltaic incorporated dc to dc boosting converter at the front ends of the existing methodology of DC–DC converters for electric vehicles battery charging applications. According to the literature, the recognized converter architecture combined with traditional evolutionary computation like PSO and GA results in low voltage gain, circuits parasitic effects that lead to low conversion efficiency, excessive output side rippling contents, and subpar controller's performances. By combining the reconfigured SEPIC Converter (MSEPIC) with MPPT-based NSGA-II methodologies, an exertion is designed to improve the overall performance of the system. This improves load side performance in terms of conversion accuracy and greater voltage gain attributed to the impact of a coupled inductors, and minimizes the effects of circuit parasitic. The ideal gained constants generated by the suggested optimal solution lower the outputs side dc rippling contents. To achieve effective power density, the system's temperature layout should be finished. With basic process variables of (600–650) W is fixated with a controlling frequency of 15 kHz at the boosting phase and is designed to simulate using the MATLAB structure, the voltage stability transformation is improved from Solar photovoltaic voltage of 25 VDC to 75 VDC to start charging a battery pack of 48 V. The batteries' impedances is configured as an RC demand with serial capacities of 12 V and 7 Ah, respectively. The system's photovoltaic efficiency can be enhanced by the upgraded Incremental Conductance (IC) MPPT method. To show the technological importance of the recommended converter, a 100 W experimental design is created and its technical performances are contrasted and investigated.

Keywords Solar PV · Output voltage Gainer · RC (resistive and capacitive load) · Circuit parasites · Non-dominated Sorting Genetic Algorithm (NSGA-II) · Maximum Power Point Tracking (MPPT)

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Smart Emergency Charging of Electric Vehicle with Solar PV-based Backstepping Model-Free and critic RL Control Structure

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Abstract: Customers are now also worrying about restricting factors in the Electric Vehicle industry like battery life, charge station location, power grid capacity, restricted drive range, and slow battery charging. However, there is a rise in Electric vehicles and Emergency Solar-to-Electric Vehicle Battery Charger (SEBC) is recommended. It offers a practical way to charge Electric cars in critical situations. Based on the state of charge (SOC), capacities, and vital factors, the proposed smart charger can charge another Electric vehicle. Smart chargers can control Output voltages and immediately deliver current into an Electric vehicle. These qualities are achieved by the model-free non-linear integral. The Back-stepping controller (MF-NIBC) is used for managing battery charger Output voltage. By using the critic networks with the deep deterministic policy gradient (DDPG), the MF-NIBC controller is adjusted. Though many solutions to these limitations have been put forth, it offers low efficiency and minimum cost-effectiveness. Therefore, this study proposes a brand-new battery charger called the Emergency Solar-to-Electric Vehicle Battery Charger (SEBC). Last but not least, real-time experiments based on the OPAL-RT configuration to verify the viability and application of the suggested Solar-to-Electric vehicle battery charging features.

Keywords: Electric vehicle, Quick charger, Sliding mode controller, System learning, Dual Active Bridge.

1. INTRODUCTION

The transport industry is rapidly switching from gas-powered cars to electric vehicles due to the pollution produced by these vehicles and their influence on climate change (Iyer et al., 2018). The Electric vehicle encourages low Energy use and minimizes carbon emission (Fuinhas et al., 2021; Gryparis et al., 2020). Yet, it includes the battery's life span, speed of the charger, and access to the station for charging and the Electric vehicle industry usage is constrained by costs and travel lengths (Asna et al., 2021; Tu et al., 2019). The restricted range of EVs is the most important obstacle to their broad adoption (Krishna, 2021). People are concerned about their Electric Vehicle's battery running out while on long trips in places with no charging options.

To handle this, charging spots have been installed in both city and country areas. Yet, it is not enough to serve all EVs and these charging points are scant and somewhat apart in rural regions. Additionally, it is not cost-efficient (Sheng et al., 2021). Using this technique, EVs can assist one another by sharing 5–15 percent of the charge in their batteries in a critical situation. But, battery-specific details like charge condition, Voltages, current, capacities, and charging time are essential to assuring a secure and convenient system. Notably, the charger and charging procedure should have been made more reliable. By using smart controller, it can be accomplished.

Some control strategies include Model prediction controller (MPC) (Li et al., 2019), slide mode controller (SMC) (Ahmed et al., 2021; Mallik et al., 2018), Active Disruption Rejections Controller (ADRC) (Aboudrar et al., 2020), Backstepping controller (Song et al., 2021), and Long Short-Term Memory (LSTM) neural networks (Chang et al., 2021), have been devised by modern researchers for use with EV chargers. However, the majority of powerful controllers necessitate an in-depth recognition of the system model. These techniques are incapable of correctly stabilizing the Electric Vehicle charger when variability and unmodeled dynamics occur. To address this issue, Model-free Backstepping control can be used on systems without defining the model (Younes et al., 2016). Also, it includes certain parameters and it is developed using a variety of techniques, such as fuzzy logic, Meta heuristic algorithm, and neural network Zeitouni et al., 2020; (Gheisarnejad & Khooban, 2019) Wu et al., 2021). In(Precup et al., 2022), the iterative Feedback Tuning, Intelligent PID Controllers, Model-Free Sliding Mode Controllers, Model-Free Adaptive Controllers, Hybrid Model-Free and Model-Free Adaptive Virtual Reference Feedback Tuning controllers and Hybrid model-free and model-free adaptive fuzzy controllers were used for tuning process which was observed and studied. This procedure deals with the structural, operational, and behavioral components of the company, perceived as an intricate dynamic system, suggesting a design and administration technique modeled after the human brain,

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ORIGINAL RESEARCH

Investigations of standalone PV system with battery-supercapacitor hybrid energy storage system for household applications

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Abstract In this paper, a standalone Photovoltaic (PV) system with Hybrid Energy Storage System (HESS) which consists of two energy storage devices namely Lithium Ion Battery (LIB) bank and Supercapacitor (SC) pack for household applications is proposed. The design of standalone PV system is carried out by considering the average solar radiation of the selected city. During the frequent load variation conditions, the Supercapacitor can discharge its energy since it can discharge high current with less time and during constant load condition LIBs take care of supplying required energy to the load. In this system, P&O algorithm is used for Maximum Power Point Tracking (MPPT) to achieve higher efficiency. MATLAB-Simulink is used to evaluate the performance of the proposed standalone PV system with HESS under various solar irradiance as well as AC loading conditions.

Keywords Hybrid energy storage system (HESS) · Lithium ion battery (LIB) · Photovoltaic (PV) system · Supercapacitor (SC)

1 Introduction

PV system is classified as standalone, grid connected and hybrid categories. A standalone or off-grid system is the one which is not connected to the power grid [1]. The fundamental basic difference between the ON-Grid and OFF Grid system comes from the energy storage features. Energy storage system is essential for the operation of standalone PV systems and which maintain the availability of power supply to the required loads and increase the system reliability. Energy storage systems can be in many forms and sizes. Storage options include batteries, thermal, or mechanical systems. All of these technologies can be paired with software that controls the charge and discharge of energy.

The ESSs are classified as Electrical Energy Storage Systems (EESS), Electrochemical Energy Storage Systems (ECESS), Mechanical Energy Storage Systems (MESS), and Hybrid Energy Storage Systems [2]. In EESS, the SCs and super conducting magnetic devices (SMD) are used. The batteries and fuel cells are coming under ECESS category. The MESS which includes flywheel (FW), compressed air energy storage (CAES) and pumped hydro energy storage (PHES). The HESS is one which is using combination of above mentioned categories. In HESS, Battery-SC, combinations of Battery Energy storage systems (BESS), BESS-FC and SC-Fuel cell (FC) combinations are frequently used. Among these hybrid storage systems, BESS-SC is popular

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J O U R N A L O F
Ceramic Processing Research

Impact of CIGS, CdS and i – ZnO film thickness, temperature on efficiency enhancement of CIGS solar cells

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In an attempt to enhance solar light photon to electron transformation proficiency of copper indium gallium selenide (CIGS) solar cells, computational exploration has been accomplished through numerical simulation. The SCAPS program was utilized to simulate enactment of CIGS. The electrical, optical properties of CIGS such as band diagram, current density, recombination current, IPCE and current – voltage efficiency was analyzed. The electrical, physical properties, thicknesses of individual layers comprising CIGS, CdS and ZnO were optimized along with their operating temperature. The CIGS solar cell efficiency analysis was executed and analyzed in the AM1.5 spectrum. The depth of CIGS, CdS and ZnO layers in CIGS solar cell determines the efficiency. The simulated optimization of CIGS properties is encouraging for enhancing the CIGS solar cell proficiency.

Key words: CIGS solar cells, SCAPS, CdS and ZnO layers, IPCE.

Introduction

Solar energy, a potential renewable energy can ameliorate the energy crisis of the globe. The growth, need for photovoltaic device market is exponential at present. The silicon based first generation solar cells are highly efficient, needs advanced fabrication techniques and very expensive [1-5]. The second-generation solar cells constructed on copper indium gallium diselenide alloys (CIGS) are encouraging due to good stability, cost effective, manufacturing flexibility and long-life time etc. [6-9]. CIGS has attained high conversion efficiency due to suitable band gap, high absorption coefficient etc. CIGS has shown 23.4% efficiency and well behind the Shockley-Queisser limit [10, 11]. Hence, reducing thickness of CIGS absorber coating reduces indium and gallium quantity and cost [12, 13]. This aims to develop low cost CIGS and to improve the efficiency by means of doping, apt thicknesses of functional layers, modifying the CIGS structure and suitable layer materials etc. [14, 15]. To improve the efficiency of CIGS, numerous thicknesses of CIGS absorber layer, ZnO and CdS were explored. The electrical, optical properties and efficiency of the predicted CIGS structures were numerically investigated and improved the CIGS performance. In modified CIGS structure, CIGS absorber layer, ZnO and CdS was varied much to investigate their performance to optimize the CIGS solar cells. The current density of electrons and holes, generation, recombination currents, current – voltage behavior and incident photon to electron conversion efficiency etc., were analyzed thoroughly. The operating temperature of CIGS, thicknesses of CIGS absorber coating, ZnO and CdS influences the optical, electrical and efficiency characteristics the solar cell remarkably. From these investigations, an optimized structure with CIGS thickness of 1.5 μm, CdS with 0.07 μm depth, an i-ZnO film with 0.07 μm thickness has upgraded effectiveness of CIGS. CIGS with these improved features has shown the efficiency of 11.54%. Hence, the performance parameters varied in this research are capable of generating better efficiency in comparison with conventional CIGS solar cells.

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2. CIGS Structure, Simulation

Numerical simulation of CIGS is accomplished by dint of employing the SCAPS-1D program (version 3.3.02) under the standard solar irradiation spectrum AM1.5 Global conditions and with incident light power of 1000 W/m^2.

This SCAPS-1D program mathematically utilizes Poisson equation, holes continuity equation and electron continuity equation for determining the semiconductor behavior. The studied CIGS structure is depicted in Fig. 1. And, physical factors of all layers used in the program are presented in Table 1.

Original Article

DEVELOPMENT OF AN EMBEDDED SAFETY SYSTEM FOR AN ELECTRIC VEHICLE

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Abstract

Every driver in a fleet has to make hundreds of minute decisions every day that affect their safety and the safety of others. At every point, from lane-changes to speed to distractions, opportunity exists for something to go wrong. From driver error to mechanical failure to simple bad luck, decisionmaking is both impactful and unavoidable. Most companies work hard to hire quality drivers and ensure proper training procedures are in place, but even the best drivers are susceptible to human error. Leveraging a Vehicle Monitoring Program can be a great asset for fleets. In existing system, the vehicle parameters are measured using required sensors and the data is processed using Arduino microcontroller and the measured parameters are sent to the web server using GSM. The stored data is accessed through a website using a browser. The computing and data transferring capabilities are limited due to the microcontroller and GSM. Another problem is only one or two parameters can be measured using a single product. Our proposed system takes advantages over the existing system in the area of computing, data transferring and data presenting. The main motto of this project is to integrate all the individual products into one single product which suits in all types of vehicle and to access it through a user-friendly android application. All the required parameters are measured using desired sensors and they are connected to Node MCU. It will transfer the data to the cloud seamlessly using built-in Wi-Fi module and an external LTE modem. The vehicle can be monitored by accessing the data through the android application.

Keywords: Live tracking, GPS, Android Application, Theft and Accident detection..

I. INTRODUCTION

This project is intended to ensure the safety of the people. Now 70% accident belongs to the road way of transport. To prevent this, it is designed with more precision and accuracy. The only motive is to equip people with 100% safety automated system, and it starts with vehicles safety not only for the users and for the vehicles thus it prevents the robbery also. It also paves way for the harassment preventive measure for the passenger in the car thus provides 100% security for the people that harassments are maximum now a days. It majorly concentrates on robbery of the vehicles that it has inbuild theft alert system and thus provides the live location of the vehicles. It ensures that it can prevent the owners of the vehicles from the cheating that are made by the drivers in harassment and fuel mafia. So, in conclusion the only objective is to make the project in such a way that it ensures people with 100% safe and secured at cheaper rates.

II. LITERATURE SURVEY

[1] BrianOlszewsk (et al), [2013] asdiscussed in paper about present manuscript proposes a novel mobile robot navigation technique using a customized RFID reader with two receiving antennas mounted on the robot and a number of standard RFID tags attached in the robot's environment to define its path. The paper deals to design for skilled navigation in mobile robotics usually requires solving two problems pertaining to the knowledge of the position of the robot, and to a motion control strategy.

Original Article

IoT BASED FOOD WASTE MONITORING AND CONTROLLING SYSTEM

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Abstract

Food waste is a common issue at several places such as colleges, schools and workplaces these days. It is estimated that the world population hits 9 billion by 2050 however lesser attention is given for wastage of food in many countries. This result in high demand for the food in future. The main objective of our work is to analyse and reduce the food waste. The proposed system finds a solution to reduce the food waste problem. A new approach is developed where the main focus is on measuring the food waste and recommending the competent authorities to change the menu according to the report generated by the food waste monitoring system. A display is placed in the system where every individual's real time food waste is displayed and the same is communicated through a message to the admin about the wastage of food. The data of food wastage is also saved in cloud for future reference. The proposed model creates a parallel result to give a detailed report to the management and the admin about the amount of excess food each time. The result of the proposed system will reduce the amount of food being cooked the next time. By incorporating Internet of Things (IoT) the food wastage date will be stored and transferred automatically at every instant. RFID (Radio Frequency Identification) sensor is used to monitor the wastage of individuals. Dustbins are opened only after the scanning of RFID tag provided to every individual.

Keywords: Internet of Things, IoT Gateway, microcontroller, SMS.

I. INTRODUCTION

T In India, the private sector grew swiftly as a result of the adoption of a mixed economy, causing rapid urbanisation. The percentage of people living in cities was 11.4% in 1901, 28.53 percentage in 2001, and 31.16 percentage in 2011. By 2030, the World Bank predicts that more than 40% of the country's population would be living in cities [1]. According to a 2017 study in the Times of India, India's metropolitan population generates a staggering 62 million tonnes of rubbish each year. Only around 22 to 28 percentage of this trash is processed, while the remainder is left to rot. This pollutes the air, hurts the environment, causes a slew of fatal diseases, and slows economic growth. The primary challenge that India is currently grappling with is 'waste management.' Solid trash and liquid waste are the two types of waste, both of which are destructive [2-3]. The three main sources of liquid waste are residential regions, industrial areas, and commercial sectors. Contaminated industrial water, home garbage, and so on is examples. Solid trash consists of objects such as metal and tin scarps, food waste, and old furniture, among other things.

In India, workers remove rubbish from bins every two to three days, but if the dustbins are full with dust, there are no options for cleaning them. It causes garbage overflow, resulting in an unsanitary atmosphere and the spread of various diseases. It is the result of the government's lack of ability to inspect whether the dustbin is full or not before the scheduled waste collection day. This current model or strategy of rubbish collection does not work well when the population grows at a rapid rate.

The main purpose of this essay is to design a prototype for future bins in which the contents can be recycled. The status of bins based on their depth is transmitted to officials once they are full, as well as to make the bin lids open and close automatically when people arrive, improving the hygiene of the surrounding areas. IoT device ESP 32 system [4,5] for monitoring and controlling of the food waste. RFID sensor and ultrasonic sensor [6] is used to monitor and measure the food wastage of individuals. The measure data is securely transferred via the internet.

II. METHODOLOGY

The following section deals with methodology of our system. The figure 1 shows our basic block diagram. It consists of sensor, display device and power source.

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LoRa Based Real-Time Electrical Substation Monitoring System

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ABSTRACT

The project proposes a novel design for creating a system based on an ESP 32 microcontroller. It is used to remotely monitor the voltage, current, power, temperature, and breaker condition of a transformer in a substation and to protect the system from changes in the parameters listed. The goal is to continuously monitor the electrical characteristics using a LoRa modem and so protect the distribution transformer from burning due to limits such as overloads, overheating, and transient voltage. If any of these values exceed the limit, the entire unit is shut down by activating an Electromagnetic Relay. This relay is activated when the parameters surpass the predefined threshold levels. The relay also serves as a circuit breaker, shutting down the main power source. The transmission substations are normally located in the area with inadequate mobile networks, hence LoRa communication is used to continuously deliver the instantaneous values to the intermediate station.

Keywords: LoRa, Substation Monitoring, Transformer Control, Circuit Breaker

I. INTRODUCTION

The automatic control of the power system using instrumentation and control devices is known as power-system automation. In order to regulate the components of the power system, substation automation refers to the utilisation of data from control and automation capabilities located within the substation as well as control orders from remote users.The terms are frequently used interchangeably since substation integration is necessary for full substation automation. Processes involved in the production and delivery of power are included in the automation of the power system. Power supply systems in the substation and on the pole are monitored and controlled to cut down on outages and lengthen their duration when they do happen. For power-system automation, a system communications protocols, and communications techniques is used. The group of devices that make up the physical systems known as "power systems" are electricity generation, transmission, and distribution. The group of gadgets that keep an eye on manage, and safeguard the power system is referred to as the "instrumentation and control (I&C) system." Several automated power systems are kept track of. LoRa, which stands for "long range," is a physical, exclusive radio communication method. It is based on chirp spread spectrum (CSS) technology-derived spread spectrum modulation techniques. It was created by Cycleo (patent 9647718-B2), a Grenoble, France-based business that SemTech eventually purchased. The communication protocol and system architecture are specified by LoRaWAN. ITU-Y.4480 T's standard for LoRaWAN has been approved by the organisation (ITU). The open, non-profit LoRa Alliance, of which SemTech is a founding member, is in charge of overseeing the continuous development of the LoRaWANprotocol.In order to wirelessly connect battery-operated devices to the internet in local, regional, or global networks, LoRa and LoRaWAN establish a Low Power, Wide Area (LPWA) networking protocol that focuses on important Internet of Things (IoT) criteria such bi-directional communication, complete security, mobility, and localization services are some of the needs. As opposed to a wireless WAN, which is intended to connect people or organisations and transmit more data while consuming more power, this sort of network is low power, low bit rate, and IoT enabled. The LoRaWAN data rate per channel varies from 0.3 kbit/s to 50 kbit/s. The upper networking layers were lacking because LoRa only defines the lower physical layer. One of the many protocols created to specify the top levels of the network is LoRaWAN. The LoRa Alliance maintains LoRaWAN, a cloud-based media access control (MAC) layer protocol that primarily serves as a network layer protocol for LPWAN gateway and end-node device communication management.

The long-range communication link is made possible by the LoRa physical layer, while LoRaWAN defines the network's communication protocol and system architecture. Moreover, LoRaWAN is in charge of controlling all devices' communication frequencies, data rates, and power. Asynchronous devices in the network only communicate when they

Original Article

Application Of An Automatic Three-Phase Power Supply Phase Selector In The Medical Ventilator

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Abstract

The Three Phase Power Supply Phase Selector device is critical for the operation of all medical equipment, particularly medical ventilators. Because of COVID 19, the need for ventilators has increased significantly. However, hospitals in rural areas are experiencing single-phase failure and low voltage in distribution lines, which causes interruptions in ventilator operation. This paper proposes an automatic Three Phase Power Supply Phase Chooser with a Programmable Logic Controller (PLC) to keep all medical ventilators running without disruption, especially in the occurrence of single-phase failure. During a phase failure, the proposed system automatically connects the ventilator to the another available phase in a very short period. The PLC detects the restoration of the phase of the single-phase supply and automatically reconnects the ventilator to the restored phase. It also aids in maintaining an uninterrupted power supply to critical single-phase medical appliances. It also protects sensitive single-phase medical equipment from damage and burnout. This system can be used in a variety of locations where critical single-phase medical equipment must operate continuously and without disruption. The key benefit of this controller is that it is reliable, easily programmable, and flexible.

Keywords: PLC, Phase Changer, Power, Phase chooser, Power system, Voltage collapse, Power instability, outages

INTRODUCTION

Many electrical consumers fed with three-phase electrical supply system, but only single phase is connected to many individual loads. In distribution transformer, sometimes it is happened that one of the three phases gets blown out due to faults in the feeder or tree branches falling on the overhead line or insulation failure or other reasons. In that case consumer load connected to faulty phases gets interrupted. This controller helps that the load connected to the faulty phase is temporarily connected to other available phase of three phase supply. This phase selector technology which connects load with the available phase temporarily until the faulty phase gets restored. However, the controller system focuses on the design of an R Y B phase selector using PLC. The flexibility of the controller system is increased because it does not require any micro controllers, hardware interfaces to connect all industrial sensors, actuators, relays, switches with the microcontrollers. PLC is created in accordance with the IEC specifications which are typically at a range of current/voltages. Additional hardware setup is not needed to connect all inputs and outputs with PLC. This controller helps that the loads connected to the phase in industry/ hospitals etc. can be temporarily connected to one of the other two working phases. The controller connects the load to the available phase automatically and restore to the actual phase when the failure phase are restored. Human intervention is reduced in this system; hence it increases the flexibility in the process control. Ephrem Ryan Alphonsus et.al concludes that the PLCs can be used for many applications whether it is of simple or complicated control system [1]. Nowadays, many of the control logic are being executed by the PLCs. According to Ofualagba G et.al [5], an intelligent control circuit is essential for careful and smooth selection channel at particular time to feed power to the single phase load without notice of outage. According to Vipula Tippa et.al [4], the importance of the power supply phase selector is predominant in case of operations and emergency treatment in hospital. Hence the automatic phase selector is essential to operate single phase essential loads without interruption.

RELATED WORKS

F. U. Nweke et al. [2] have designed the Automatic three phase power system selector with comparator unit could results complication in the circuit connections as well as separate protection system needed to protect the ICs, capacitors, resistors etc. against sudden increase in voltage in the distribution grid. Namita R. Chavan et al. [3] have implemented the Automatic active phase selector with arduino unit which may need extra hardware arrangement to connect the power circuit load with arduino. Ofualagba G et al. [5] have demonstrated Automatic Phase Selector and Changeover Switch for 3-phase supply with ATmega

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An Intelligent Systemto Detect Faultsand Condition Monitoringin Transformers

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ABSTRACT: Thispapermainlyproposesageneralov erviewabouttransformer condition monitoring.Winding deformation could be a common drawback that takes place inside in operation power transformers because of numerous internal and external conditions because of their progressive nature, winding deformations ought to be detected and corrected as they emerge, the sole reliable technique to notice such faults at this stage is that the frequency response analysis that is conducted offline. In this paper, we tend to proposing a concept to notice power electrical device inchoate winding deformations in real time through measure voltage and current level in electrical device. during this technique, we tend to square measure observation the live standing of electrical device victimization low value and simply out there sensors. Winding deformation could be a common downside that takes place among operative power transformers because of varied internal and external conditions because of their progressive nature, winding deformations ought to be detected and corrected as before long as they emerge. sadly, the sole reliable technique to observe such faults at this stage is that the frequency response analysis that is conducted offline. In this technique, we have a tendency to observe the live standing of electrical device mistreatment low price and simply accessible sensors.

I. INTRODUCTION

An electric power supply system includes the generating station, transmission lines and therefore the distribution system. In generating station, power is generated by 3 section alternators operative in parallel. To transmit the electricity from the purpose of generation to the top user, AN interconnected network of electrical grid is employed. The network of electrical grid consists of calculable range of generating stations, high-voltage transmission lines and distribution lines. we all know that once a coffee voltage power is transmitted over long distance, the facility loss we have a tendency to acquire are going to be a lot of. Winding deformation could be a common downside that takes place among operative power transformers because of varied internal and external conditions. because of their progressive nature, winding deformations ought to be detected and corrected as before long as they emerge. sadly, the sole reliable technique to observe such faults at this stage is that the frequency response analysis that is conducted offline. during this paper, we have a tendency to ar proposing an inspiration to observe power electrical device inchoate winding deformations in real time through activity voltage and current level in electrical device. during this technique, we have a tendency to ar observation the live standing of electrical device mistreatment low price and simply accessible sensors. Winding deformation could be a common drawback that takes place inside in operation power transformers because of numerous internal and external conditions. because of their progressive nature, winding deformations ought to be detected and corrected as presently as they emerge. sadly, the sole reliable technique to notice such faults at this stage is that the frequency response analysis that is conducted offline. during this paper, we tend to square measure proposing a concept to notice power electrical device inchoate winding deformations in real time through measure voltage and current level in electrical device. during this technique, we tend to square measure observation the live standing of electrical device victimization low value and simply out there sensors.

II. METHODOLOGY USED FOR IOT MONITORING SYSTEM

According to statistical data, winding deformation represents the main failure mode in the current worldwide power transformer fleet. The current conventional techniques to detect transformer winding deformations including sweep frequency response analysis (SFRA), short-circuit

Application of Cognitive Optimization Algorithms to Solve Generation Expansion Planning Problem by Considering the Recuperation for Aged Thermal Plants

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Abstract

Power plant recuperation is conventionally designed for old units that can be upgraded to yield additional capacity, and intends to extend their life. Recuperation procedure depends on many physical factors such as generating unit types, locations, finance etc. In this study, Generation Expansion Planning (GEP) problem has been solved by considering the retirement and recuperation of thermal power plants. Particle Swarm Optimization (PSO) and Local Stochastic Search Particle Swarm Optimization (LSSPSO) algorithms have been applied to solve the GEP problem by considering the objective functions such as minimization of cost, minimization of emission and maximization of reliability. The real-world power system of Tamil Nadu, an Indian state has been considered for investigation. The problem has been solved for 7-year (till 2027) and 14-year (till 2034) planning horizons for four different scenarios. The results show that the combined consideration of recuperation and retirement of thermal power plants considerably reduces the cost of planning and the emission.

KeyWords: Thermal Units, Recuperation, Generation Expansion Planning, Least Cost, Minimum CO_2Emission, Tamil Nadu

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1. INTRODUCTION

The consumption of electricity keeps on increasing worldwide, especially in the developing countries like India [1]. Hence, suitable generation expansion plans are important to operate the power system safe and reliable [2]. Generation Expansion Planning (GEP) refers to the selection of optimal type of power plants, capacity, location and time for installing new generating units for fulfilling demand at least cost [3, 4]. So as to solve the complex GEP problems several optimization techniques have been applied [5]. In recent times, numerous power system problems such as economic dispatch, voltage stability, system reliability, transmission planning, have been solved by Particle Swarm Optimization (PSO) algorithm [6]. Especially, the minimal emission based capacity expansion problem has been solved using PSO and the authors have concluded that PSO performs virtuous due to less number of parameters and resulted with stable convergence [7]. Recently, the technical and economic aspects of GEP problem have been presented to satisfy the load growth and operating costs over the planning period by considering the reliability indices such as loss of load expected (LOLE) and expected energy not served (EENS) [8]. Least cost and CO_2 emission based GEP problem have been solved to meet the load growth and

Deep Learning-Based Anticipation of Driver Movement in Semi-autonomous Vehicles

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Abstract

Advanced Driver Assistance Systems (ADAS) are quickly becoming one of the most intriguing research topics pursued by automakers to improve traffic safety and transportation effectiveness. Over the last ten years, ADAS has increased driving safety. These are the systems that aid drivers in improving vehicle safety while they are on the road by taking the appropriate action in response to potential hazards to vehicle safety. Since road traffic accidents account for over 35.2% of all accidental deaths and are the sixth most common cause of death in India, there is a pressing need for study into this issue. The adaptive pre-processing methods needed to extract additional features from the photos in our dataset are presented in this study. Here, the algorithms for movement anticipation are discussed along with inside and outside feature extraction strategies. It then contrasts the results with conventional categorization methods.

Keywords: Anticipation, ADAS, Vehicle, Autonomous, NHTSA.

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1. Introduction

One of the most serious causes of unnatural deaths nowadays is traffic accidents. The majority of traffic accidents happen as a result of the driver's negligence or incapacity to recognise potential risk in time. Therefore, the automotive research community and car manufacturers are concentrating on proactive driving aid system technologies that may significantly increase driving safety [1]. We further evaluate the data to determine the severity of the issue. Figure.1 shows that the primary cause of unintentional traffic fatalities is reckless and risky driving, which is a powerful incentive to solve the driver aid issue.

Department of Electronics and Communication Engineering – Journal Publications

1. Vairaprakash S, Alagarsamy, M., Thangaraju, D., Mani, D.P. **Classification of COVID-19 Patient Based on Multilayer Perceptron Neural Networks Optimized with Garra Rufa Fish Optimization Using CT Scan Images** (2023) *International Journal of Pattern Recognition and Artificial Intelligence*, 37 (6), art. no. 2357003, . **(SCI with IF:1.261)**
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Classification of COVID-19 Patient Based on Multilayer Perceptron Neural Networks Optimized with Garra Rufa Fish Optimization Using CT Scan Images

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COVID-19 is known in recent times as a severe syndrome of respiratory organ (Lungs) and has gradually produced pneumonia, a lung disorder all around the world. As coronavirus is continually spreading rapidly globally, the computed tomography (CT) technique has been made important and essential for quick diagnosis of this dangerous syndrome. Hence, it is necessitated to develop a precise computer-based technique for assisting medical clinicians in identifying the COVID-19 influenced patients with the help of CT scan images. Therefore, the multilayer perceptron neural networks optimized with Garra Rufa Fish optimization using images of CT scan is proposed in this paper for the classification of COVID-19 patients (COV-19-MPNN-GRF-CTI). The input images are taken from SARS-COV-2 CT-scan dataset. Initially, the input images are pre-processed utilizing convolutional auto-encoder (CAE) to enhance the quality of the input images by eliminating noises. The pre-processed images are fed to Residual Network (ResNet-50) for extracting the global and statistical features. The

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A hybrid CapSA-WHO method used for performance enhancement of tandem perovskite solar cell

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ABSTRACT

This manuscript proposes a hybrid method for determining the effects of contact-electrode and light-power in tandem perovskite solar-cell (PSC) efficiency. The proposed system combines the Capuchin-Search-Algorithm (CapSA) and the Wild-Horse-Optimizer (WHO), together known as CapSA-WHO method. The proposed work creates the following major contributions: (i) investigating the composition of the tandem Perovskite Solar-Cell (SC) layer; (ii) investigating the effectiveness of PSC depending on Formamidinium and tin; (iii) modelling proficient hybrid solar cells; and (iv) analyzes the performance of the proposed SC. The CapSA-WHO technique is used to examine the effect of absorbent layer materials and optimize the devices. This work also investigated the impacts of various materials, such as hole and transport layers, as well as metal back contact, absorber layer flaws, light radiation power, and so on. Moreover, the influence of temperature variation on absorber layer defect density on solar cell is examined. The proposed CapSA-WHO hybrid method is executed in MATLAB or Simulink site and its performance is compared to existing methods. The system gives an optimal solution with minimal computing time by employing the CapSA-WHO technique. Furthermore, the proposed method discovered minimum fault density to attain maximum device efficiency.

1. Introduction

Currently, using the rapid growth of society, the fossil-fuel consumption has been intensively maximized to lead the major environmental issues containing global warming, pollution, and climatic-change (Pang et al., 2017; Smith, Hoke, Solis-Ibarra, McGehee, & Karunadasa, 2014). Nowadays, the pressing problem of the global energy disaster is produced with limiting natural resources and maximizing electricity prices (Rajesh, Shajin, & Kannayeram, 2022; Wali, Iqbal, Pal, Lowe, & Jose, 2018). Few potential renewable energy sources are currently being used to solve this issue are wind, hydro, geothermal and solar (Shajin, Rajesh, & Nagoji Rao, 2022; Yao et al., 2017). Solar radiation constantly reaches the planet, amounting to 170,000 TWh, or 10,000 times the amount of energy required by humans in a year (Chen et al., 2016, 2019; Löper et al., 2014). Organic-inorganic halide perovskite photovoltaic (PVs), a decade old is attained by imposing power conversion efficiencies (PCEs) as well as meet the industrial stability requirements (Shajin, Rajesh, & Raja, 2022; Le-Duc, Nguyen, & Nguyen-Xuan, 2020). For commercialization, several perovskite PV technologies of every perovskite tandem solar cells (PTSCs) are front runners (Rajesh, Shajin, & Kumaran, 2022; Ghasemian, Ghasemian, & Vahdat-Nejad, 2020). The combination of narrow perovskite back cell band gap and broad perovskite front cell band gap results in PTSCs (Zhu, Bai, et al., 2016). To meet the industrial energy requirements, 2% PCE solar panels cover 10% of industrial deserts. In several countries and regions, the commercial solar modules based on silicon and CdTe is installed (Zhang & Toudert, 2018; Zhang et al., 2017). But, the challenges of high cost and related pollution also use the large scale limit. The global PV market is dominated by silicon wafer-related SC composed of crystalline-silicon (c-Si) and mono-crystalline silicon (m-Si). Because of the correct production procedure, the PSC has a great manufacturing cost than other solar-cells (Chan, Wright, Elumalai, Uddin, & Pillai, 2017; Sun, Kripalani, & Chi, 2023). PSC are made at low temperatures by utilizing the roll-to-roll technique on lightweight, flexible substrate to save costs (Zhang & Park, 2023). According to preliminary study, hybrid organic–inorganic perovskite (HOIPs) are hopeful materials for subsequent generation solar cells based on its superior photovoltaic properties (Bella, Renzi, Cavallo, & Gerbaldi, 2018). In Historical, first, hybrid organic-inorganic perovskite (HOIP) are used in solar cells (Yang et al., 2018) in 2009 as color in dye-sensitized solar cells (SC) (DSSC) (Zhu,

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Research Article

Enhancement of QoS in Internet of Things Wearable Devices Dependent on 5G Technology

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In general, the malicious hackers can infiltrate tens of thousands or millions of insecure computers, disable infrastructure, shut down networks, and access personal information. The hackers use some security vulnerabilities in the network to steal and use the required data. And things like the buck they do with advanced technologies are constantly providing them with the data they need, not just once and no matter how protective the firewalls on the Internet are, there is still an increase in cybercrime. This was affected the Quality of Service (QoS) of a wearable device. In this paper, an improved QoS model was proposed to enhance the IoT smart systems. This algorithm was helpful to prevent the smart IoT device from the vulnerable hacking. This system was compared with the existing algorithms, and the results are displayed the below sections. The suggested method performs more than 96 percent of input entry authentication and about 3 percent of password cracking actions. The source code security management was then upgraded to 99.9%. Finally, the number of updating difficulties for various device entries was decreased by 0.02 percent, and the number of privacy breaches was reduced by up to 0.32 percent. Hence, the proposed method was more secured and free from cyber security issues.

1. Introduction

We all need to be aware of cyber security issues. We also need to realize that there is an inherent risk associated with connecting to the Internet and more and more devices with each other. Homes and businesses continue to connect these networks and other smart devices to their networks, but surveillance cameras connected to the Internet can be hacked by SMART TV hackers [1]. Does almost half of the IoT devices fall? Although connected devices include everything from computers and smart phones to smart TVs and kitchen appliances, surveillance camera systems are generally hacked IoT devices. Many of these attacks revolve around the security of low-cost IP cameras [2]. That is, if one model has a defect, it can affect other models as well. Many IoT devices have been found to have bugs that allow attackers to

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An energy efficient deep learning model for intrusion detection in smart healthcare with optimal feature selection mechanism

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Abstract. In healthcare (HC), Internet of Things (IoT) integrated cloud computing provides various features and real-time applications. However, owing to the nature of IoT architecture, their types, various modes of communication and the density of data transformed in the network, security is currently a critical issue in the IoT healthcare (IoT-HC) field. This paper proposes a deep learning (DL) model, namely Adaptive Swish-based Deep Multi-Layer Perceptron (ASDMLP) that identifies the intrusions or attacks in the IoT healthcare (IoT-HC) platform. The proposed model starts by clustering the patients' sensor devices in the network using the Probability-based Fuzzy C-Means (PFCM) model. After clustering the devices, the cluster heads (CHs) among the cluster members are selected based on the energy, distance and degree of the sensor devices for aggregating the data sensed by the medical sensor devices. The base station (BS) sends the patient's data collected by the CHs to the cloud server (CS). At the cloud end, the proposed model implements an IDS by applying training of the DL model in publicly available databases. The DL approach first performs preprocessing of the data and then selects optimal features from the dataset using the Opposition and Greedy Levy mutation-based Coyotes Optimization Algorithm (OGCOA). The ASDMLP trains these optimal features for the detection of HC data intrusions. The outcomes confirm that the proposed approach works well on real-time IoT datasets for intrusion detection (ID) without compromising the energy consumption (EC) and lifespan of the network.

Keywords: Smart healthcare, Internet of Things (IoT), intrusion detection system, deep learning, healthcare security

1. Introduction

The variety of interconnected devices and the IoT have increased dramatically in recent years [1]. The IoT is a network of interconnected sensors, smart devices, and embedded computers that process, store, and communicate heterogeneous data [2]. IP addresses are assigned to such objects in order to identify the devices. Thus they can transmit and receive data over a network without human intervention [3]. IoT technologies include travel, agriculture, smart cities, emergency responders, and infrastructure. The HC industry is one of the most critical fields for Artificial Intelligence applications [4]. The physical devices collect vital signs using a variety of sensors and transmit real-time data to the medical team by connecting to the internet, making it a significant and necessary source of medical data [5]. Although there are many advantages to the Internet of Medical Things (IoMT) eco-system, it is also a potential target for various new cyber threats and attacks

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Article

IOT Assisted Biomedical Monitoring Sensors for Healthcare in Human

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Abstract: The Internet of Things (IoT) is a concept that refers to the deployment of Internet Protocol (IP) address sensors in health care systems to monitor patients' health. It has the ability to access the Internet and collect data from sensors. Automated decisions are made after evaluating the information of illness people records. Patients' health and well-being can be monitored through IoT medical devices. It is possible to trace the origins of biological, medical equipment and processes. Human reliability is a major concern in user activity and fitness trackers in day-to-day activities. The fundamental challenge is to measure the efficiency of the human system accurately. Aim to maintain tabs on the well-being of humans; this paper recommends the use of wireless body area networks (WBANs) and artificial neural networks (ANN) to create an IoT-based healthcare framework for hospital information systems (IoT-HF-HIS). Our evaluation system uses a server to estimate how much computing power is needed for modeling, and simulations of the framework have been done using data rate and latency requirements are implementing the energy-aware technology presented in this paper. The proposed framework implements several hospital information system case studies by building a time-saving simulation environment. As the world's population ages, more and more people suffer from physical and emotional ailments. Using the recommended strategy regularly has been proven user-friendly, reliable, and cost-effective, with an overall performance of 95.2%.

Keywords: IoT; WBANs; ANN; healthcare; biomedical sensors; humans

1 Introduction

Using an idea behind the Internet of Things, everyday objects and gadgets are given the ability to hear, sense, and communicate by exchanging data and communicating with one another [1]. The Internet of Things uses embedded systems, modulation schemes, sensor or access technologies, and applications to transform these standard things into smart ones [2]. IoT-based systems with worldwide connections may gather, manage, and share healthcare-related information, such as treatment, diagnostics, recovery, inventories, and medicine [3]. Healthcare services based on the Internet of Things contain wireless terminals and

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Article

Tech Science Press

Mobility Aware Zone-Based Routing in Vehicle Ad hoc Networks Using Hybrid Metaheuristic Algorithm

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Abstract: Vehicle Ad hoc Networks (VANETs) have high mobility and a randomized connection structure, resulting in extremely dynamic behavior. Several challenges, such as frequent connection failures, sustainability, multi-hop data transfer, and data loss, affect the effectiveness of Transmission Control Protocols (TCP) on such wireless *ad hoc* networks. To avoid the problem, in this paper, mobility-aware zone-based routing in VANET is proposed. To achieve this concept, in this paper hybrid optimization algorithm is presented. The hybrid algorithm is a combination of Ant colony optimization (ACO) and artificial bee colony optimization (ABC). The proposed hybrid algorithm is designed for the routing process which is transmitting the information from one place to another. The optimal routing process is used to avoid traffic and link failure. The fitness function is designed based on Link stability and Residual energy. The validation of the proposed algorithm takes solution encoding, fitness calculation, and updating functions. To perform simulation experiments, NS2 simulator software is used. The performance of the proposed approach is analyzed based on different metrics namely, delivery ratio, delay time, throughput, and overhead. The effectiveness of the proposed method compared with different algorithms. Compared to other existing VANET algorithms, the hybrid algorithm has proven to be very efficient in terms of packet delivery ratio and delay.

Keywords: Vehicle *ad hoc* network; transmission control protocol; multi-hop data transmission; ant colony optimization; artificial bee colony optimization

1 Introduction

VANET is a kind of wireless networking innovation, made by building up a network of vehicles with roadside units, utilized for communication reasons on roadways or in urban conditions to expand security and comfort for vehicles [1]. VANETs act as an important part of Intelligent Transportation Systems (ITS) and VANETs are an up-and-coming innovative innovation, a blend of Ad-Hoc network, wireless local area network, and cell innovation to achieve a shrewd vehicle Communication framework. VANETs

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Clustering-based image segmentation for optimal image fusion using CT and MRI images

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As opposed to using many unrelated photographs to depict the same scene, image fusions combine multiple, similar images to generate a single, unified image with greater detail. Imaging sensors and the need for a wideband signal to transmit most source images limit their resolution. This study suggests new methods of fusing medical pictures from different modalities in order to increase image quality and, by extension, the accuracy with which brain tumors can be detected and identified. Improved convolutional neural network (ICNN) and region growth-based K-means clustering (RKMC) are used in the suggested strategy to boost the quality of brain image fusions obtained from Computed tomography scanned image (CTSI) and magnetic resonance imaging (MRI) in this study. The first stages of this task consist of eliminating noise, segmenting images, extracting and selecting features, and fusing images. AMF (Adaptive Median Filtering) are first used to eliminate noise from MRI images and CTSI of the brain, improving the image quality. With the help of the RKMC algorithm, MRI image and CTSI scans can be segmented into their constituent pieces, which can then be seen either as grayscale images or as pictures of objects. The RKMC algorithm is able to adequately account for the possibility of tumors in white images. More useful image features can be extracted with the use of MPCA (Modified Principal Component Analysis). Afterward, features with the highest fitness values are chosen by using AFO (Adaptive Firefly Optimization). Image fusions of multimodal images are carried out using ICNN, which generates the image's lower-, middle-, and higher-level contents. Incorporating important and relevant image characteristics from all viewpoints and perspectives improves feature training and

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Computer vision based healthcare system for identification of diabetes & its types using AI

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ARTICLE INFO

Keywords:
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ABSTRACT

Diabetes mellitus, often known as diabetes, is an endocrine disorder that has a wide global impact today. Here is a requirement for an effective model that able prognoses diabetes and its types with more accurateness as early. Given the breadth and depth of existing studies, there is a pressing need for accurate and timely illness forecasting in the healthcare sector. Current circumstances need the creation and design of systems that are quicker to respond, more accurate, more durable, and more generalizable. For increasing the accurateness of prediction with best effectiveness innovative Artificial Intelligence and Machine Learning Model is proposed. This model predicts the diabetes class using the symptoms located into the data-set which is having the row as one rule of the system & this rule are need to understand and compile using feature.

1. Introduction

It is one of the most significant problems facing public health on a global scale today. The International Diabetes Federation (IDF) estimates that by 2030, as many as 550 million people would have diabetes, up from an estimated 350 million in 2011. 80% of all diabetes-related deaths happen in third world countries like India. In addition to putting a significant strain on the global healthcare system and the global budget, diabetes mellitus is a major economic burden worldwide [1]. All current medical services and administrations have access to high-quality monitoring and a plethora of information collection technologies, providing very inexpensive ways to capture and store data. Because of the sheer volume of data stored in healthcare databases, specialised tools are needed for data retrieval, data storage and loading, information examination, and operational use of data. Fig. 1 depicts the Healthcare AI and DM Applications.

Data mining is prevalently known as KDD Knowledge Discovery in Databases and reason for this KDD or DM is to extricate valuable data from enormous or tremendous databases or information distribution centres. Mining applications are utilized for business just as logical sides [2]. DM is characterized as the way toward finding already obscure examples, drifts in databases and utilizing that data which will assist with building prescient models. Else, It is characterized as the methodology of information determination and investigation and building models utilizing colossal information stores to reveal beforehand unidentified, obscure examples.

In healthcare domain, mining a data is becoming progressively popular, where the massive volumes of information produced, produced by clinical dealings are much multifaceted as well as large for managing and analyzing using old approaches. Data _mining can discover designs, pattern as well as tendencies in enormous quantities of multifaceted dataset which improve decision-making [3]. The healthcare industry will take lots of aids, benefits from data mining applications. Data Mining is shown in Fig. 2 as a stage of the knowledge discovery process.

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ARTICLE

Removal of Salt and Pepper Noise Using Hybrid Adaptive Switching Median Filter with Ant Colony Optimization Technique in Nano Electronic Applications

S. Vairaprakash[1,*], Jayakumar Karuppaiah[2], B. Buvaneswari[3], and Abdullah Alghamdi[4]

Background: Restoration of noisy images from the salt and pepper noise is an interesting area in the field of image processing. The restoration process can be done using various filtering algorithms. The restoration process should not affect the pixels of the original image. The problem of the existing work persists as the increase in the error rate while the dimensions as well as the image format changes. The proposed work consists of Hybrid Adaptive Switching median filtering (HASMF). The hybrid technique corrupted images' high-density salt and pepper noise removal using Ant colony Optimization technique. This hybrid technique would remove the high-density salt and pepper noise from the corrupted images. The noisy pixel value from the corrupted images is identified and selected using the Ant Colony Optimization technique (ACO). The identified corrupted value can be replaced using the Adaptive Switching Median Filter. The switching process is carried out using the pixel by pixel with the normalized median values. The noisy pixels are identified and selected using Ant colony Optimization. The optimized values are subjected to the filtering process. The proposed method decreases the salt and pepper noise within the original image. The hybrid design approach was used in the proposed study, which used 45 nm technology combined with a Verilog-A model-based circuit that was implemented using Spintronic. It was discovered that the suggested changed task had less latency, used less space, and dissipated less power than the original. Furthermore, it was discovered that designed memory arrays were both energy and space-efficient. It does not affect the normal pixels within the original image. The comparison process has been made with the various existing algorithms such as Median Filter (MF), Modified Decision Based Unsymmetrical Trimmed Median Filter (MDBUTMF). The proposed method has overcome the various performance metrics such as Peak Signal Noise Ratio (PSNR), Mean Square Error (MSE), and Structural Similarity Index (SSIM). The results obtained have shown the significant results in terms of object measures as well as visual perception of the denoised image.

Keywords: Hybrid Adaptive Switching Median Filtering, Ant Colony Optimization, Salt and Pepper Noise, Peak Signal Noise Ratio (PSNR), Mean Square Error (MSE), and Structural Similarity Index (SSIM), Spintronic, CMOS, Non-Volatile Master Slave Flip Flop (NVMSFF), Verilog-A Model.

1. INTRODUCTION

The term "digital image processing" is often used to describe the treatment of a 2-dimensional (2-D) image signal by digital technology. Broadly speaking, this refers to the processing of any signal using purpose-built hardware, such as an application-specific integrated circuit (ASIC),

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Implementation of Lane Marking Detection Algorithm for FPGA Using Soft Computing Technique

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ABSTRACT

Lane detection is a critical processing stage in Advanced Driving Assistance Systems (ADAS). Automatically detecting lane boundaries from a video stream is computationally challenging and therefore hardware accelerators such as FPGAs and GPUs are often required to achieve real time performance. In this model, an FPGA-based lane candidate generator is coupled with a software-based polynomial fitting engine, to determine lane boundaries. Lane detection is a critical processing stage in Advanced Driving Assistance Systems (ADAS). Automatically detecting lane boundaries from a video stream is computationally challenging and therefore hardware accelerators such as FPGAs and GPUs are often required to achieve real time performance. In this project, we propose a lane detection method that is suitable for all kinds of complex traffic situations; an FPGA- based lane candidate generator is coupled with a software-based polynomial fitting engine, to determine lane boundaries.

Keywords

Lane Marking detection ,ADAS , Distrotion Detection, Edge Detection,Hough Transform

Original Article

Performance Evaluation Of Different Mimo Systems

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Abstract

With each passing year, there is a rapid increase in mobile data traffic and also there occurs a demand for bringing a higher data rate to a growing number of users. The next generation networks need to depend on denser infrastructure deployment, reduced inter- and intra-cell interference, [2] simple signal processing, and reduced transmitted power, as well as improved energy and spectral efficiency, to provide seamless connectivity. The mathematical modeling of MIMO systems is discussed, with emphasis on the technology's key features. The latest developments in the MIMO area, such as Multi-user MIMO (MU-MIMO) [1], Massive MIMO, and MIMO OFDM techniques, are then discussed in detail, with an emphasis on their importance in cellular communication systems. Massive MIMO has been regarded as the best approaches to increase spectral and energy efficiency in broadband wireless communication systems. The massive MIMO's channel model must be explored as the first step in evaluating the performance of any communication system.

Keywords - MIMO, MU-MIMO, Massive MIMO, MIMO-OFDM.

I. INTRODUCTION

[1] A smart antenna array group called MIMO which stands for "Multiple Input Multiple Output". This method uses so many transmit and receive antennas in order to enhance transmission data rate and improve system reliability by deploying spatial multiplexing. MIMO systems accomplish these benefits by utilizing scattering effects from several routes without the need for increased capacity. A MIMO system requires no additional bandwidth because each antenna operates on the same frequency. Numerous copies of the same signal is being supplied to the receiver with the help of MIMO system, even if a channel is damaged by fading effect, which will affect the error rate [1].

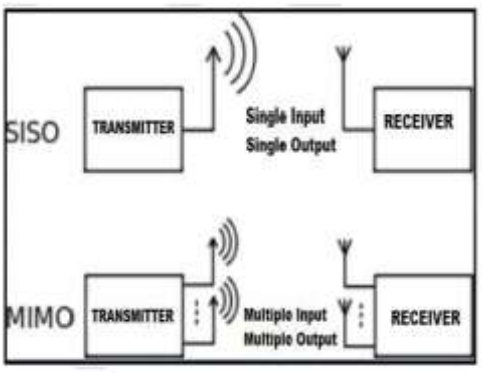

Figure.1. Basic Difference Between SISO and MIMO System

sensors

MDPI

Article

Adaptive Fuzzy Logic Deep-Learning Equalizer for Mitigating Linear and Nonlinear Distortions in Underwater Visible Light Communication Systems

Radhakrishnan Rajalakshmi [1], Sivakumar Pothiraj [2], Miroslav Mahdal [3] and Muniyandy Elangovan [4,*]

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Abstract: Underwater visible light communication (UVLC) has recently come to light as a viable wireless carrier for signal transmission in risky, uncharted, and delicate aquatic environments like seas. Despite the potential of UVLC as a green, clean, and safe alternative to conventional communication methods, it is challenged by significant signal attenuation and turbulent channel conditions compared to long-distance terrestrial communication. To address linear and nonlinear impairments in UVLC systems, this paper presents an adaptive fuzzy logic deep-learning equalizer (AFL-DLE) for 64 Quadrature Amplitude Modulation-Component minimal Amplitude Phase shift (QAM-CAP)-modulated UVLC systems. The proposed AFL-DLE is dependent on complex-valued neural networks and constellation partitioning schemes and utilizes the Enhanced Chaotic Sparrow Search Optimization Algorithm (ECSSOA) to improve overall system performance. Experimental outcomes demonstrate that the suggested equalizer achieves significant reductions in bit error rate (55%), distortion rate (45%), computational complexity (48%), and computation cost (75%) while maintaining a high transmission rate (99%). This approach enables the development of high-speed UVLC systems capable of processing data online, thereby advancing state-of-the-art underwater communication.

Keywords: underwater visible light communication; deep learning; equalization; adaptive fuzzy logic; deep-learning equalizer; sparrow search optimization

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1. Introduction

Underwater visible light communication (UVLC) is an intensity modulation method accessible by light-emitting diodes (LEDs). Adjusting the LED's light wave outcome may accelerate rapid data transfer speeds. Future networking systems have a lot of potential for this technology. UVLC will soon get closer to flexible connectivity (FC), enabling it to continuously and creatively deploy energy to meet the demands of different frequency bands and improve spectrum utilization.

Frequent significant FC technologies are "Modulation Classification (MC) technologies". This refers to a piece of information technology that is frequently utilized and capable of autonomous learning and adaptation. MC may help the transmitter correctly identify and change the demodulation modes when the broadcast protocols are altered due to external conditions. Real-time functioning is, therefore, a necessity for MC [1]. The creative improvement of UVLC, in line with the 5 G and 5 GB goals for future wireless communications, will increase operational effectiveness globally while still satisfying the demands of the moment. With minimal eavesdropping, UVLC offers extremely safe data transmission.

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and texture of features in retinal images. Colour fundus images are widely used for the diagnosis of retinal diseases like diabetic retinopathy (DR), glaucoma, age-related macular degeneration (AMD), etc. Image processing enhances the input image, which segments and highlights regions of interest and quantify it. In this paper, we have segmented optic disc and blood vessels in colour fundus images using an algorithm coded in MATLAB. The input images and their corresponding ground truth images were obtained from public datasets available in Kaggle. The validation of the segmented images is done for parameters like accuracy, sensitivity, precision, F-measure, Mathews correlation coefficient, Dice coefficient, Jaccard index and specificity. The algorithm could effectively segment images, with an average accuracy of 99.74% in segmenting optic disc and 94.74% that of blood vessels.

Keywords: *retinal image segmentation; colour fundus imaging; optic disc; retinal blood vessels.*
DOI: 10.1504/IJMEI.2022.10052912

- **Hybrid multi-kernel SVM algorithm for microaneurysm recognition in colour fundus images**

by S.B. Mohan, B. Kannan, D. Ravikumar, C. Sivakumaran

Abstract: Diabetic retinopathy (DR) is a condition that results in impaired vision and is triggered by diabetic. These alterations in the retinal vessels may be traced back to hyperglycemia. Microaneurysms (MAs) seem to be the initial disease symptoms of DR, and a prompt identification of microaneurysms may assist in the detection of DR in the preclinical phase. Optical coherence imaging system, often known as OCT, is a non-invasive imaging technology that offers a cross-sectional picture of the retinal. We construct new probability foundations for support vector machines (SVMs) using informational differences and the Fisher score. The findings that were achieved were as follows: the accuracy criterion had a score of 96.32%, the sensitivity criterion had a score of 97.34%, the specificity criterion had a score of 95.42%, and the precision criterion had a score of 95.27%.

Keywords: *retinal pictures; scaled Dirichlet combination; support vector machines; SVMs; microaneurysm images.*
DOI: 10.1504/IJMEI.2023.10053229

- **Application of deep learning to segment pelvis bones**

by N. Thamaraikannan, M. Saravanan, N.K. Anushkannan, S. Ramesh, C. Sivakumaran

Abstract: The proper identification and localisation of pelvic bone metastases begins with precise segmentation of the pelvic bones. Existing pelvic bone segmentation algorithms are generally manual or semi-automatic, and they exhibit low accuracy when dealing with picture appearance changes caused by multi-site domain shifts, etc. This paper presents a strategy for segmenting normal pelvic bone characteristics in multiparametric magnetic resonance imaging (mpMRI) using a 3D U-Net based on deep learning. Extensive testing on our dataset indicates the usefulness of our automated technique. The 3D U-Net network, based on deep learning, offers patients accurate identification and segmentation of pelvic bone metastases.

Keywords: *U-Net; pelvis bone; segmentation; biomedical signal processing.*
DOI: 10.1504/IJMEI.2023.10053901

- **Psychological distress and its association with socioeconomic and health behaviour factors**

by Xiangdong An, Hui-chuan Chen, Monty Taylor

Abstract: The authors assess the relationships among psychological distress, socioeconomic status, and health behaviour factors. Data from the Canadian Community Health Survey (CCHS) dataset was analysed for this study using hierarchical regression and ANOVA. Results show that daily energy expenditure is positively related with psychological distress. The authors also find that daily fruit consumption, daily green salad consumption, and monthly frequency of leisure activities are negatively associated with psychological distress. Furthermore, the results indicate that people with personal incomes of less than $20,000 perceive significantly higher distress than people with higher incomes. Among five occupation groups, the sales and services group perceives significantly higher distress compared to the other four groups. The four other occupation groups as categorised by CCHS do not perceive significantly different distress levels.

Keywords: *psychological distress; gender; occupation; income; health behaviour; fruit consumption; green salad consumption; leisure activities; energy expenditure.*
DOI: 10.1504/IJMEI.2023.10053931

- **A novel method to predict stroke using deep learning approach**

by Swagata Sarkar, A. Jayashree, R. Thirumurugan, C. Sivakumaran

- **Integer wavelet transform based data hiding scheme for medical image protection**

by Moad Med Sayad, Zermi Narima, Khaldi Amine, Kafi Med Redouane

Abstract: A crucial security and protection challenge today in telemedicine is how to ensure the confidentiality of sensitive data sent over the internet and limit access to specified designated information. To keep such details private, we propose in this work a robust and blind medical image watermarking approach that combines integer wavelet transform (IWT) and singular value decomposition (SVD). Low embedding capacity is a potential drawback of modern integer wavelet transform (IWT)-based watermarking systems. A secure high capacity watermarking scheme based on IWT is proposed in this work to overcome this specific limitation. According to experiment results on imperceptibility and robustness, the proposed solution efficiently maintains a significant quality of watermarked images and the watermark is resistant to the most commonly used attacks in watermarking. The integration of information about the patient in his medical image will avoid any confusion between two images.

Keywords: *medical image; digital watermarking; blind watermarking; integer wavelet transform; IWT; singular value decomposition; SVD; QR code.*

DOI: 10.1504/IJMEI.2023.10055240

- **Segnet and U-Net based brain tumour segmentation**

by R. Ashwini, Swagata Sarkar, C. Pandi, S. Rajalakshmi

Abstract: The process of separating individual brain tumours in diagnostic pictures is an essential component of therapeutic therapy. The manual segmentation process takes a lot of time and requires a lot of work, while the current automated segmentation techniques have problems such as a large number of parameters and a lack of accuracy. We created a completely automated technique for the segmentation of brain tumours by applying deep learning. The system was tested on 285 examples of brain tumours using multi-parametric magnet resonant images taken from either the BraTS2018 data set. The quantitative study of brain tumours is helpful in gaining a better knowledge of the features of the tumour as well as in developing more effective treatment strategies. Through the use of this technology, it was possible to get mean dice values of 0.9213 for the overall tumour and 0.8729 for the tumour core.

Keywords: *brain tumour; BraTS database; computer intelligence; Densenet; U-Net.*

DOI: 10.1504/IJMEI.2023.10055242

- **Myocardial infarction detection in late gadolinium enhancement cardiac MRI**

by Sarra Dali Youcef, Mahammed Messadi

Abstract: Cardiac magnetic resonance imaging (MRI) has become the most used technique for assessing myocardial viability. Myocardial segmentation is a fundamental step in the detection of myocardial infarction (MI) on late gadolinium enhancement (LGE) images. In this paper, we provide a system for automated myocardial infarct detection. The myocardial segmentation is applied to cine images and then transferred to LGE images, to subsequently detect myocardial infarction. We tested our approach on the sunnybrook cardiac database. The proposed method shows remarkable accuracy. We obtained a dice similarity coefficient of 0.92 and an average perpendicular distance of 1.75 (mm) between automated and manual segmentation.

Keywords: *left ventricle; cine MR images; late gadolinium enhanced MR images; myocardial infarct; viability.*

DOI: 10.1504/IJMEI.2023.10055269

- **Medical image registration and automatic hippocampus segmentation through convolutional neural network**

by S. Durga Prasad, K.S.N. Murthy, B. Kannan, C. Sivakumaran

Abstract: Alzheimer's disease (AD) is a brain degenerative ailment that progresses and is irreversible. Mild cognitive impairment, known as MCI, is a clinical indicator that AD may eventually develop. In order to effectively treat and prevent AD, an accurate diagnosis of the illness's early stages is required. AD often manifests its symptoms first in the hippocampus. Deep machine learning was used in this project with the intention of achieving its aim of segmenting a specific region. The suggested method's performance was compared to manual segmentation using similarity measures. The performance of a CNN that segments the hippocampus directly is inferior to that of any contouring technique and the findings were 96% accurate. The quantitative results are improved by the application of stringent corrections to the data, although the gap is still rather large. The suggested technique is promising and may be expanded in AD prognosis by predicting hippocampal volume changes in the early stages of the illness.

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A Novel Method of Enhancing Security Solutions and Energy Efficiency of IoT Protocols

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Abstract— Mobile Ad-hoc Networks (MANET's) are wireless networks that are capable of operating without any fixed infrastructure. MANET routing protocols must adhere to strict secrecy, integrity, availability and non-repudiation criteria. In MANETs, attacks are roughly categorised into two types: active and passive. An active attack attempts to modify or remove data being transferred across a network. On the other hand, passive attack does not modify or erase the data being sent over the network. The majority of routing protocols for MANETs were built with little regard for security and are therefore susceptible to a variety of assaults. Routing technologies such as AODV and dynamic source routing are quite common. Both however are susceptible to a variety of network layer attacks, including black holes, wormholes, rushing, byzantine, information disclosure. The mobility of the nodes and the open architecture in which the nodes are free to join or leave the network keep changing the topology of the network. The routing in such scenarios becomes a challenging task since it has to take into account the constraints of resources of mobile devices. In this an analysis of these protocols indicates that, though proactive routing protocols maintain a route to every destination and have low latency, they suffer from high routing overheads and inability to keep up with the dynamic topology in a large sized network. The reactive routing protocols in contrast have low routing overheads, better throughput and higher packet delivery ratio. AODVACO-PSO-DHKE Methodology boosts throughput by 10% while reducing routing overhead by 7%, latency by 8% and energy consumption by 5%. To avoid nodes always being on, a duty cycle procedure that's also paired with the hybrid method is used ACO-FDR PSO is applied to a 100-node network and NS-3 is used to measure various metrics such as throughput, latency, overhead, energy consumption and packet delivery ratio.

Keywords- Security, Throughput, Internet of Things, Energy Efficient, Mobile Ad-hoc Network, Pocket Delivery Ratio and reactive protocols.

I. INTRODUCTION

A seamless connectivity to users is provided by wireless networks regardless of their location. There are two kinds of wireless networks; one based on fixed infrastructure and the other is Ad hoc networks independent of a permanent infrastructure of any kind. The mobile devices in infrastructure based wireless networks are connected to fixed routers and gateways through a network of access points/base stations [1]. The mobile device in range of a base station remains connected to the network and on moving out of range is handed over to the next base station. A cellular network or a WiFi Local Area Network (LAN) is the example of infrastructure based network. The MANETs assume a trusted behaviour among nodes and are characterized by lack of centralized infrastructure, dynamic topology, open architecture, processing power, short range, and limited bandwidth, memory for storage and battery power [2]. The characteristics of MANETs have the following implications on the operations of MANETs: Multi-hop relaying: When source node and destination node are out of range, then, source node use their neighbour node as a relay nodes to send the packet from sender to receiver. Dynamic topology: MANET uses dynamic topology. Each node moves at different speeds from one place to other place and they dynamically establish routes among themselves.

Energy management: Nodes in MANET fully depend on battery power. Energy management plays a vital role in MANET. MANETs are finding increasing use in military, disaster management, search and rescue operations, surveillance networks, law enforcement operations, sensor networks, vehicular ad hoc networks, public health, security and many commercial applications. In military the MANETs

Hybrid optimized verification methodology using deep reinforcement neural network

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Abstract: Universal Verification Methodology (UVM) caters to an essential role in verifying the different categories of circuits ranging from small-scale chips to complex system-on-chip architectures. Constrained random simulations are an indispensable part of UVM and are often used for design verification. However, the effort and time spent manually updating and analyzing the design input constraints result in high time complexity, which typically impacts the coverage goal and fault verification ratio. To overcome this problem, this paper proposes a novel hybrid optimized verification framework that combines Reinforcement Learning (RL) and Deep Neural Networks (DNN) for automatically optimizing the input constraints, accelerating faster verification with a high coverage ratio. The proposed algorithm uses reinforcement learning to generate all possible vector sequences needed for testing the target devices and corresponding outputs of the target devices and potential design errors. Furthermore, the framework intends to use high-speed deep-feedforward neural networks to automate and optimize the constraints during runtime. The proposed framework was developed using Python interfaced with the TCL environment. Extensive experimentation was carried out using several circuits, including multi-core designs, and performance parameters such as coverage accuracy, speed, and computational complexity were calculated and analyzed. The experiment demonstrated the proposed framework remarkable results, showing its superior performance in faster coverage and fewer misclassification errors. Furthermore, the proposed framework is compared with existing verification frameworks and other classical learning models. Good results demonstrate that the proposed framework increases the 4.5x speed for verifying multi-core designs and the 99% accuracy of detection and coverage.

Keywords: Universal verification methodology, reinforcement learning, deep feed forward neural network, multi-core designs

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Texture Image Analysis for Larger Lattice Structure Using Orthogonal Polynomial Framework

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Texture Image Analysis for Larger Lattice Structure Using Orthogonal Polynomial Framework

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RESEARCH ARTICLE-COMPUTER ENGINEERING AND COMPUTER SCIENCE

An Adaptive MRI-PET Image Fusion Model Based on Deep Residual Learning and Self-Adaptive Total Variation

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Abstract
Multi-modal medical image fusion facilitates construction of composite images capturing complementary features from discrete images of multiple modalities. Fusion of anatomical and functional images captures structural and functional details in the fused image, which enables an integral examination of both images for a through diagnosis. In this paper, we propose an adaptive MRI-PET fusion framework based on a deep learning framework and self-adaptive total variation called DRL-SATV. The proposed model tested on MR_Gad-PET, MR_T1-PET and MR_T2-PET modalities from a benchmark dataset achieves best mutual information values of 3.6964, 3.7170 and 3.5491, respectively, compared to state-of-the-art models. Further, we have established the superiority of the proposed model with other objective metrics, time and design complexity evaluations and behavioral analyses with respect to free parameters, advocating its usage in clinical settings.

Keywords MRI-PET fusion · Self-adaptive total variation · ADMM · Deep residual network · Symmetric network fusion · Regularized auto-pooling

1 Introduction

Recent developments in medical image acquisition systems have significantly improved the diagnostic accuracy, therapeutic assessment and meticulous planning of the treatment regimen. Complex imaging systems capture medical images exhibiting anatomical, functional and thermal profiles of the subjects. An integral image combining these features considerably improves the diagnostic accuracy of several pathologies. Medical image fusion is in practice for more than three decades. Starting with the pioneering work on medical image fusion by Hill et al. [1], this domain has been extensively explored with valuable contributions in the form of representation of candidate images, fusion models, mathematical transforms, etc., as described in [2].

Though medical image fusion is broadly classified into multi-exposure, multi-focus and multi-modal fusion approaches based on the characteristic of the source images, multi-modal fusion has gained wide research attention with the progression of new imaging modalities. Nevertheless, this approach is comparatively very intriguing attributed to the diversity of features to be integrated to construct a fused image without loss of details.

Magnetic Resonance Imaging (MRI) is a predominant modality in medical image fusion due to its proliferating usage in the diagnosis and treatment protocols of several pathologies concerned with abdomen, liver, brain, etc. It captures the tendons, muscles and ligaments of these organs with High Resolution (HR). Similarly, Positron Emission Tomography (PET) is efficient in capturing the internal functions of these organs in response to ligands in the therapeutic treatment of lesions, metastases, tumors, Alzheimer, etc. However, the PET images feature Low Resolution (LR)

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BRAIN CANCER ANALYSIS USING DEEP LEARNING ARCHITECTURE ON MRI BRAIN IMAGE

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Abstract: Brain cancer diagnosis in the medical images sector without human involvement is a huge complex one. The brain tumour tissue can be detected from the whole brain are extremely difficult. Multi-sequence MRI technologyis not standardized in brain tumour segmentation clinical practice and hence, a flexible segmentation process is required which uses all of the available MRI data optimally. The proposed algorithm provides a precise and robust segmentation of tumours, which helps in diagnosis, therapy planning, and risk factor detection. SVM classification and Convolutional Neural Network classification are applied and analyzed. The proposed system obtains more accuratepredictions.

Keywords: Image processing, MRI images, Brain Tumour, SVM classification, Watershed Image Segmentation Techniques, Deep Learning

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High-Speed and Area-Efficient Modified Binary Divider

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Abstract
Division is the least commonly used of the four basic arithmetic operations because it is too difficult to utilize. The primitive use of division is an iterative subtraction. In very large-scale integration realization, the redundant representation of partial remainders and quotient digits is used in digit recurrence binary division. Divider modules are frequently used in digital signal processing and image processing applications. The former uses carry save representation for binary floating point division where the number of iterations is large and also occupied more area. The floating point binary division using carry save representation led to extra power consumptions for initialization and quotient digit selection. The idea is to lower the number of cycles in use while also taking up less space. Therefore, the signed-digit floating point binary division using carry increment adder has been proposed. It implies that carry increment adder has carry lookahead adder which is to minimize the propagation delay. The quotient digit selection is slightly varied to reduce the number of iterations. Result analysis shows that the area and delay are reduced compared to the floating point binary division using carry save representation. The proposed adder is suitable for high-speed applications.

Keywords Approximate unit · Divider · Floating point unit · Carry lookahead adder

1 Introduction

Division is one of the four basic mathematical operations. Addition, subtraction and multiplication are the others. The method of computing the number of times one number is contained within another is known as division of two natural numbers. The

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RESEARCH ARTICLE

A novel haze removal computing architecture for remote sensing images using multi-scale Retinex technique

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Abstract

One of the major degradation arise in the satellite images is poor weather conditions (i.e., haze). Haze is an environmental distortion which significantly affect and minimize the efficiency of remote sensing image interpretation. To tackle this complication, this research work introduced a new approach named as multi-scale retinex histogram equalization with U-Net Dense Optimized Pyramidal (MSRHE with U-Net DOPT) scheme. In this scheme, multi-scale retinex technique is applied to eliminate ambient atmospheric light value of inhomogeneous information and retain only object surface reflection but they suffer from dark tone. So, of contrast limited adaptive histogram equalization is employed to brighten the image tone with limited contrast level. Then the enhanced image is restored using U-Net Dense Optimized Pyramidal technique which deeply extract the feature information with dragonfly optimized ReLU activation unit to enhance the system efficiency. This resolved criteria can greatly improve the image efficiency to generate haze-free image. At the same time, the techniques such as dark channel prior (DCP) method, urban remote sensing haze removal (URSHR) method were employed to comparatively analysed with MSRHE with U-Net DOPT. Three parameters such as peak signal to noise ratio (PSNR), feature similarity (FSIM) and structural similarity index measure (SSIM) were employed to quantitatively estimate the test (query) result. The experimental result concludes that the proposed technique works well when compared with other classic approaches.

Keywords Histogram equalization · Multi-scale Retinex · Remote sensing image · Haze · Dragonfly optimization and restoration

Introduction

Remote sensing (RS) is a technical informative technology essentially intended to observe the earth surface and acquire ground target information. During transmission, an information gathering technology collects huge amount of data that significantly creates data acquisition and data distortion problem. Therefore, RS information processing system has been entered to tackle the problem using several theories or algorithms. While the sensor acquired the image, the respective data is concerned by atmospheric weather condition as a result, it resembles like a hazy image. Hazy image is a weather contaminated scene majorly caused severe complication to outsight observation and remote sensing (RS) detection mechanism. Some particulates of dust, smoke, sand, fog, water vapour etc., are superiorly present in the atmosphere that finally created the atmosphere as haze weather. These suspended particles have powerful absorption and scattering effect on sunlight, therefore that light would possibly provide great attenuation during propagation process. Concentration of light intensity capture the strong attenuation, this determination can greatly reduce the image quality in the form of distorted details, diminished clarity and color degradation. Image degradation is greatly influenced by heavy concentration of haze detail propagation. These distorted images not only create severe problem for color constraint but also reflect bad visual effect. All these negative impacts are seriously create a problem in most significant field of optical imaging application such as target detection system, outdoor observation system, tracking aviation and aerospace remote sensing system etc., So, an image processing technique is applied on the hazy image to obtain a well-effective dehaze output (Huang et al. 2020a). In past literatures, several effective methods have been built in different conceptual idea to

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Multiscale Laplacian graph kernel features combined with tree deep convolutional neural network for the detection of ECG arrhythmia

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ABSTRACT

In this manuscript, Multiscale Laplacian graph kernel features combined with Tree Deep Convolutional Neural Network (MLGK-TDCNN) is proposed for the detection of Electrocardiogram (ECG) arrhythmia. Here, the input ECG signals are taken from two datasets: (i) MIT-BIH AF database (AFDB) (ii) MIT-BIH arrhythmia database (MBDB). These datasets are fully unbalanced dataset, and these datasets are balanced using Improved fuzzy c-means method for unbalanced dataset. Moreover, the de-noised ECG signals are given to the MLGK. The proposed MLGK is to combine the Multiscale kernel features from the Preprocessed ECG signals. The combined Multiscale kernel features given to the TDCNN classifier for the detection of AF with raw normal sinus rhythm (NSR). The proposed approach is activated in MATLAB platform, then the efficiency is analyzed with existing approaches. The experimental outcomes demonstrate that the proposed FFREWT-MLGK-TDCNN approach is compared with two databases. From the analysis, the accuracy of AFDB shows 9.40%, 16.44% and 23.20% better than the existing approaches, the accuracy of MBDB shows 14.67%, 21.42% and 7.54% better than the existing approaches, like novel intelligent approach depending on multi-scale convolution kernel (MCK) and Squeeze-and-Excitation network (SENet) for AF detection, automatic arrhythmia classification strategy using the optimization-based deep convolutional neural network (CNN-BaROA), deep learning method for classifying arrhythmia by using 2-second segments of 2D recurrence plot images of ECG signals (2D-CNN) respectively.

1. Introduction

In some cases, the improper treatment is given to cardiovascular disease leads to sudden death [1]. The electrocardiogram (ECG) is the main factor uses the prediction of cardiovascular diseases (CVDs) [2]. In heart beat classification, the ECG is a significant device to analyze the cardiac arrhythmia [3]. The series of heart beat with abnormal morphology caused by this arrhythmia [4]. Thus, once carried out the signal acquisition, the heartbeat classification is a vital stage [5,6]. The heart-beat classification is separated into 4 groups: signal preprocessing, heart-beat detection with segmentation, feature extraction, classification [7]. A certain methods are utilized to automatic ECG classification, viz frequency analysis, k-Nearest Neighbor clustering, Artificial Neural Networks, Support Vector Neural Network, Convolutional Neural Network, and SVM (Support Vector Machine) [8,9]. In which, CNN is broadly employed ECG classification models. Automated ECG estimation methods, effectiveness predicts good outcome for a variety of reasons [10]. Convolutional Neural Networks present effectual outcomes for particular data type. The classification accuracy is enhanced by data augmentation to enlarge the training data and decreased the feasibility of ignoring ECG beats [11]. Owing to various kinds of noises with physiological artifacts, the ECG signals have been suffered. Differences with individuals' ECG signal indicate irregularity in approaches of categorizing various subjects [12,13]. To improve the difficulty with the automatic evaluation system, there is a time-varying dynamics with the morphological features of identical individual electrocardiogram signals [14,15]. The research concentrating in arrhythmia classification utilizing electrocardiogram signals of the individuals. The arrhythmia classification depends on DNNs that is changed ideally with optimization approach [16–19]. There are several approaches were presented in the

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RESEARCH ARTICLE

Computational efficient compression scheme for satellite images

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Abstract
Satellite image transmission and storage have limitations like limited bandwidth to send the signals to limited number of receiving stations and a huge storage requirements for ultra-resolution photographs. Above limitations and requirements calls for efficient compression algorithms which are least complex and compress the images without affecting the Region of Interest (ROI). This work we propose a compression scheme where a Sigmoidal activation function using orthogonal projection based ELM for shape adaptive compression of water body satellite images. The ROI is determined using saliency maps. Proposed method efficiently compresses the satellite images with adaptive compression with a better PSNR, structural content and normalized errors.

Keywords DCT · SVD · ELM · Saliency maps

Introduction

Satellite images map geospatial features accurately and in detail but comes at a cost of higher storage requirement,hardware throughput constraints (Susilo and Bretschneider 2003) and a large amount of data to be transmitted under low bandwidth with limited amount of receiving stations and lesser time windows when satellites have direct line of sight with receiving stations. Above limitations require image compression algorithms to reduce the dependency on the constraints. A number of image compression techniques can be used for the satellite image compression. Deeksha et al. (Gangadhar and Ananth 2018) and Qusay (Kadhim 2016) performed Direct Cosine Transform (DCT) to compress the image followed by Inverse Discrete Cosine Transform (IDCT) for image reconstruction. Integer DCT was used by Hua et al. (Chen et al. 2010) for progressive satellite images and due to inverse nature of DCT the image was reproduced with lossless results. DCT compression schemes are computationally intensive and affects hardware throughput. Zahraa et al. (Oleiwi et al. 2021) proposed removal of DCT coefficients redundant calculations to reduce the compression complexity. Other least computational techniques are Bandelets transform (Delaunay et al. 2008) which involves directional post processing of wavelet coefficients as an alternate to computationally extensive DCTs. Bandelets are used finding directional correlation between wavelet coefficient in vertical and horizontal direction by taking into account the wavelet subband. Ryan et al. (Ryan and Arnold 1997) suggested another less complex lossless vector quantization on 224 bands Airborne/Visible infrared Imaging Spectrometer Images using Mean Normalized vector quantization (M-NVQ) which yields compression performances with minimum entropy of 5 bits/pixel given an input entropy between 8 to 10 bits/pixel. Khaled et al. (Sahnoun and Benabadji 2013) proposed vector quantization improvement by directly working on the quantization step of input vectors. The best vector code was selected by using the k nearest algorithm was used on the quantization steps of input vectors. Other least complex algorithms were based on removing the sub bands before compression. To remove the subbands, correlation coefficients were determined between the bands by Ahmed et al. (Hagag et al. 2017). For compression, Discrete Wavelet Transform (DWT) was used followed by entropy encoding technique (Huffman

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Research Article

Machine Learning-Based Modelling and Predictive Maintenance of Turning Operation under Cooling/Lubrication for Manufacturing Systems

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Cutting force is one of the significant parameters in the metal cutting process. The metal cutting process is the primary in the production and manufacturing industry to produce high-quality products. Every production and manufacturing needs to develop a technology, i.e., a cooling or lubrication system at the cutting zone while doing the metal cutting process. This current work focuses on developing the machine learning algorithm by using three different types of regression processes, namely, polynomial regression process (PR), support vector regression (SVR), and gaussian process regression (GPR). These three processes are developed to predict the machine learning force, cutting power, and cutting pressure by controlling primary factors (cutting speed, depth of cut, and feed rate). The cooling or lubrication process also affects the machining process. We need to maintain the minimum qualifications to perform under minimum quality lubrication (MQL) and high-pressure coolant (HPC). The ANN algorithm was used to run different parameters, and these parameters are optimized for cutting force.

1. Introduction

In industry 4.O, some techniques are used, i.e., IoT, machine learning, artificial intelligence, blockchain technology, etc. These technologies are tested to enhance the quality and productivity of the industries [1]. Now, several manufacturing industries are working on intelligent manufacturing techniques integrated with several sensors with the machines. These manufacturing sensors were synchronized with the various systems through the IoT and used for different prediction management [2, 3].

Metal cutting predictive models have some excellent characteristics because of prediction by using one or more input parameters to get the output parameters. Modelling and forecasting the cutting force in the turning process is related to the number of parameters [4]. Also, it is the getting of power needed for the machine tool, in any way number of parameters challenging to develop the model. Several

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A novel method of data compression using ROI for biomedical 2D images

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ABSTRACT

In the era of modern medical imaging communal, huge volume of medical image data are being acquired and need to be transmitted and archived which necessitate the development of efficient image compression techniques on both 2D and 3D images. The compression of medical images is an essential process to support remote healthcare services. The medical diagnostics through these services require more accurate information from an image. As the property of inverse proportionality between the compression rate and quality of the image takes place in any kind of compression method, there is a need to sacrifice any one of those credentials (Quality or Compression Rate). With this context, Region of Interest (ROI) codecs are emerging and reduces this proportionality that yields more compression rate without compromising the quality. In this paper, presents an ROI based near lossless image compression method that incorporates the Set Partitioning in Hierarchical Trees (SPIHT) and Vector Quantization coding for medical images.

1. Introduction

The present decade tenants at visually enchanting world, which explores extensive attributes such as colors, textures, motions and so on. The human visual system can easily bear any kind of these attributes and has the potential to discriminate and interpret such things. Imparting such notion to a machinery point of view also evolving through the image processing techniques. Thus, image processing applications becomes on integral part of our life in which the image can convey huge amount of information in a compact form. The substantial growth in utilization of images in variety of fields such as Satellite Imaging, Bio-imaging, Multimedia services and different types of web based applications is impactly elevated. In addition, the medical images also take an essential role in our daily life. Since we live in a Digital Age, image processing plays a significant role in our day-today life by any means. Image compression is a powerful tool to compactly represent an image. It reduces the actual number of bits needed to store the images which effected with low transmission costs. The reversible compression is termed as lossless due to no account of data loss after decoding. In contrast, irreversible compression endured with data loss and hence it is known as lossy compression. In the medical civilization, large number of medical-related data and images are handled. The advancements in medical imaging techniques also increases the practice of both 2D and 3D medical images in the diagnostics process. The quality of medical image is very crucial factor that related to diagnostics accuracy and feasibleness. The lossless compression methods give high reconstruction quality with low compression performance whereas near lossless compression gives appreciable reconstruction quality with better compression performance. With these concern, several image compression methods were proposed for 2D as well as for 3D medical images. Image compression is compulsory for various applications such as multimedia, documents and medical imaging which require huge data storage, transmission and retrieval. Significant storage capacity and transmission bandwidth are needed for uncompressed images. The intention of image compression is to represent image as a data in compact form and this can be done by reducing the redundancy of image data.

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Artificial intelligence and IoT-based biomedical sensors for intelligent cattle husbandry systems

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The presence of many animals with different body types and characteristics necessitates the need for cattle husbandry system. Especially in cows, elevated heart rates have been linked to symptoms of stress, such as sweating and anguish, and they can provide valuable information for monitoring systems. There are many ways to measure a cow's pulse rate. In the current study, cow's pulmonary function, cardiovascular system, contemplation rates and durations have been measured using biomedical sensors. An electro cardiogram-based sensor (ECS) approach for noninvasively monitoring the ruminant's ingestive activity has also been developed in this study. A sensor adapter is used to sample the chewing surface Electrocardiogram (ECG) signal from ruminant animals' masseter muscles while eating. When it comes to this, an intra-ruminal real-time sensor is designed to get accurate information on the ruminal activity of cows while grazing. A Fixed-Length Feature Extraction (FLFE) algorithm is used to analyze the respiratory rate and other factors. Four segmentation methods that have been tested and used to split the chewing signal automatically are Blind Fragmentation (BF), Fixed Duration Peak-Centered Segmentation (FDPCS), Double Onset Segmentation (DOS) and Fixed-Length Feature Extraction (FLFE) algorithm. Digital components have been integrated into an IoT-enabled digital platform for commercial use. The obtained ECG signal is

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Anatomical Region Detection Scheme Using Deep Learning Model in Video Capsule Endoscope

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Abstract: Video capsule endoscope (VCE) is a developing methodology, which permits analysis of the full gastrointestinal (GI) tract with minimum intrusion. Although VCE permits for profound analysis, evaluating and analyzing for long hours of images is tiresome and cost-inefficient. To achieve automatic VCE-dependent GI disease detection, identifying the anatomical region shall permit for a more concentrated examination and abnormality identification in each area of the GI tract. Hence we proposed a hybrid (Long-short term memory-Visual Geometry Group network) LSTM-VGGNET based classification for the identification of the anatomical area inside the gastrointestinal tract caught by VCE images. The video input data is converted to frames such that the converted frame images are taken and are processed. The processing and classification of health condition data are done by the use of Artificial intelligence (AI) techniques. In this paper, we proposed a prediction of medical abnormality from medical video data that includes the following stages as given: Pre-processing stage performs using Gabor filtering, histogram-based enhancement technique is employed for the enhancement of the image. Multi-linear component analysis-based feature selection is employed, and the classification stage performs using Hybrid LSTM-VGGNET with the performance of accurate prediction rate.

Keywords: Video capsule endoscope (VCE); gabor filtering; semantic entropy-based feature extraction; hybrid LSTM-VGGNET

1 Introduction

Video capsule endoscope (VCE) is regarded as the most emergent means of technology for allowing entire gastrointestinal tract examination with negligible invasion. Many indirect procedures like angiography, echo sounding, x-radiography (including CT), and dispensing to identify diseases of the GI tract have been established. Unfortunately, they have been found to have little diagnostic efficiency or are occasionally beneficial even in bleeding detection until they are very active. The greatest way to discover and detect GI problems is by physically examining the GI tract, making endoscopy a direct and effective diagnostic technique. The whole stomach, intestine, and colon may be viewed in a wired endoscopic

Real-Time Inspection in Detection Magnetic Flux Leakage by Deep Learning Integrated with Concentrating Non-Destructive Principle and Electromagnetic Induction

Nallamilli P. G. Bhavani, Ganapathy Senthilkumar, Shahnazeer Chembalakkat Kunjumohamad, Azhagu Jaisudhan Pazhani, Ravi Kumar, Abolfazl Mehbodniya, and Julian L. Webber

One of the most common techniques of pipeline inspection is magnetic flux leakage (MFL). It is a non-destructive testing (NDT) method that employs magnetic sensitive sensors to detect MFL of faults on pipelines' internal and external surfaces. This research proposed a novel technique in real-time detection of MFL with pattern recognition in non-destructive principle using deep learning architectures. Here, the MFL signal has been collected as a large data sequence which has to be trained and validated using neural networks. Initially, the MFL has been detected using Faraday's law of electromagnetic induction (EMI) which is induced with Z-filter in electromagnetic (EM) decomposition. The collected signal of MFL has been classified using convolutional neural network (CNN), and this classified signal has been recognized by the patterns based on their threshold of the signal. By extracting and analyzing magnetic properties of MFL for a signal, the quantitative MFL has exceeded their threshold value from detected signals. Damage indices based on the link between enveloped MFL signal and the threshold value, as well as a generic damage index for MFL technique, were used to strengthen the quantitative analysis.

Introduction

Steel wire ropes are utilized extensively in the metallurgical sector, mining, transportation, construction, cable strayed bridges, tourism and architecture, among other applications. However, after a period of use, some faults in steel wire rope may appear. Steel wire rope deterioration, such as broken wires, fatigue, corrosion, abrasion or wear, causes the structure strength of steel wire rope to decline [1]–[3], and they may even result in disasters. Wire rope safety is becoming increasingly important in today's world. Acoustic emission, electromagnetic methods, X-ray, and other inspection methods have been examined, with the electromagnetic method being the most practical and robust [4].

As the amount of time spent using the product rises, the severity of the damage enhances. If rope cannot be fixed or changed promptly, safe production is jeopardized, putting people and equipment in danger. Fatigue damage like broken wires, wear and corrosion will occur when employing steel wire rope [5]–[6]. The design of the MFL testing system is complicated by the constraints imposed by its portability and some desired capabilities. Magnetic flux (MF) in specimen stays uniform when there is no damage. Flux leakage, on the other hand, happens when local faults cause damage. Because of the volume constraint, obtaining high defect resolution with a coil sensor is quite challenging. Hall sensors, on the other hand, allow for the measurement of MFL's absolute value (B). Because the Hall sensor dimension is so small, resolution of an instrument with a Hall sensor might be increased, and novel concept sensor topologies could be constructed by using an array of them. Many factors influence the resolution and dependability of equipment, including detector topology, sensor technology, defect location and dimension, and signal processing techniques [6].

The contribution of this research is as follows:

- To develop an MFL testing system with pattern recognition in non-destructive principle using deep learning architectures.
- To collect the MFL signals' large data sequence which has to be trained and validated using neural networks.
- To detect MFL using Faraday's law of electromagnetic (EM) induction which is induced with Z-filter in EM decomposition.
- To classify collected signals of MFL using convolutional neural network (CNN).

The paper covers related works, provides an overview of magnetic flux leakage detection in wire rope, shows CNN based MFL signal classification, gives a performance analysis and offers conclusions from the research.

Related Works

The MFL approach has been used in the detection and size of defects in the past. Authors in [7] analyze the use of multilayer Perceptrons (MLP) for MFL data pattern recognition in pipeline weld joints, where machine learning had previously been employed in this context. For defect-shape construction, work reported [6] uses inverse modeling methods.

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Peer–Peer Communication Using Novel Slice Handover Algorithm for 5G Wireless Networks

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Abstract: The goal of 5G wireless networks is to address the growing need for network services among users. User equipment has progressed to the point where users now expect diverse services from the network. The latency, reliability, and bandwidth requirements of users can all be classified. To fulfil the different needs of users in an economical manner, while guaranteeing network resources are resourcefully assigned to consumers, 5G systems plan to leverage technologies like Software Defined Networks, Network Function Virtualization, and Network Slicing. For the purpose of ensuring continuous handover among network slices, while catering to the advent of varied 5G application scenarios, new mobility management techniques must be adopted in Sliced 5G networks. Users want to travel from one region of coverage to another region without any fading in their network connection. Different network slices can coexist in 5G networks, with every slice offering services customized to various QoS demands. As a result, when customers travel from one region of coverage to another, the call can be transferred to a slice that caters to similar or slightly different requirements. The goal of this study was to develop an intra- and inter-slice algorithm for determining handover decisions in sliced 5G networks and to assess performance by comparing intra- and inter-slice handovers. The proposed work shows that an inter-slice handover algorithm offers superior quality of service when compared to an intra-slice algorithm.

Keywords: 5G; latency; bandwidth; radio; slicing; QoS; NFV; machine

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1. Introduction

Since the introduction of the first generation of wireless technology, the telecommunications industry has grown at an exponential rate. The industry's growth can be attributed to an increase in customer demand for network services. Users requesting network services have a wide range of needs, including streaming videos and audio, sending and receiving multimedia files, and making online transactions. These services necessitate network providers providing high levels of QoS, while resourcefully consuming network resources.

In this regard, 5G networks use different kinds of technologies and Network Slicing to accommodate the varying needs of users. Network slicing is the rational division of a physical network structure into multiple autonomous virtual networks, each of which is designed to meet the needs of specific users. The use of radio resources is improved through network slicing, which ensures that only the resources required are readily available. Network slicing ensures that the networks make optimum use of network resources. In order to deliver acceptable QoS, mobility management is a major difficulty in 5G networks where continuous connectivity, smooth at cell borders, is anticipated.

IoT-Based Healthcare Application and Security Framework

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Abstract

Most applications based on wireless sensor networks (WSNs) nowadays are moving toward the Internet of Things (IoT) paradigm. In order to manage the vast amount of digital resources produced by a large number of heterogeneous devices, the IoT idea is combined with the cloud. A common IoT framework that is interoperable with global infrastructure is much sought for. IoT solutions that need human interaction initially require user identification and permission of access requests made by authorised users. This study provides a plan for creating a general foundation for practical Internet of Things applications. Additionally, it comprises the design and analysis of the two most crucial security modules, access control and authentication, which vary from the security characteristics necessary in a completely automated system. The creation of a general multi-layer architecture serves as the foundation of this study endeavour. Here, the integration of the disparate areas is the key concern (intranet, web, cloud, and application). The layered framework's fine tuning capability makes it possible to add, remove, or modify functions at each horizontal tier, making it capable of meeting the majority of needs of IoT-based remote applications. Here, vertical layers serve as the glue holding together the horizontal layers. The four-layer framework's secured workflow is examined, and remote health scenarios are used to test the framework's viability.

Keywords: IoT, Healthcare, Security, Network, Cloud, Internet.

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1. Introduction

Given that there are more Internet-connected gadgets than people on the planet, there is a huge need for automated or semi-automatic interactions. Real-time data capture, high-volume digital content transmission, and processing are all made possible by technological advancements. The idea was developed with the intention of minimising human interference and improving living. Kevin Ashton of the MIT Auto-ID Center initially used the term "Internet of Things" (IoT) to describe this idea. A network of linked computer nodes or networks is referred to as the "Internet" and operates using a set of common protocols. "Things" in this context refer to actual things or commonplace items with processing units that are linked to the Internet to enable access from anywhere at any time. To connect to the Internet, objects must have a distinct identification, such as an IP address [1]. Due to a lack of address space in the IPv4 protocol (232), IPv6 is used to identify a significant number of Internet-

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Circular slot antenna for triband application

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ABSTRACT

We recommend a circular monopole antenna (CMPA) with a central feed to operate in three bands. The antenna is circular and has an 8 cm diameter. The suggested antennas' resonance frequency ranges are 2.43 GHz, 5.24 GHz, and 9.61 GHz. The planned CMPA is made up of two circle-shaped slots cut into the radiating patch. The whole structure is supplied via a microstrip feed line and analysed using CST Studio's electromagnetic simulator, which is based on finite integral technique (FIT). To check the structure, the return loss, radiation pattern, voltage standing wave ratio (VSWR), and gain are all examined. The structure's ideal dimensions are determined using a parametric study of three factors: feed position, feed breadth, and ground size. The proposed CMPA is capable of operating in several bands and has good matching impedance in all of them.

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1. INTRODUCTION

Wireless transmission to single-band antennas in the field is the most rapidly evolving communication technology. It's a method of transmitting data from one point to another without using wires, cables, or any other physical medium. In a communication system, data is transferred across a short distance to a receiver. Wireless communication transmitters and receivers may be anywhere from a few metres (like a television remote control) to thousands of kilometres away (satellite communication). A multiband antenna may operate across many frequency bands [1]–[5]. Multiband antennas consist of two components, one of which is active for one band and the other for another. The antennas may have lower-than-average gains or be physically bigger to accommodate the various bands [6]–[10].

Metamaterials are artificial materials with properties that aren't found in nature. These qualities come from the insertion of small inhomogeneities to assure successful macroscopic behaviour. Metamaterials are now part of the primary electromagnetic stream [11]–[15]. Metamaterials with a one-of-a-kind design and structure are very valuable. Electromagnetic waves interact with inclusions in composite media, generating electric and magnetic moments that affect the bulk composite medium's macroscopic effective permittivity and permeability. This provides criteria such as host material quality, size, form, and inclusion combinations to the designer. All of these design aspects combine to form the final result. The shape of the inclusions in these materials brings up new metamaterial processing opportunities [16]–[20].

Colon Cancer Classification on Histopathological Images using Deep Learning Techniques

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***Abstract*— Colorectal cancer is recognized in each gender around the globe. As per the report generated by WHO in 2018, carcinoma placed within the third position whereas 1.80 million people are affected. Therefore, it is the second most common cancer among females & third among males. An effective way to recognize colon cancer at an early stage and substantial treatment can reduce the ensuring death rates to a great extent. We use histopathological images for classification in our work. In this work, we proposed the best classification methodology based on CNN methods. Then, we used deep learning technology to distinguish between healthy and diseased large intestine tissues. We train a neural network, we're going to use 20% of the image dataset for validation and the other 80% for training. From this we can get the classified output having an accuracy of about 99.7%**

Keywords— Colorectal cancer, Histopathological Images, Deep Learning, Image classification

I. INTRODUCTION

A cancer of the colon or rectum, located at the digestive tract's lower end. Early cases can begin as non-cancerous polyps. Colon cancer can occur in any part of the colon. An examination of entire colon using a long, flexible tube equipped with a camera (colonoscopy) is one way to detect colon cancer and polyps. The tissues that is collected from colonoscopy is examined under a microscope and the image obtained after examination is histopathological image and this histopathological images are used in our work. In our work we use CNN for training our model. CNN is one of the deep learning technique which helps in achieving higher accuracy. Deep Learning, which has emerged as an effective tool for analyzing big data uses complex algorithms and artificial neural networks to train machines/computers so that they can learn from experience, classify and recognize data/images just like a human brain does. Within Deep Learning, a Convolutional Neural Network or CNN is a type of artificial neural network, which is widely used for image/object recognition and classification. Deep Learning thus recognizes objects in an image by using a CNN. CNNs are playing a major role in diverse tasks/functions like image processing problems, computer vision tasks like localization and segmentation, video analysis, to recognize obstacles in self-driving cars, as well as speech recognition in natural language processing. As CNNs are playing a significant role in these fast-growing and emerging areas, they are very popular in Deep Learning. CNNs have fundamentally changed our approach towards image recognition as they can detect patterns and make sense of them. They are considered the most effective architecture for image classification, retrieval and detection tasks as the accuracy of their results is very high. The CNN-based deep neural system is widely used in the medical classification task. CNN is an excellent feature extractor, therefore utilizing it to classify medical images can avoid complicated and expensive feature engineering. Since CNN has these many advantages we are using it in our work in order to achieve high performance and better accuracy.

II. RELATED WORKS

Colorectal carcinoma (CRC) is one of the most common cancers and one of the main causes of cancer-related death globally. This kind of cancer has a considerable burden in most of the regions, according to recent epidemiological statistics, and it is still associated with very high fatality rate. As a result, early tumour detection and differentiation are critical for the life and well-being of a huge number of patients. The examination of hematoxylin and eosin (H&E)-stained tissue sections by microscopy remains the first step in the diagnostic workup of solid tumours. This is a time-consuming process that necessitates meticulous attention to detail. Furthermore, diagnoses are impacted by the expertise and experience of the pathologist, and they are not always repeatable amongst pathologists. We provide a deep learning-based technique for detecting and segmenting colorectal cancer using digitised H&E-stained histology slides. In this study, we show that when compared to pathologist-based diagnosis using H&E-stained slides digitised from clinical samples, this neural network technique provides median accuracy of 99.9% for normal slides and 94.8% for cancer slides. Given our approach's excellent accuracy on normal slides, neural network methods could be used as a screening tool. Many treatments are based on molecular

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Drug delivery system for chronic obstructive pulmonary diseases using IoT

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***Abstract*---**Controlling drug delivery for ventilator circuits is the most difficult task. Most of the medicine is often lost in the exhaled breath, forcing the patient to breathe in a way that suits the flow of the medicine and can cause choking. The internal intercostal muscles contract during forced exhalation, lowering the chest and reducing chest volume, while the abdominal muscles push the diaphragm and contract the chest cavity. For multiple pulmonary lung disorders such as Chronic Obstructive Pulmonary Disease (COPD), asthma and others, this treatment has become an unavoidable part of the normal management strategy. Three types of inhalers that are often used include nebulizers, metered dosage inhalers, and dry powder inhalers. The most popular way to create medical aerosols is via spraying, which is done on both adults and children all over the world, particularly for at-home long-term lung disease therapy and emergency treatment of acute illnesses. The proposed system manages drug delivery in all ventilator environments with and without

Auditory model system to recognise Alzheimer's diseases: speech signal analysis

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Abstract: Alzheimer's disease is a catch-all phrase for a variety of illnesses, including numerous neurodegenerative disorders. A century ago, neurosyphilis-caused dementia was the most frequent cause of dementia in developed nations, but Alzheimer's disease (AD) is today the most common cause. Dementia might still be difficult to diagnose because of a number of barriers. Early symptoms overlap with other disorders, and the potential of several, or mixed, aetiologies are just a few of the factors that contribute to a wide range of possible outcomes. Because language diminishes along with

A Novel Method for Multiple Object Detection on Road Using Improved YOLOv2 Model

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Object detection is a branch of machine vision and image processing that deals with instances of a certain class of semantic items. One of the most significant habits of object detection in intelligent transportation schemes is vehicle detection. Its aim is to extract clear-cut vehicle-type information from photographs or videos of automobiles. A fully convolutional network (FCN) is employed in sophisticated driver assistance systems for high performance and quick object identification (ADAS). A novel vehicle detection model employing YOLOv2 is presented to tackle the difficulties of prevailing vehicle detection, such as the absence of vehicle-type recognition, stumpy detection accuracy and sluggish speed. The detection model is trained using the VOC and COCO datasets, and the detection enactment is evaluated quantitatively using KITTI training pictures. In addition, the performance of the YOLOv2 model was compared to that of prior models.

Povzetek: Razvita je nova metoda zaznavanja več objektov na cesti s pomočjo YOLOv2 modela.

1 Introduction

Moving object detection is a computer technique that compacts with recognizing occurrences of semantic matters of a precise class (such as humans, automobiles, etc.) in a digital picture or video. It is connected to computer vision, image processing, and neural networks. Vehicle detection and pedestrian detection are two well-studied fields. In the field of machine vision, moving object detection has a variety of applications, including picture retrieval and video monitoring.

While new research datasets have increased the number of training sets and testing instances to get closer to real-world situations, detectors' capacity to process big data sets in an acceptable period of time has become a significant concern in addition to accuracy. It is not just the number of classes that matters, but also the training examples.

Detecting moving items in a video clip entail finding them in the frame. Item detection is required by every tracking technique, whichever in all frame or when the object first shows in the video. Various backdrop removal approaches from the literature were simulated for moving object detection. Background subtraction uses the relative difference between the current image and the reference updated backdrop over time. Background subtraction that works well should be able to deal with fluctuating lighting conditions, background clutter, shadows, camouflage, bootstrapping, and foreground segmentation in real time.

The tracking of moving objects in video images has flickered a lot of interest in machine vision. Surveillance systems, navigation systems, and object identification all flinch with object tracking. Object tracking is extremely important in a real-time environment because it allows for an improved sense of refuge through visual information, security and surveillance to recognize people, analysis of customer shopping behavior in retail spaces, video abstraction to attain involuntary annotation of videos, generation of object-based synopses, traffic management to examine flow, and design futuristic video effects.

Huieun Kim et al. offered "On-road object identification using Deep Neural Network" [4], which advocated SSD as a quicker object detection method than R-CNN by 41 frames per second. The model is built on SSD and tweaked with the KITTI dataset, which is made up of on-road environment object classes (SSD is a pre-trained model by Pascal VOC pictures). This work proposes an on-road object identification method based on SSD that overcomes the difficulties of detecting on-road objects using a camera in instantaneous and allows for robust object detection. It creates appearance characteristics from input pictures using convolutional layers and trains object position in 2D image coordinates by calculating loss of object box position (IoU) during the training step. SSD, on the other hand, has the disadvantage of overlooking tiny things due to its grid methodology.

The furthermost representative FCN-based object identification approaches are region-based fully convolutional networks (R-FCN), single shot multi-box detector (SSD), and you only look once (YOLO). To obtain good detection performance, these approaches

Department of Mechanical Engineering – Journal Publications

1. Vellivel, P., Vembu, S., Gunasekaran, A., Sivakumar, V.**Water depth effect on energy, exergy losses, and exergy efficiency of solar still with wick materials: an experimental research** (2023) *Environmental Science and Pollution Research*, . **DOI:** 10.1007/s11356-023-27519-8 **(SCI with IF: 5.190)**
2. Maharajan, S., Michael Thomas Rex, F., Ravindran, D., Rajakarunakaran, S. **Surface morphology studies and corrosion behaviour of plasma sprayed Cr3C2/8YSZ composite coating on SS316** (2023) *Surface Topography: Metrology and Properties*, 11 (2), art. no. 025003, . **(SCI with IF: 2.185)**
3. Chakkravarthy, V., Manojkumar, P., Lakshmanan, M., Eswar Prasad, K., Dafale, R., Vadhana, V.C., Narayan, R.L. **Comparing bio-tribocorrosion of selective laser melted Titanium-25% Niobium and conventionally manufactured Ti-6Al-4 V in inflammatory conditions** (2023) *Journal of Alloys and Compounds*, 952, art. no. 169852, . **(SCI with IF: 6.371)**
4. Sureshkumar, P., Ganesan, L., UmaRani, C., Stalin, B., Sasikumar, C., Rajan, S.T.K., Borek, W. **Effect of strain rate on fractography texture descriptor of AA6063/(Si3N4)x/(Cu(NO3)2)y (x=12%, y = 2–6%)composite after multiple ECAP passes: second order statistical texture analysis conjunction with regression analysis** (2023) *Journal of Materials Research and Technology*, 23, pp. 2750-2783 **(SCI with IF: 6.267)**
5. Chakkravarthy, V., Oliveira, J.P., Mahomed, A., Yu, N., Manojkumar, P., Lakshmanan, M., Zhang, L., Raja, V., Jerome, S., Prabhu T.R, Narayan, R.L. **Effect of abrasive water jet peening on NaCl-induced hot corrosion behavior of Ti–6Al–4V** (2023) *Vacuum*, 210, art. no. 111872. **(SCI with IF: 4.110)**
6. Hadi Attia, M.E., Hussein, A.K., Radhakrishnan, G., Sivakumar V., Younis, O., Akkurt, N. **Energy, exergy and cost analysis of different hemispherical solar distillers: A comparative study** (2023) *Solar Energy Materials and Solar Cells*, 252, art. no. 112187. **(SCI with IF: 7.305)**
7. Pethuraj, M., Uthayakumar, M., Rajesh, S., Abdul Majid, M.S., Rajakarunakaran, S., Niemczewska-Wójcik, M. **Dry Sliding Wear Studies on Sillimanite and B4C Reinforced Aluminium Hybrid Composites Fabricated by Vacuum Assisted Stir Casting Process** (2023) *Materials*, 16 (1), art. no. 259, . **(SCI with IF: 3.748)**
8. Arunagiri, R., Pandian, P., Krishnasamy, V., Ramasamy, R., Rajakarunakaran, S., **Selection of browsers for smartphones: a fuzzy hybrid approach and machine learning technique** (2023) *Knowledge and Information Systems*, . **(SCI with IF: 2.531)**
9. Ganesh, R., Kannapiran, K., Saranraj, R., Praburam, G. **Optimization of Wear Behaviour on Mg-TiO2 Nanocomposite Using Taguchi Grey Relational Analysis** (2023) *Mechanics of Advanced Composite Structures*, 10 (1), pp. 151-156. (Scopus)
10. Maharajan, S., Michael Thomas Rex, F., Ravindran, D., Rajakarunakaran, S. **Erosive and corrosive wear performance and characterization studies of plasma-sprayed**

WC/Cr3C2 coating on SS316 (2022) *International Journal of Applied Ceramic Technology*, 19 (5), pp. 2845-2861. **(SCI with IF: 2.328)**

11. Thirumoorthy, K., Jerold John Britto, J. **A clustering approach for software defect prediction using hybrid social mimic optimization algorithm** (2022) *Computing*, 104 (12), pp. 2605-2633. **(SCI with IF: 2.420)**
12. Sureshkumar, P., Sasikumar, C., Rajan, S.T.K., Jagadeesha, T., Natrayan, L., Ravichandran, M., Veeman, D., Borek, W. **Evaluation of mechanical and wear properties of AA6063/(Si3N4)6%-12%/(CuN2O6)2%-4%composite via PM route and optimization through robust design technique** (2022) *Materials Research Express*, 9 (7), art. no. 076502, . **(SCI with IF: 2.025)**
13. Arunagiri, R., Pandian, P., Krishnasamy, V., Rajakarunakaran, S. **Browser Selection for Android Smartphones Using Novel Fuzzy Hybrid Multi Criteria Decision Making Technique** (2022) *Information Technology and Control*, 51 (3), pp. 467-484. **(SCI with IF: 0.813)**
14. Arun Kumar R., Murugavel Kulandaivelu, K. **Performance comparison of solar still with inbuilt condenser and agitator over conventional solar still with energy and exergy analysis** (2022) *Environmental Science and Pollution Research*, 29 (55), pp. 83378-83388. **(SCI with IF: 5.190)**
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RESEARCH ARTICLE

Water depth effect on energy, exergy losses, and exergy efficiency of solar still with wick materials: an experimental research

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Abstract

This study analyzes the energy and exergy destruction of a solar still with black painted wick materials (SS with BPWM) at different salt water depths (Wd) of 1, 2, and 3 cm. The coefficients of heat transfer for evaporative, convective, and radiant heat transfer have been calculated for a basin, water, and glass. The thermal efficiency and exergy losses caused by basin material, basin water, and glass material were also determined. An SS with BPWM at Wd of 1, 2, and 3 cm has produced a maximum yield of 0.4, 0.55, and 0.38 kg per hour, respectively. An SS with BPWM at Wd of 1, 2, and 3 cm has produced a daily yield of 1.95, 2.34, and 1.81 kg, respectively. From the SS with BPWM at Wd of 1, 2, and 3 cm, respectively, daily yields of 1.95, 2.34, and 1.81 kg were obtained. The highest exergy loss of the glass material, basin material, and basin water for the SS with BPWM at 1 cm Wd was 728.7, 133.4, and 123.8 W/m^2, respectively. The SS with BPWM's thermal and exergy efficiency are 41.1 and 3.1% at 1 cm Wd, 43.3 and 3.9% at 2 cm Wd, and 38.2 and 2.9% at 3 cm Wd, respectively. The results show that compared to the exergy loss of basin water in SS with BPWM at 1 and 3 cm Wd, the basin water exergy loss of SS with BPWM at 2 cm Wd is minimal.

Keywords Solar still · Distillation · Wick materials · Solar energy · Exergy analysis

Nomenclature

SS solar still
Wd basin water depth

Introduction and literature survey

Water, one of the necessities for all living things, is becoming increasingly limited worldwide. As the world's population slowly grows, getting access to potable water has gotten more difficult (Manokar et al. 2018 & 2014). In 2018, the High-Level Political Programme on Sustainable Development of the United Nations chose the issue of "Water and Sanitation," noting that over 2 billion humans worldwide are under severe water stress (Essa et al. 2021a & 2021b). Water scarcity may be effectively addressed by solar technology that makes use of the sun's energy when it is available. One of the potential technologies being continuously developed by researchers worldwide is basin-type SS. The rate of SS evaporation is influenced by a variety of elements, which in turn affect SS production (Balachandran, et al. 2020a & 2020b, Balachandran, et al. 2021, Attia et al. 2021a, 2021b &2021c).

A thorough survey was conducted by Nougriaya et al. and it focused on the Wd impacts (1–15 cm) and basin design on productivity (Nougriaya et al., 2021). For the first time, Taghvaei et al. examined the Wd impact on active SS. Two active SS with different surface areas were used in an experiment that continued for 10 days. Results showed that, in contrast to

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Documents

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Surface morphology studies and corrosion behaviour of plasma sprayed Cr3C2/8YSZ composite coating on SS316
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Abstract
Austenitic Stainless Steel (SS316) is a commonly used material in marine and offshore locations. The components' surface in such environments degrades due to chloride and moisture exposure. Hence, adding a ceramic coating to the surface enhances its functionality. In the present work, Cr3C2 and 8YSZ powders are mixed in an equal ratio to deposit unique composite coated layers on the SS316 substrate by plasma spray coating method. The performance of the composite coating is also compared to that of uncoated, Cr3C2-coated, and 8YSZ-coated substrates. The surface morphology and cross-sectional microstructures of the coated SS316 substrate are examined using scanning electron microscope (SEM) images, and The presence of chemical elements in the coatings is determined using Energy Dispersive x-ray Analysis (EDAX) with elemental mapping. Further, the corrosion resistance of the substrate is evaluated using potentiodynamic polarisation and Electrochemical Impedance Spectroscopy (EIS) methods. The results show that the composite coating has a decreased porosity of 1.33% area and a higher microhardness of 880.02HV compared to bare and other coated surfaces. The corrosion analysis reveals that the composite coating has a decreased corrosion current density (Icorr) of 3.233 × 10-6 mA cm−2 and an enhanced charge transfer resistance of 2396.23 ohms.cm2 due to strong passivation and restricted electrolyte penetration into the coating. Further, the electrochemical corrosion study reveals that the composite coating exhibits the lowest corrosion rate of 0.00004306 mm / year. © 2023 IOP Publishing Ltd.

Author Keywords
8YSZ; chromium carbide; composite coating; corrosion; plasma spray

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Carbides, Charge transfer, Chlorine compounds, Chromium alloys, Chromium compounds, Composite coatings, Corrosion rate, Corrosion resistance, Corrosion resistant coatings, Corrosive effects, Electrochemical corrosion, Electrochemical impedance spectroscopy, Electrolytes, Energy dispersive X ray analysis, Morphology, Plasma jets, Plasma spraying, Steel corrosion, Substrates, Surface morphology, X ray diffraction analysis; 8YSZ, A: Ceramics, Coated layers, Composites coating, Corrosion behaviour, Marine locations, Moisture exposure, Offshore locations, Plasma spray, Plasma-sprayed; Scanning electron microscopy

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Comparing bio-tribocorrosion of selective laser melted Titanium-25% Niobium and conventionally manufactured Ti-6Al-4 V in inflammatory conditions

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ABSTRACT

The present study aims to evaluate the biocompatibility and bio-tribocorrosion potential of selective laser melted (SLM) Titanium-25% Niobium (Ti-25 Nb) alloy. Further the suitability of the Ti-25 Nb implant was assessed by benchmarking with conventionally manufactured commercial Ti-6Al-4 V implant. Ball-on-plate tests were performed on these alloys while submerging them in an acidic sodium lactate (ASL) medium. Simultaneously, the open circuit potential (OCV) of the two alloys were measured before, during and after sliding the indenter. Characterization of the surface morphology and composition after the test revealed that SLM fabricated Ti-25 Nb exhibits superior wear resistance and hence has greater resistance to de-passivation than commercial Ti-6Al-4 V implant. Biocompatibility of the implants, in terms of cell adhesion, cell proliferation, osteogenic differentiation and Alkaline Phosphatase (ALP) activity were also studied on the surfaces of the worn alloys. Results indicate that the worn Ti-25 Nb surface is more conducive for the healthy growth of cells and facilitates more pronounced ALP activity than that of Ti-6Al-4 V, over a duration of 14 days. The superior bio-tribocorrosion performance and biocompatibility of Ti-25 Nb is attributed to SLM induced development of compressive residual stresses, smoother worn surface, higher compactness of the Nb oxides over the alloy surface and negligible toxicity of Nb.

1. Introduction

Ti-alloys, are popular candidates for load-bearing implant applications owing to their high strength-to-weight ratio, good biocompatibility and excellent corrosion resistance [1–4]. Of these, Ti-6Al-4 V is the most popular one and is being commercially used as an implant material. The only concern with the use of Ti-6Al-4 V as an implant material is that it does not have inherent tribocorrosion resistance, which is necessary for implants attached to the joints. Bio-tribocorrosion resistance is specifically required for implants connected to joints because they undergo relative motion, which leads to metal-on-metal rubbing. This causes wear of the implant surface and releases metal debris inside the human body [5,6]. Mouthuy et.al. pointed out that the release / accumulation of metal debris/ metal oxide and ions triggers an inflammatory response around the surrounding local tissues and causes significant

Abbreviations: Ti-25 Nb, Titanium-25% Niobium; SLM, Selective Laser Melting; Ti-6Al-4 V, Titanium- 6% Aluminum- 4% Vanadium; ASL, Acidic Sodium Lactate; OCV, Open Circuit Potential; ALP, Alkaline Phosphatase; β-Ti, Beta Titanium; AM, Additive Manufacturing; LPBF, Laser Powder Bed Fusion; H2O2, Hydrogen Peroxide; ZMR, Zimmer; OCP, Open-Circuit Voltage Potential; ICP, Inductively Coupled Plasma; AFM, Atomic ForceMicroscopy; XRD, X-ray diffraction; MC, Clonal Murine Cell; DAPI, Damidino –Phenylindole; CLSM, Confocal Laser Scanning Microscopy; CCK-8, Cell Counting Kit-8; ICMP, Inductively Coupled Mass Impedance Spectroscopy; ANOVA, Analysis of variance; FESEM, Field Emission Scanning Electron Microscopy; IPF, Inverse Pole Figures; EBSD, Electron Backscatter Diffraction; Rq, Average Root Mean Square Roughness; EDS, Energy Dispersive Spectroscopy; XPS, X-ray Photo-Electron Spectroscopy

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Original Article

Effect of strain rate on fractography texture descriptor of AA6063/$(Si_3N_4)_x$/$(Cu(NO_3)_2)_y$ (x=12%, y = 2–6%)composite after multiple ECAP passes: second order statistical texture analysis conjunction with regression analysis

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ABSTRACT

The tensile strength of the ECAP processed composite of AA6063/(Si3N4)x/(Cu(NO3)2)y (x=12%, y=2-6%) at various strain rates from 0.0001 to 1s-1 with an increment of 10 was examined in relation to the seven-fracture image texture descriptor through void features such as void size and distribution. In order to measure the matrices of voids on the fracture surface created through the coalescence of void results to enhance the material hardening as strain rate increases, the second order statistical texture analysis has been used. With respect to the rising strain rate, it was observed that the composite fracture image feature parameter correlation, homogeneity improved by 6 %, and 20.74% for AA6063/12%Si3N4/6% Cu(NO3)2 after I passes as compared to AA6063/12% Si3N4 after III pass. The contrast was reduced by around 58.643% when reinforcement went from a single reinforcement of 12% Si3N4 with I Pass to a composite of two reinforcements (Si3N4, Cu(NO3)2) that had 6% Cu(NO3)2 with I Pass. After three passes on AA6063/12%Si3N4/2%Cu(NO3)2, the maximum entropy was seen due to the material's increased plastic deformation, which led to an uneven particle distribution. As strain rate and copper nitrate percentage grew from 0 to 6

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Effect of abrasive water jet peening on NaCl-induced hot corrosion behavior of Ti–6Al–4V

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ABSTRACT

Hot corrosion studies were performed on pristine and abrasive water jet peened (AWJP) Ti–6Al–4V surfaces. Oxide scales form on the peened and pristine surfaces when coated with NaCl and exposed to 600 °C for 100 h. Despite similar oxide compositions on both surfaces, the thickness and roughness of the oxide scale on the AWJ peened surface is lower. The hot corrosion rate of the pristine surface is 2.5 times higher than that on the AWJ peened surface. Enhanced hot corrosion resistance of the latter is attributed to compressive residual stresses on the surface that retards diffusion of chloride in the material.

1. Introduction

Ti–6Al–4V alloy is widely used in the fabrication of gas turbine engine components and fuel storage tanks of jet engines [1–3] due to its high specific strength and excellent elevated temperature mechanical properties [4,5]. Additionally, they have good corrosion resistance in ambient conditions as a stable and coherent TiO_2 film, which prevents its further oxidation, forms on the surface. However, when exposed to corrosive environments at high temperatures, components made from Ti–6Al–4V undergo hot corrosion. Hot corrosion occurs when a metallic component is repeatedly exposed to extremely high temperatures in the presence of difficult service environments like alkali sulphate deposits or sulfur-containing gases [6–8]. For instance, some of the by-products that get generated from the combustion of low-grade oil fuels such as, Na_2SO_4, NaCl and V_2O_5, are highly corrosive [9]. Of these, NaCl causes the most intense hot corrosion damage in Ti–6Al–4V [10]. Prolonged exposure of the component to NaCl at temperatures $\geq$600 °C leads to the formation of a dense oxide scale over the alloy surfaces. Anuwar et al. [11] noted that low altitude flying aircraft components made from Ti–6Al–4V also experiences hot corrosion attack while flying across the sea, which is abundant in NaCl. It the context of preventive measures for hot corrosion, it was observed that several surface modification techniques such as Hot Isostatic Pressing (HIPing) [12], laser shock peening [13,14], surface coating [15], shot peening [16], ultrasonic peening [9] and electrochemical processing [17] help in mitigating hot corrosion damage caused by NaCl. The subsurface modification depth in these techniques can range from few μm to mm [18]. For instance, Kumar et al. showed that ultrasonic shot peening of Ti–6Al–4V can modify the

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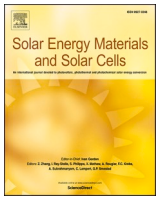

Energy, exergy and cost analysis of different hemispherical solar distillers: A comparative study

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ABSTRACT

The experimental study of the results of reflective aluminum foils, metal sheets, and phosphate granules on the productivity and efficiency of hemispherical solar stills was given throughout this work under the solar conditions of the city of El-Oued (Algeria). Solar stills were designed, manufactured, and tested in August 2020. A standard hemispherical solar still was made of wood and coated with black silicon. It was considered a traditional solar still. Although it was compared to traditional solar stills, it was improved by covering its side walls with reflective aluminum foil, zinc metal sheets, and copper sheets. It had been found that the productivity of the modified still was 8.67%, 29.08%, and 42.35%, respectively, on top of that of the traditional solar still. This could be due to the activity of the foils and metals, which reflect more radiation and store energy, increasing the temperature of the salt water in the basin. In the second experiment, three modified solar stills in line with aluminum foil and phosphate granules (30 g/L), zinc metal sheet and phosphate granules, and copper metal sheet and phosphate granules were collectively used. It had been found that the productivity of the modified solar still with aluminum foil and phosphate granules (the improvement rate is 30.61%) was on the far side of that with zinc metal sheets and phosphate granules (the improvement rate is 49.961%) and copper metal sheets and phosphate granules (the improvement rate is 62.24%).

1. Introduction

Solar energy is one of the best-known and most abundant energy sources among all the totally different renewable energies [1]. It is worth noting that the total radiation falling on the planet each year is approximately (7500 times) the annual global energy consumption [2,3]. Nowadays, alternative energy is expeditiously utilized in many industrial fields like air-conditioning and refrigeration, water heating and cooling, cooking, irrigation systems, physical phenomenon systems, greenhouses, power generation, absorption cooling systems, and water distillation [4]. Solar distillation systems have attracted much attention from scientists and researchers, notably over the past few decades. The reason for this increasing attention is their efficiency in ever-changing binary compounds or briny water into contemporary forms with a high degree of purity, victimizing clean and free alternative energy [5,6]. In fact, natural freshwater sources such as rivers, lakes, swamps, wells, underground waters, and ponds are dwindling step by step, day by day, and year by year due to a variety of uncontrollable factors such as environmental pollution, rapid growth, particularly in developing countries, and severe climate change [7,8]. For all of these and other reasons, low-cost systems to supply fresh water and distill water using solar energy are required. The solar still, also known as the solar distiller, is the most important component of those systems. The principle of operation is extremely easy and is comparable to the well-known

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Dry Sliding Wear Studies on Sillimanite and B_4C Reinforced Aluminium Hybrid Composites Fabricated by Vacuum Assisted Stir Casting Process

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Abstract: This paper presents the results of studies to understand the influence of hybridisation on mechanical and tribological behaviour as well as dry sliding wear of aluminium metal matrix composites. Sillimanite and boron carbide (B_4C) were used as primary and secondary reinforcements and pure aluminium was used as the matrix material. The composite was fabricated by using a vacuum assisted stir casting process. Different research instruments were used, including a scanning electron microscope with EDX spectrometer, a surface measurement device, a thermal image analyser, as well as a tribotester. The results show that tensile, impact strength and hardness of the hybridised composites are superior (a step ahead) than unreinforced and primary composites. The wear behaviour of the fabricated specimens was tested for the dry sliding wear behaviour under the load range of 10–50 N with the steps of 20 N for the sliding velocities 0.75, 1.5 and 2.25 m/s over a distance of 1000 m. The wear rate increased with load and decreased as the wt.% of reinforcement increased. The wear rate of the composite with 10 wt.% Al_2SiO_5 was approximately 44% lower than that of the composite with 5 wt.% Al_2SiO_5. The same dependence was noted for hybrid composite (5 wt.% Al_2SiO_5 + 5 wt.% B_4C)—the wear rate was approximately 50.8% lower than that of the composite with 5 wt.% Al_2SiO_5 under the same test condition. The friction coefficient decreased as the weight percentage of the reinforcement (Al_2SiO_5 and B_4C) increased due to the uniform distribution of the reinforcement on the surface of the composites. The main wear mechanism of the studied materials was abrasion wear. The wear mechanism of the composite had tribochemical type. It involved the oxidation and transfer of the material, which formed protective tribolayers ensuring an additional sliding process. The mechanism that played the main role in the wear process of the composites was a combination of abrasive, adhesive and oxidative wear.

Keywords: sillimanite; boron carbide; hybrid composites; mechanical properties; friction coefficient; wear rate; surface characteristic

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1. Introduction

The major global industrial sectors, such as automobile, aerospace, military and nuclear, are experiencing the advantage of using particulate reinforced Aluminium Metal Matrix Composite (AMMC) because of its exceptional mechanical and tribological

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REGULAR PAPER

Selection of browsers for smartphones: a fuzzy hybrid approach and machine learning technique

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Abstract
The telecommunication segment has grown tremendously over the past few decades. Particularly smartphones have now turned out to be essential and have outperformed many gadgets like computers, cameras, etc. In this current scenario, smartphones become an essential product for all kinds of consumers such as students, teachers, businessmen, etc. And the consumers also like an extensive number of enhanced and better-quality features being embedded into them. Along with this growth, there is a fast growth of mobile application software providers also. Apart from calling, many consumers use smartphones for browsing the internet. Many android developers provide browser application software with several advancements. This puts the consumers into confusion to select a better browser for their smartphone to accomplish their requirements. Hence the consumers need a proven methodology to select a better browser for their smartphones. To select a better browser, in this paper a hybrid multi-criteria decision making model is proposed by integrating grey relational analysis (GRA) and fuzzy analytical hierarchy process (FAHP). The findings are compared and validated through a machine learning approach also.

Keywords Browser selection · MCDM · GRA · FAHP · Machine learning · Decision tree

1 Introduction

There are rapid and remarkable developments in communication and information technologies in the past 20 years. Among these developments, the usage of mobile phones has increased exponentially in a short period. In earlier days, mobile phones were used only for making calls as an alternative to telephones and telegrams. After the launch of smartphones, they replace many gadgets like digital cameras, computers, etc., using mobile application software [1]. Smartphones are enhancing the experience of mobile internet users to access

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Optimization of Wear Behaviour on Mg-TiO_2 Nanocomposite Using Taguchi Grey Relational Analysis

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KEYWORDS

Optimization;
Process parameters;
Wear;
ANOVA;
Grey relational grade.

ABSTRACT

In this research, the dry sliding wear behaviour of the Mg-TiO_2 nanocomposite is analyzed by conducting a wear test using a pin-on-disc wear testing machine under normal atmospheric conditions. The process parameters considered during the test are the weight fraction of TiO_2 nanoparticles, normal load, and sliding speed. The sliding distance and wear track diameter are maintained constant at 1500 m and 90 mm respectively during the test. The performance measures are cumulative wear and coefficient of friction. Taguchi-based Grey relational analysis is employed in this study to optimize the performance of the wear behaviour of the nanocomposite. The design of experiments considered in this study is L9 orthogonal array with each process parameter for three levels. Grey relational grade (GRG) is computed for each experiment and it was found that the maximum GRG of 0.825 is obtained for the process parameter combination A3B2C1 which corresponds to 5wt% TiO_2, 1 kg normal load and 1.5 m/s sliding speed respectively. The initial GRG estimated is compared with the predicted and experimental values for the optimum process parameters and it was found that there is an improvement in GRG by 2.2% and 0.77% respectively. ANOVA (Analysis of variance) is carried out to estimate the process parameter that influences the wear behaviour of the nanocomposite significantly and later concluded that the process parameter normal load is the most significant factor other than any other factors.

1. Introduction

Pure magnesium and magnesium-based metal matrix composites are emerging as a new class of engineering materials with applications in aerospace, automobiles, structural engineering, and biomedical. Magnesium alloys and composites have recently attracted much interest due to their specific characteristics, such as low density and high specific strength despite having low creep resistance, wear resistance, and modulus. [1] The reason for this is that adding appropriate reinforcements in the right form can considerably improve the material's above-mentioned qualities. For example, adding particle reinforcements such as Titanium oxide (TiO_2), Titanium carbide (TiC), Silicon carbide (SiC), Aluminum oxide (Al_2O_3), and others to pure Mg or Mg alloys may greatly improve the material's mechanical behaviour. [2-4] Due to magnesium's affinity for oxygen, the processing and manufacture of magnesium-based composites are thought to be more difficult. As a result, the initial cost of producing magnesium-based composites was raised. In order to solve this challenge, the powder-based fabrication method is preferred, which has become increasingly popular in recent years, as they are easier to fabricate and more cost-effective. When opposed to liquid-state processing processes, powder metallurgy has fewer oxidation and flammability concerns. Though magnesium-based composites have a number of drawbacks, low wear resistance has received increasing attention as a result of magnesium's use in vehicle and biomedical applications. [5] The wear behaviour of the material has a greater impact on performance in these applications than any other mechanical

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Documents

Maharajan, S.[a] , Michael Thomas Rex, F.[b] , Ravindran, D.[c] , Rajakarunakaran, S.[a]

Erosive and corrosive wear performance and characterization studies of plasma-sprayed WC/Cr3C2 coating on SS316

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Abstract
Plasma spray coating with ceramic carbide is a promising approach for improving the surface quality of the materials. In this work, the effectiveness of tungsten carbide (WC), chromium carbide (Cr3C2), and the composite coating of the two powders in the weight ratio of 50:50 were investigated. In the erosion test, aluminum oxide (Al2O3) particles were combined with a high-speed air-jet and impinged at 90° on the top surface of the material. Electrochemical polarization and electrochemical impedance spectroscopy studies were conducted with a 3.5 wt.% of sodium chloride (NaCl) solution as the electrolyte. Using a scanning electron microscope, the surface morphology of powders and coatings, as well as the mechanisms of erosion and corrosion, were studied. Energy-dispersive X-ray analysis and X-ray diffractometry were used to reveal the composition and elemental distribution of the feedstock powders and coatings. Because of the presence of hard phases, the composite coating shows the highest average microhardness of 1350.2 HV. The composite coating exhibits improved erosive wear resistance with an increase in erodent exposure time. The Cr3C2 coating has a reduced corrosion current density of 1.404 × 10−5 mA/cm2 and a higher charge transfer resistance of 2086.75 Ω cm2 due to passivation. © 2022 The American Ceramic Society.

Author Keywords
chromium carbide; composite coating; corrosion; erosion wear; plasma spray; tungsten carbide

Index Keywords
Alumina, Aluminum oxide, Charge transfer, Corrosion resistant coatings, Electrochemical corrosion, Electrochemical impedance spectroscopy, Electrolytes, Energy dispersive X ray analysis, Erosion, Morphology, Plasma jets, Plasma spraying, Powders, Scanning electron microscopy, Sodium chloride, Surface morphology, Tungsten carbide, Wear of materials, Wear resistance, X ray powder diffraction; Characterization studies, Composites coating, Corrosive wear, Erosion wear, Erosive wear, Performance study, Plasma spray, Plasma-sprayed, Wear characterization, Wear performance; Composite coatings

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Documents

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A clustering approach for software defect prediction using hybrid social mimic optimization algorithm
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Abstract
In this information era, software usage is intertwined with daily routine work and business. Defects in software can cause a severe economic crisis. It is a crucial task in the software industry to be able to predict software defects in advance. Software Defect Prediction (SDP) aims to identify the potential defects based on the software metrics. A software module is a software component(piece of program) that contains one or more procedure. In this study, we propose a clustering approach for grouping the software modules. This work proposes a hybrid elitist self-adaptive multi-population social mimic optimization technique (ESAMP-SMO) for clustering the software defect modules. The objective function (fitness function) of the proposed study minimizes the intra cluster distance and maximizes fault prediction rate. In this study, we used the three popular benchmark NASA datasets (CM1, JM1 and KC1) for the experimental work. The performance comparison analysis shows that the proposed clustering technique outperforms the other competitor approaches. © 2022, The Author(s), under exclusive licence to Springer-Verlag GmbH Austria, part of Springer Nature.

Author Keywords
Elitism; Hybrid social mimic optimization; Multi-population; Self-Adaptive; Software defect prediction

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Defects, Forecasting, Software engineering; Clustering approach, Elitism, Hybrid social mimic optimization, Multi population, Optimisations, Optimization algorithms, Self-adaptive, Software defect prediction, Software defects, Software modules; NASA

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PAPER

Evaluation of mechanical and wear properties of AA6063/$(Si_3N_4)_{6\%-12\%}$/$(CuN_2O_6)_{2\%-4\%}$ composite via PM route and optimization through robust design technique

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Keywords: AA6063 alloy composite, powder metallurgy, hardness, wear analysis, inorganic reinforcement, taguchi design of experiments

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Abstract

The study is to investigate the physical, mechanical, and tribological properties of Al6063 alloy reinforced by Silicon Nitride (Si_3N_4) & compound Copper Nitrate (CuN_2O_6) processed via Powder Metallurgy (PM) Techniques. Incorporation of reinforcement in matrix material ranged from 6 to 12% Si_3N_4 in a 6-step interval, and 2 to 6%CuN_2O_6 in a two-step interval. The characterizations were made on the PM produced specimens using OM, EDS, XRD and hardness. The reinforcement particles were distributed uniformly is attributed by homogeneous mixer of matrix and reinforcements. The tests were carried out in accordance with ASTM Standards on the Al6063 alloy and its composites. The test findings show that as the reinforcing percentage of ceramic and inorganic compound is increased, properties such as hardness and density rise monolithically and considerably. The dispersion of Si_3N_4 and CuN_2O_6 reinforcement in the AA6061 matrix was ensured by x-ray diffraction patterns. In comparison to the base alloy, the hardness of AA6063/12%Si_3N_4/6% CuN_2O_6 improved by 88% due to the mismatch of thermal expansion between the Al matrix and reinforcement causes huge internal stress, causing the aluminium matrix to deform plastically to lodge the smaller volume expansion of Si_3N_4 and CuN_2O_6 particles. The dry sliding wear test was carried out on a tribometer with a pin-on-disc arrangement, and the findings show that the composite has a higher wear resistance. The Taguchi design of experiments was used to investigate the solution containing parameters employing an orthogonal array, the signal-to-noise ratio, and analysis of variance. The weight percentage of Si_3N_4/CuN_2O_6 compound and the relationship between wt% of reinforcement and applied load had the highest impact on composite wear resistance, accounted for 31.66%. Before and after the wear morphology during the wear test, images from a scanning electron microscope and energy dispersive microscopy were used to examine the manufactured composites.

1. Introduction

In the recent decades, Hybrid Aluminum matrix composite (HAMC) has been used for many applications such as aerospace, automobile, marine and light weight components due to their attractive properties such as good specific strength, specific modulus. Because of its light weight and great strength, aluminium is widely employed

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Browser Selection for Android Smartphones Using Novel Fuzzy Hybrid Multi Criteria Decision Making Technique

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Browser Selection for Android Smartphones Using Novel Fuzzy Hybrid Multi Criteria Decision Making Technique

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IT and Telecommunication sector has grown massively over the past few decades. Mobile phones that were initially developed for making calls and now become an essential item and are just not restricted to calling. They have dominated most of the gadgets like computers, cameras, etc. Regularly people come across an extensive number of enhanced and better-quality features being built-in with them. A variety of mobile phones with different shapes and sizes are manufactured within a wide range of budgets. This is the key motivation behind an exponential growth in the number of users and the arrival of new manufacturers in the field. Along with this growth, there is a fast growth of mobile application software providers also. Apart from calling, many consumers use smartphones for browsing the internet. This puts users into a dilemma to select a better browser for their smartphone to fulfill their requirements. With this aim, an attempt is made in this paper for the evaluation and selection of a better browser. To achieve this, a hybrid Multi Criteria Decision Making (MCDM) approach is proposed by combining Analytical Hierarchy Process (AHP), COPRAS (Complex Proportional Assessment of alternatives) technique and Fuzzy Analytical Hierarchy Process (FAHP).

KEYWORDS: Browser Selection, Multi Criteria Decision Making, AHP, COPRAS, FAHP.

Performance Comparison of Solar Still With Inbuilt Condenser and Agitator Over Conventional Solar Still With Energy and Exergy Analysis

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Performance comparison of solar still with inbuilt condenser and agitator over conventional solar still with energy and exergy analysis

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Abstract
Demand for fresh water increases day by day. Solar desalination is one of the promising technologies to meet this demand in an economical fashion which uses solar still. For the current study, single-basin single-slope conventional solar still and a modified single-basin single-slope solar still with inbuilt condenser and agitator were designed and fabricated. Both the stills were tested under the same ambient conditions to compare the performance. Through experimental results, it was found that modified still with inbuilt condenser and agitator had 98.69% more productivity than conventional solar still. Modified still productivity was recorded as 4.856 L/m2/day and that of conventional still was 2.44 L/m2/day. The agitation effect caused by the agitator in the modified still led to an increase in the rate of evaporation. The increase in condensing area for the same evaporation area of the modified still improved the condensation rate. These two synergized effects resulted in an overall performance improvement of the modified still over the conventional still. An energy analysis revealed that modified still is 24.42% more efficient than its counterpart. The energy efficiency of modified and conventional stills was calculated as 4.82% and 2.04% respectively. © 2022, The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature.

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Agitator; Desalination; Energy; Exergy; Inbuilt condenser; Solar still

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A feature selection model for software defect prediction using binary Rao optimization algorithm

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ABSTRACT

In this digital world, using software has become an important part of daily life and business. The software must be rigorously tested in order to avert a financial crisis. The defect-free software enhances the functionality of the business. Predicting software defects in advance is a crucial task in the software industry. The aim of Software Defect Prediction (SDP) is to locate the possible software bugs. This paper proposes a hybrid feature selection (filter–wrapper) approach based on the multi-criteria decision making (MCDM) method and the Rao optimization method for selecting the more informative features to improve the software defect prediction rate. The proposed work measures the fitness of the candidate solution by using the defect prediction rate and the feature selection ratio. The performance of the proposed method is evaluated using three popular benchmark NASA datasets (PC5, JM1, and KC1) and compared with the state-of-the-art methods. The proposed feature subset selection scheme identifies the most significant feature subset for defect prediction with an average accuracy of 95% on the benchmark datasets. According to the experimental results, the proposed hybrid approach outperforms the standard strategy in terms of defect prediction rate.

1. Introduction

In this century, internet users are using various software in the form of web applications and mobile applications, in which the quality of software is considered to be one of the most significant components in software development [1,2]. In computer programming, a software defect is an error that has an incorrect impact and reduces the software's reliability. Software defects can be caused by logic errors, requirement errors, or design errors [3,4]. Finding defects in a software module can be extremely challenging for a software tester. Software Defect Prediction (SDP) is an essential part in the software development process. During the process of software testing, the automated software defect prediction system provides assistance to the software professional. The supervised machine learning algorithms are used to develop the software defect prediction system. It uses the supervised dataset to build the software defect prediction model. The feature space of the dataset is high. The high dimensional feature space reduces the performance of the defect prediction system. The high dimensional feature space may contain the redundant and non-informative features. In order to improve the performance of the fault prediction system, the feature selection is one of the dimension reduction(feature selection) techniques which improve the performance of the prediction system [5]. Basically, feature selection strategies are grouped into the following,

- Filter method: The filter-based approach [6] applies the scoring methodologies such as Information Gain, Gini index, etc. to all the feature. It computes the significance score of each feature. Finally, it uses the significance rank to pick the top-rated features.
- Wrapper method: The main goal of the wrapper-based strategy is to select the best subset of features [7]. The wrapper based approach depends on a specific supervised learning algorithm.

1.1. Software description record representation

The software description dataset S is a set of software modules. Let software dataset contains 'k' software modules, and is denoted as $S = \{s_1, s_2, s_3, \ldots, s_k\}$. The software description record is described by various software metrics. The set of software metrics is denoted as $M = [m_1, m_2, m_3, \ldots, m_l]$, where l is the total number of software metrics. Each software description record s_i is represented as a vector $\langle w_{i1}, w_{i2}, w_{i3}, \ldots, w_{im}\rangle$ where w_{ij} denotes the software metric value of m_j which is taken on the software s_i. Table 1 shows a typical software description record dataset in terms of feature(software metric) vector.

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ENVIRONMENTAL PROGRESS & SUSTAINABLE ENERGY

ORIGINAL RESEARCH

Sustainable Energy

Experimental studies of solar still with tar-coated blue metal stones: Energy and exergy study

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Abstract

In the present manuscript, performance studies of Solar Still (SS) were studied for the climatic conditions of Erode, India. Three different experiments were conducted: Conventional SS (CSS), CSS incorporated with blue metal stones, and CSS incorporated with tar-coated blue metal stones. Furthermore, the energy and exergy efficiency of the CSS is evaluated. The daily-distilled yield by incorporating the tar-coated blue metal stones in CSS is 3.21 Kg and blue metal stones in CSS is 2.89 Kg with augmentation of 34.4% and 27%, respectively than the CSS. The distilled water production during daytime (8 a.m.–6 p.m.) from the CSS, CSS incorporated with blue metal stones, and CSS incorporated with tar-coated blue metal stones is 2.02, 2.59, and 2.83 kg, respectively. Similarly distilled water production during nighttime (7 p.m. to 11 p.m.) is 0.08, 0.29, and 0.39 kg, respectively. The distilled water production during daytime and nighttime from the CSS incorporated with tar-coated blue metal stones and CSS incorporated with blue metal stones are 28.3%, 22%, 78.6%, and 71.7% higher than the day-time and night-time yield from the CSS. Also, the energy and exergy efficiency of the CSS incorporated with tar-coated blue metal stones and CSS incorporated with blue metal stones is 21.6% and 1.63%, and 20% and 1.4%, respectively.

KEYWORDS
distilled water, energy storage, solar energy, solar still, tar-coated blue metal stones

1 | INTRODUCTION

Water, one of the most basic needs of all living beings, is becoming increasingly limited around the earth.[1–3] Access to potable water has become an issue as the world's population continues to grow.[4–6] Water and sanitation were chosen as the issue for the United Nations High-Level Political Program on Sustainable Development in 2018, and it is estimated that over 2 billion people throughout the world are under water stress.[7,8] Solar technologies can be used to harness the Sun's energy and provide a long-term context of water scarcity. SS is one of the promising technologies that researchers all over the world are working on right now. The evaporation rate of SS is influenced by several factors, which have an impact on the still's output.[9,10]

Parsa et al.[11] have performed a comparative study on two SS (active and passive) located at Tochal 3964 m and Tehran 1171 m. The performance factors such as yield, energy, economic, environmental, energy matrices, and heat transfer were carried out for two different altitudes. The active SS is similar to passive SS but incorporated with 4 thermoelectric modules for heating saltwater in the basin. The author reports that at Tochal and the city of Tehran, the annual yield for active and passive SS's was 2122.8, 2971.8, 717.36, and 916.5 L / year respectively. The output of SS's at Tochal is higher compared to the similar SS's at Tehran by 39.96% & 27.7%, respectively. It is also observed that daily energy output at the summit of the mountain for active SS is greater by nearly 0.139, 0.312, and 0.351 kWh/day. Similarly, energy output for active solar still is greater

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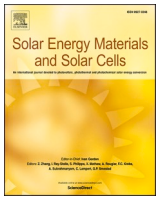

Enhancing the productivity of hemispherical solar distillation by using energy storage (rubber) and wick materials at different thickness

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ABSTRACT

The yield produced from conventional hemispherical solar still (CHSS) is limited. Modified hemispherical solar still (MHSS) using rubber and wick materials at the basin of the HSS are examined in this research paper. To experimentally studied the effect of rubber materials at different thicknesses (2.5, 5, 7.5, and 10 mm) and wick materials at a different thicknesses (1.5, 3, 4.5, and 6 mm), under the same operating conditions, three equal HSS units are designed and constructed. The experiments were conducted in four days, under the climatic conditions of the city of El Oued-Algeria. The experimental results showed that a rubber material at a different thickness (2.5, 5, 7.5, and 10 mm) improves the yield by 14.29, 26.53, 35.71, and 46.94%, respectively as compared to the CHSS. Also, using wick materials at different thicknesses (1.5, 3, 4.5, and 6 mm) improves the yield by 12.24, 22.45, 30.61, and 40.81%, respectively, as compared to the CHSS. This modification is very efficient and inexpensive because rubber and wick materials are available at a cheap price. After comparing the yield of HSS according to the thickness of the rubber and wick materials used, we found that the more thickness of the materials (rubber and wick), the better the yield. Therefore, we recommend using thicker materials.

1. Introduction

Algeria is located in North Africa between lines (12° E and 9° W, 19° N and 37° N). The Sahara covers 80% of its territory, where its geographical nature and its distinct astronomical position make it rich in energy potentials as a result of most of its lands receiving a large annual rate of solar radiation. At the same time, several communities living in isolated areas suffer from a shortage of drinking water. These communities are supplied freshwater by trucks fitted with water tanks from elsewhere. However, some areas do not reach transport trucks with drinking water due to the lack of access roads. However, the transportation cost increases the cost of drinking water [1-3]. Hence, a suitable solution to the problem of shortage of fresh water in remote areas is to use a simple device called a solar distillation device. Free energy partially offsets the cost of consuming drinking water. Solar distillation is the most suitable technology for desalination in remote areas for small capacity [4-6]. But, the amount of yield produced is rather small making solar basins still useless in some cases. Therefore, Researchers have investigated improving designs to reduce the construction cost like hemispherical [7], pyramid [8], tubular [9], single slope [10], inclined wick [11], double slope [12], stepped [13] SS using external heating source (PV/T collector) [14], concentrator [15], aluminum foil sheet as absorber cover [16], internal and external reflectors [17-19] to improve the performance of SS. Research also been directed towards improving productivity of solar distillates and efficiency by add absorbents materials (energy storage materials) such as: dye [20], sand grains [21,22], sandbags [23], phosphate bed [24], phosphate bags [25], charcoal [26], aluminum balls [27], trays metal [28], fins [29], sponge [30], gravel [31], phase change materials (PCM) [32-34] and nanofluids [35-39]. Balachandran et al. [40] performed a study on a SS with eggshells as an

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ORIGINAL ARTICLE

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A novel coarse-to-fine computational method for three-dimensional landmark detection to perform hard-tissue cephalometric analysis

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Abstract

Cephalometric analysis has an important and essential role to treat the patients with craniofacial and dentofacial deformities. Cephalometric analysis is a relationship of human geometry which can be quantified and derived from the linear and angular measurements. To treat any patient, such analysis is required to be performed on the Head X-ray image of the patient. The objective of the proposed work is to detect cephalometric landmarks automatically on CT (computational tomography) images. Twenty cephalometric landmarks were automatically localized on 100 CT scans using hybrid coarse-to-fine computational method. The mean error for landmark detection was computed as 2.88 mm and standard deviation of 1.85 mm. The highest detection rate for cephalometric landmarks was received as 100% for Nasion landmark under 4-mm error and the highest detection rate was received as 99% for Nasion landmark under 3-mm error. The less number of datasets were used for the training and higher number of datasets were used for the testing. Compared to the literature methods, our method used higher number of datasets to demonstrate the accuracy of the proposed method.

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Injecting cognitive intelligence into beyond-5G networks: A MAC layer perspective☆,☆☆

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ABSTRACT

The rapid rise of heterogeneous data traffic exposes the shortcomings of fifth-generation (5G) technology, which was initially designed to form self-organizing and self-sustaining networks to facilitate the adoption of the Internet-of-Everything (IoE). This study presents the applications and service requirements of future communication networks. This study details flexible design agreements of the Medium Access Control (MAC) layer of Beyond-5G (B5G) from the current 3rd Generation Partnership (3GPP) study and highlights the current open research issues and challenges which are yet to be optimized. To ensure that the network is self-sustaining and self-organized for B5G paradigm, an intelligent network design is required. Artificial Intelligence (AI) is revolutionizing every aspect of life, therefore, this article provides an overview of how AI plays an important role in improving future-generation communication by solving MAC-related issues.

1. Introduction

The Internet-of-Everything (IoE) is shifting the focus from high-data rate services like the enhanced mobile broadband (eMBB) and massive machine-type-communication (mMTC) to delay-centric ultra-reliable low latency communication (URLLC). With a $1000x$ increase in data rate and network capacity, the fifth-generation (5G) of mobile communications was projected to be the major enabler for IoE. Release 15 of the new radio (NR), which only utilizes millimeter wave ($(\mathrm{mm}Wave$) frequencies -a real IoE carrier that has not yet been attained, has been standardized as a result of the 3GPP's development of 5G [1]. But most 5G variants throughout the world continue to operate at sub-GHz frequencies. The goal of creating a self-sustaining and self-organized network (SSN/SON) has so far remained a mirage, and these ambitions have been transferred upward to B5G networks, even if 5G networks readily enable URLLC services.

The services of URLLC, which include anything from tele-medicine to autonomous flying cars, are all designated by the International Telecommunication Union (ITU) as having dependability requirements of at least 10^{-7} packet error rate and radio

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Smart microgrid with the internet of things for adequate energy management and analysis

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ARTICLE INFO

Keywords:
Microgrid
Internet of Things (IoT)
Operation and control
Energy management
Power systems
Renewable energy systems

ABSTRACT

Smart microgrid sounds familiar in recent days for their advanced electrification in rural/urban areas without the support of a grid network. Energy management and control can provide stability to the microgrid when there is a sudden change in loads. In this paper, the Internet of Things (IoT) has been used with the microgrid for energy management and analysis. The obtained result identifies the performance and operation of the IoT-based energy management and analysis in the smart microgrid. The proposed system identifies the demand pattern and allows the microgrid to supply power accordingly. In case of uncertain demand, the proposed system initiates the user to isolate and protects the microgrid. The experimental setup has been developed with PV/Wind and Piezo based 2.5 kW hybrid power generation system and the obtained results have been compared with competitive technologies. The IoT assessment has been carried out using Thinkspeak and MATLAB tools.

1. Introduction

Microgrid plays a vital role in the electrification of rural and urban areas where there is no grid power supply. Microgrids have been developed by combining various renewable energy resources [1]. Renewable energy resources like wind and solar are used often to power up the microgrid [2]. When these microgrids are equipped with a smart metre and have the capability to energy share and trade then it's called smart microgrids or smart-grid [3]. Smart-grid has features like energy trading and fault protection. But, these microgrids often get saturated because of the uneven demand power. Any uneven power demand affects the grid frequency and collapses the entire microgrid network [4]. There is two common power demand such as low demand and high demand [5]. The low demand is when supply is higher than the load (i.e.,) more energy gets fed into the microgrid [6]. The high demand is when the energy generation is low but the energy requirement will be high [7]. Both these patterns occur unevenly in the microgrid thereby affecting

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Documents

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Abstract
Self-adaptive software can assess and modify its behavior when the assessment indicates that the program is not performing as intended or when improved functionality or performance is available. Since the mid-1960s, system adaptivity has been extensively researched, and during the last decade, many application areas and technologies involving self-adaptation have gained prominence. All of these efforts have in common the introduction of self-adaptability through software. Thus, it is essential to investigate systematic software engineering methods to create self-adaptive systems that may be used across different domains. The primary objective of this research is to summarize current advances in awareness requirements for adaptive strategies and their performance management based on an examination of state-of-the-art methods described in the literature. This paper reviews self-adaptive systems in the context of requirement awareness and summarizes the most common methodologies applied. At first glance, it examines the previous surveys and works about self-adaptive systems. Afterward, it classifies the current self-adaptive systems based on six criteria. Then, it presents performance management in the current adaptive systems and then evaluates the most common self-adaptive approaches. Lastly, the self-adaptive models are evaluated based on four concepts (requirements description, monitoring, relationship, dependency/impact, and tools).

Author Keywords
Adaptive systems; Awareness requirements; Performance management; Self-adaptive systems

Index Keywords
Software engineering; 'current, Application area, Application technologies, Awareness requirement, Performance, Performance management, Requirement management, Self-adaptive software, Self-adaptive system, System adaptivity; Adaptive systems

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Comparative Evaluation of Attribute-Enabled Supervised Classification in Predicting the Air Quality

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Abstract
Air pollution demonstrates the appearance of toxins into the air which is blocking human prosperity and the earth. It will portray as potentially the riskiest threats that humanity anytime faced. It makes hurt animals, harvests to thwart these issues in transportation territories need to expect air quality from pollutions utilizing AI systems and IoT. Along these lines, air quality evaluation and assumption has become a huge target for human health factors and also affect internal organs related to respiratory. The accuracy of Air Pollution prediction has been involved with the machine learning techniques and the best accuracy model is identified. The air quality prediction dataset is used for identifying the meteorology air pollution data while the predicted model is involved the decision tree computation for predicting the toxin contents in the region, the Air quality indicator is used to assess the pollution level and monitoring the air quality. The performance analysis shows that the decision tree technique has produced the better results in the performance metrics of Accuracy, precision, recall, and F1-score with the minimized error values while the comparative evaluation of Attribute-enabled classification has identified the best technique for predicting the air quality.

Keywords Air Pollution · Machine learning technique · Accuracy · Air quality indicator · Classification · Spatial data analysis

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1 Introduction

The Environment protection is very important to us because we are depending on ecosystem for surviving our day-to-day needs. Environment is getting polluted because of human activities and natural disaster, and the most polluted median is air [1]. The meteorological parameters governed the concentration of air pollutants in clean air like atmospheric wind speed, temperature, and humidity. The atmosphere has felt the humidity while the urbanization process is the main reason of air pollution for increasing the transportation provisions emits high amount of atmosphere pollutants and also with the increased amount of Industrialization [2]. The main pollutants are Carbon Monoxide (CO), Nitrogen Oxide (NO), Particulate substance of 10 mm and 2.5 mm (PM), SO2 etc. Carbon Monoxide produces because of the scarce decomposition of propellant like petrol, diesel, and gas. Nitrogen Oxide released because of the explosion of thermal fuel. Carbon monoxide causes several medical problems [3].

Every pollutant causing air pollution is also dangerous to human beings and animals, must take measures to diminish

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Hybrid Bayesian optimization hypertuned catboost approach for malicious access and anomaly detection in IoT nomalyframework

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Keywords:
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Ensemble learning
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ABSTRACT

The successful applications and diversified popularity of the Internet of Things (IoT) present various advantages and opportunities in broad characteristics of our lives. However, unfortunately, the IoT is allied with several types of defenseless attacks and illegitimate exploits. Security specialists specify voluminous threats imposed by the IoT devices in various aspects. Therefore, security and intrusion detection have constantly been growing areas of distress for any field of IoT research. This paper introduces a new hybrid ensemble hyper-tuned model (i.e., Catboost) that efficiently recognizes IoT sensor attacks and anomalies. The hyper-parameters are optimized with Bayesian optimization to develop security-based models effectively. The significant contributions of this work are the design of an intelligent model-based security framework based on the advanced ensemble learning Catboost model for detecting malicious IoT activities in the IoT network, the use of a Bayesian optimization approach to find an optimal set of Catboost hyper-parameters, and evaluate the model with a new real dataset (DOS2DOS) from a large-scale IoT network. The performance of the proposed model is compared with other state-of-the-art approaches, and the experimental results are evident towards a high detection rate of 99.9%.

1. Introduction

The Internet has played a significant role in everyone's life in the past years. More than 2 billion people throughout the globe are utilizing the Internet to substitute the vast amount of data with social networking applications like sending and receiving emails, etc. Due to the more widespread usage of the internet day by day, one more domain is known as the Internet of Things (IoT). It is a worldwide platform for creating machines and intelligent objects to assess, manage, and communicate. IoT is the new enhancement in communication methodologies that has constantly exceeded the conventional sensing of adjacent environments. IoT is a method of interconnecting systems, objects, people, and machines with unique identifiers (UIDs). The Internet of Things devices is outfitted with processing control and sensors that permit them to be used in various environments [1]. IoT communicates the customized, desired technologies and the ensuing network of thousands of devices. The IoT world is vast in applications such as smart cities, smart homes, medical and healthcare transportation, environmental monitoring, ocean of things, agriculture, military applications, etc. However, the associated IoT devices continue to pose actual safety threats, predominantly as they can be readily cooperated with and provide information exfiltration, superior breakages, and additional issues. So, IoT devices are vulnerable to network, physical, privacy leakage, software, and hardware attacks by considering the services and networks. A few additional security risks such as Spoofing, Privacy leakage, Jamming, distributed denial-of-service attack (DDoS), DoS, Software attacks, and Man-in-the-middle attacks are aimed to evade IoT devices from obtaining the network sources [2]. A spoofing attacker replicates an

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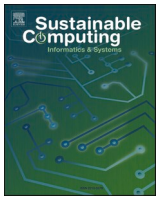

Software-defined network aided lightweight group key management for resource-constrained Internet of Things devices

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ARTICLE INFO

Keywords:
Internet of Things
Packet keys
Lightweight
Key management
Security service

ABSTRACT

Software-Defined Network (SDN) and Network Function Virtualization (NFV) are key enablers for provisioning dynamic, virtual security services on demand. This article, presents a novel Group Key Management scheme for Low-Resource Devices (GKM-LRD) with SDN aided trusted key management server as a central server to provide key management service to groups formed in Internet of Things (IoT) applications. In addition to the group key management scheme, a lightweight packet key-based communication system is proposed to make the data traffic reliable. Packet keys are short sized keys acquiring the lifetime of a packet. Even though the key is short sized, the security strength comes from its short lifetime. The proposed GKM-LRD is evaluated in terms of computation load, communication load, storage and scalability in comparison with the existing group key management schemes. The computation load, communication load and storage load is reduced by 80%, 17.25% and 20% respectively in comparison with the existing system assuring the scheme as lightweight and applicable for IoT devices. The proposed packet key-based communication scheme is compared with an existing Diffie-Hellman based packet key system. The results show the system is comparatively lightweight with computation load reduced by 74.8%. The security analysis of the proposed scheme proves that the scheme ensures forward secrecy, backward secrecy and resistance to man-in-the-middle and replay attacks.

1. Introduction

The ubiquitous IoT applications demands the services of fog and cloud service providers to perform cost effective tasks [1]. In healthcare application cloud and fog services are leveraged for application partitioning and scheduling tasks to minimize energy consumption and application enhancement [2,3]. In Internet of Vehicular Things (IoVT), the fog, cloud service is leveraged to provide mobility-aware services based on containers [4]. The fog cloud services are further enhanced with the inclusion of technologies like SDN and Intelligent Reflecting Surface (IRS) [5]. SDN is an emerging platform that uses software to program the network. With its logically centralized control SDN is able to attain bird's eye view of the network [6]. The features of SDN include dynamic rerouting of traffic, dynamic reconfiguration capabilities, optimized use of virtual services, real-time attack or failure detection and resilience [7]. The heterogeneous network of IoT uses several lightweight communication protocols like ZigBee, Z-wave, BLE, Sigfox, LoRaWAN for connectivity [8] and the data generation is vast. SDN centered security service management to IoT traffic is essential to tackle heterogeneity by providing centralized control as well as to provide optimized service. SDN is capable of providing resilience with reduced latency in case of attack or network failure. Moreover, SDN is also capable of managing the sleep/wake cycle of IoT devices to optimize energy usage. Security is provided as a service using SDN and NFV by steering the packets through Virtual Service Functions (VSFs) like firewall, intrusion detection system and deep packet inspection based on the application requirements [7]. In order to obtain a centralized control over the network, SDN controller integrated fog and edge nodes are used

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Kurdish Handwritten character recognition using deep learning techniques

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ARTICLE INFO

Keywords:
Kurdish alphabet
Offline handwriting recognition
Database
Convolutional neural network

ABSTRACT

Handwriting recognition is regarded as a dynamic and inspiring topic in the exploration of pattern recognition and image processing. It has many applications including a blind reading aid, computerized reading, and processing for paper documents, making any handwritten document searchable and converting it into structural text form. High accuracy rates have been achieved by this technology when recognizing handwriting recognition systems for English, Chinese Arabic, Persian, and many other languages. However, there is not such a system for recognizing Kurdish handwriting. In this paper, an attempt is made to design and develop a model that can recognize handwritten characters for Kurdish alphabets using deep learning techniques. Kurdish (Sorani) contains 34 characters and mainly employs an Arabic/Persian based script with modified alphabets. In this work, a Deep Convolutional Neural Network model is employed that has shown exemplary performance in handwriting recognition systems. Then, a comprehensive database has been created for handwritten Kurdish characters which contain more than 40 thousand images. The created database has been used for training the Deep Convolutional Neural Network model for classification and recognition tasks. In the proposed system the experimental results show an acceptable recognition level. The testing results reported an 83% accuracy rate, and training accuracy reported a 96% accuracy rate. From the experimental results, it is clear that the proposed deep learning model is performing well and comparable to the similar to other languages handwriting recognition systems.

1. Introduction

Currently, handwritten character recognitions are increasing in demand and popularity as a result of their potential application areas, which would reduce the data entry tasks and save an unimaginable time when filling and searching for the form in handwritten documents and much more. The work of this study shows the consideration of the following problems:

1) Character recognition is a challenging and broad area for research, and still, improvement is required because the accuracy of the existing models is nowhere near the human capabilities. Handwriting character recognition is even more complex and challenging to be processed due to the nature of handwriting itself (Zhang et al., 2017).
2) When researching Kurdish handwriting, some issues demand attention and solution with a suitable choosing mechanism and an

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ORIGINAL ARTICLE

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Blockchain-based IoT architecture to secure healthcare system using identity-based encryption

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Abstract

Nowadays, blockchain and Internet of Things (IoT) are two emerging areas of the Information Technology (IT) sector. These two emerging areas are used in various fields, such as supply chain, logistics and automotive industry. Due to the low processing power and storage space of IoT devices, users' medical information is usually saved in a centralized third party like a clinical repository or a cloud computing environment. Thus, in many cases, users lose control of their medical information, which can result in security disclosure and a single-point impediment. So, an advanced solution is required to improve the data sharing process, while restricting it in terms of security. Blockchain technology with IoT can significantly affect the healthcare industry by improving its efficiency, security and transparency, as well as can provide more business opportunities. The efficient sharing of Electronic Health Record (EHR) can improve the treatment process, diagnosis accuracy, security and privacy. This article proposes a blockchain-based IoT architecture to provide enhanced security of healthcare data by using Identity-Based Encryption (IBE) algorithm. Here, the smart contract defines all the basic operations of the healthcare system, which can be beneficial to all stakeholders. Many experiments are executed to evaluate the efficiency of the proposed scheme. The results show that the proposed scheme is better than the existing renowned schemes.

KEYWORDS
electronic health record, Ethereum, smart contract, Swarm

1 | INTRODUCTION

The Internet of Things defines as a system of interrelated computing devices that are able to collect and transfer data over a wireless network without human intervention (Akpakwu et al., 2018; Hamidi & Fazeli, 2018). Industrial organizations are progressively embracing IoT technology and its applications called Industrial Internet of Things (IIoT). Presently, it has already been implemented in various industries, such as automobile industry (Zhu et al., 2018), energy sector (Li et al., 2018), manufacturing industry (Song et al., 2017) and healthcare sector. The healthcare system is an information-intensive medical domain, where large amounts of data are routinely generated, obtained and disseminated. Due to the

Computation Offloading and Service Caching for Intelligent Transportation Systems with Digital Twin

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***Abstract*—Mobile edge computing (MEC) provides a novel computing paradigm to satisfy the increasing computation requirements of mobile applications. In MEC-enabled intelligent transportation systems (ITS), the latency-sensitive computing tasks are offloaded to RSUs for execution, reducing the transmission latency compared with the cloud solutions. However, the repetitive executions of the same tasks whose outputs are dependent on the inputs lead to the extra system latency, an alternative is to cache the required services on RSUs in advance. The service requirements of latency-sensitive computing tasks are satisfied by jointly considering computation offloading and service caching. Besides, the digital twin (DT) is utilized to construct the virtual world reflecting the physical world in real-time to efficiently make offloading strategies. In this paper, a computation offloading and service caching method using decision theory in ITS with DT, named CODT, is proposed. Specifically, the computation offloading and service caching in ITS is modeled first with DT. Then, a mixed-integer nonlinear programming (MINLP) problem is formulated to minimize the system latency. Afterward, the decision theory is used to analyze the utilities of offloading strategies in different states of RSUs and make the optimal strategy. Finally, extensive simulations based on the real-world datasets demonstrate that the proposed CODT outperforms other baselines.**

***Index Terms*—Computation Offloading, Digital Twin, Intelligent Transportation Systems, Decision Theory, Service Caching**

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I. Introduction

The development of Intelligent Transportation Systems (ITS) diversifies vehicular services, e.g., route planning, augmented reality (AR), and autonomous driving [1]. Those services are almost sensitive to latency and require to consume many computation resources. However, the limited computation capacities in vehicles fail to meet the requirements of services, increasing the processing delay of services and degrading the quality of service (QoS) [2]. A potential method is to offload the computing tasks to the cloud server, where the tasks are executed with adequate computation resources. Nevertheless, the service latency is hardly guaranteed because of the remote distance between vehicles and the cloud server.

Recently, mobile edge computing (MEC), emerging as a computing paradigm, can efficiently provide users with latency-sensitive services [3]. In MEC-enabled ITS, the roadside units (RSUs) are deployed along the roads, processing computing tasks close to users [4]. Therefore, most of the computing tasks can be offloaded to RSUs for execution, which decreases the service latency and mitigates the workload on the cloud server [5]. Nevertheless, the computing tasks whose requirements exceed the computation capacity of RSUs are still offloaded to the cloud server due to the limited computation resources on RSUs. Besides, to balance the workload on RSUs, the tasks offloaded to RSUs may be offloaded again to other RSUs [6]. As mentioned above, it is necessary for different computing tasks to determine reasonable offloading strategies.

In ITS, the computing tasks are executed with the computation resources on RSUs to return the feedback to the users. Generally speaking, the computing tasks are dependent on their input. The tasks with different inputs are supposed to return different outputs. However, there are many same computing tasks except the input. The repetitive executions of these tasks will increase the system latency, which leads to the importance of service caching. The service refers to the general execution of the same tasks and can be cached on RSUs by occupying computation resources of RSUs, waiting for the input of tasks to return the relevant feedback [7]. The computing

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EEG-based affective state recognition from human brain signals by using Hjorth-activity

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Keywords:
EEG
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SELEMO
ASCERTAIN

ABSTRACT

EEG-based emotion recognition enables investigation of human brain activity, which is recognized as an important factor in brain-computer interface. In recent years, several methods have been studied to find optimal features from brain signals. The main limitation of existing studies is that either they consider very few emotion classes or they employ a large feature set. To overcome these issues, we propose a novel Hjorth-feature-based emotion recognition model. Unlike other methods, our proposed method explores a wider set of emotion classes in the arousal-valence domain. To reduce the dimension of the feature set, we employ Hjorth parameters (HPs) and analyze the parameters in the frequency domain. At the same time, our study was focused to maintain the accuracy of emotion recognition for four emotional classes. The average accuracy was approximately 69%, 76%, 85%, 59%, and 87% for DEAP, SEED-IV, DREAMER, SELEMO, and ASCERTAIN, respectively. Results show that the features from HP activity with random forest outperforms all the classic methods of EEG-based emotion recognition.

1. Introduction

Emotions play a key role in human daily life. For example, emotions are directly influenced by the learning and decision-making processes. They can affect the moods and emotional states psychologically [1]. Emotions may affect human behavior and subjective experiences [2]. Current trends show the significance of emotion recognition in people's daily activities [3–5]. Brain signals are one of the best sources to identify human affective states [6–8].

To understand affective states, the main challenge is how to minimize the barriers between humans and computers. It would be possible only by developing emotion-oriented systems that understand and respond to human emotions intelligently [4]. To induce feelings in the human brain, stimulating the subject through visual or audio interfaces is recommended. To record emotion-based brain signals, researchers employed either invasive or non-invasive methods. Electroencephalography (EEG) is a non-invasive method. Due to its better performance in accuracy and objective evaluation, it is regularly useful for the recording of human brain signals [9–11].

EEG-based emotion recognition has become an interesting research topic due to the noninvasive application of EEG. The EEG patterns generated from emotion recognition tasks can be further applied to the development of brain-computer-interface (BCI) systems. EEG patterns could be useful to express the emotions of individuals with disabilities [12,13]. Such applications include driving fatigue detection, mental state monitoring, interaction with autistic patients, and so on [14–17].

Recently, researchers have proposed several approaches of signal processing to analyze the EEG-based brain signals. However, there are still many open issues to be resolved such as feature complexity or size [18], recognition rate [19], and real time processing [20–23]. The emotion recognition rate is one of the key challenges, among others. To solve this problem, it is essential to consider several important factors such as feature extraction, feature selection, and classification. By understanding some common issues, we proposed the novel method which is comprised of process of feature extraction, selection and classification. To validate the proposed method, we employed a common database for emotion analysis using physiological signals such as ASCERTAIN [24], DEAP [25], SEED IV [26], DREAMER [27], and SELEMO [28] and

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Extreme learning machine and bayesian optimization-driven intelligent framework for IoMT cyber-attack detection

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Abstract
The Internet of Medical Things (IoMT) is a bionetwork of allied medical devices, sensors, wearable biosensor devices, etc. It is gradually reforming the healthcare industry by leveraging its capabilities to improve personalized healthcare services by enabling seamless communication of medical data. IoMT facilitates prompt emergency responses and provides improved quality of medical services with minimum cost. With the advancement of modern technology, progressively ubiquitous medical devices raise critical security and data privacy concerns through resource constraints and open connectivity. Vulnerabilities in IoMT devices allow unauthorized access for potential entry into healthcare and sensitive personal data. In addition, the patient may experience severe physical damage with the attack on IoMT devices. To provide security to IoMT devices and privacy to patient data, we have proposed a novel IoMT framework with the hybridization of Bayesian optimization and extreme learning machine (ELM). The proposed model derives encouraging performance with enhanced accuracy in decision-making process compared to similar state-of-the-art methods.

Keywords IoMT · Extreme learning machine · Bayesian optimization · IoT security

1 Introduction

The IoT (Internet of Things) is a conceptual term of device computing, which describes the idea of connecting physical objects to the internet every day and identifying themselves with other devices. IoT is a vital piece of technology with different things related to each other and is expected to develop dramatically over time

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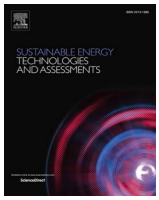

LAKE-BSG: Lightweight authenticated key exchange scheme for blockchain-enabled smart grids

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ABSTRACT

The Smart grid employs information and communication networks to collect data on energy production and consumption, and then utilize it to improve efficiency, reliability, economic benefit, power generation, and distribution sustainability. However, in SG networks the components communicate over insecure public channels, raising severe security concerns. Likewise, the security challenge is growing more difficult with the introduction of virtual solutions in SG networks. Thus, we devise a new scheme, named lightweight authenticated key exchange scheme for a blockchain-enabled SG environment (LAKE-BSG), which permits secure communication among smart meters (SMs) and service providers (SPs). In the proposed scheme, data is kept secured in a blockchain network. SPs are liable for verifying new blocks in the private blockchain through a consensus algorithm. We provide a detailed security analysis of LAKE-BSG through informal security analysis, formal security analysis using the real oracle model, and formal security verification using the Scyther tool. The results demonstrate that the devised scheme is resilient towards various security attacks in an SG environment. Furthermore, an exhaustive comparative analysis reveals that LAKE-BSG is efficient in terms of communication and computation overheads and provides additional security and functionality features.

1. Introduction

The smart grid (SG) concept was created as a replacement of the traditional power system with the objective of establishing the most efficient technique of combining green and renewable energy technology [1]. Thus, the Internet-connected SG, often referred to as the energy Internet, is establishing itself as a revolutionary approach for providing energy availability from everywhere and at any time [2–6]. The underlying objective of these advancements is to promote the growth of a sustainable society. However, integrating and coordinating an increasing number of linked devices, such as distributed energy producers and consumers, electric vehicles, intelligent devices, and cyber-physical systems, might be difficult for the traditional centralized grid systems [7]. Centralizing management of such a fast-developing network will necessitate sophisticated and expensive information and communication infrastructures. As a result, decentralization is a trend in the SG since it permits the dynamic integration of all of its components.

However, because of the numerous components and intricate linkages, the decentralized SG system may also require privacy, security, and mitigated trust nightmare [8], forcing the development of new and novel solutions. Conversely, because blockchain is a relatively new and promising technology, it permits the creation of new decentralized systems. This decentralized blockchain technology does not require a central trusted authority to govern it; rather, various entities inside the network can build, sustain, and store a chain of blocks among themselves [9]. Each entity is capable of checking that the sequence and data

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FREEDOM: Effective Surveillance and Investigation of Water-borne Diseases from Data-centric Networking Using Machine Learning Techniques

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Abstract
Worldwide, epidemics continue to be a concern on public health. Even with the technological advances, there are still barriers present in predicting the outbreaks. We propose a new methodology known as FREEDOM (Effective Surveillance and Investigation of Water-borne Diseases from data-centric networking using Machine Learning) to perform effective surveillance and investigation of water-borne diseases from social media with next-generation data. In the proposed model, we collected the data from the Twitter media, preprocessed the tweet content, performed hierarchical spectral clustering, and generated the frequent word set from each cluster through the apriori algorithm. At last, the inferences are extracted from the frequent word set through human intervention. From the experimental results, the support and confidence value of the outcome derived from the Apriori algorithm has exhibited the different water-borne diseases that are not listed in the WHO (World Health Organization), and the surveillance of those diseases with percentage ranking and has been achieved using the data-centric networking. They get aligned with precise results portraying real statistics. This type of analysis will empower doctors and health organizations (Government sector) to keep track of the water-borne diseases, their symptoms for early detection, and safe recovery thereby sufficiently reducing the death tolls. © 2022 World Scientific Publishing Company.

Author Keywords
Apriori algorithm; hierarchical spectral clustering; machine learning; Social data analysis

Index Keywords
Clustering algorithms, Health, Machine learning, Monitoring, Social networking (online); Apriori algorithms, Data centric, Hierarchical spectral clustering, Machine learning techniques, Machine-learning, Social data analyse, Social media, Spectral clustering, Technological advances, Water-borne disease; Learning algorithms

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Comparative analysis of FSO, OFC and diffused channel links in photonics using artificial intelligence based S-band, C-band and L-band of the attenuation metrics

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Abstract
Optical communication system is preferred over microwave and radio frequency communication system because of license free operation. Simulative analysis of 10gbps Optical Communication using different optical bands of L-Band S-Band, E-Band and C-Band under different attenuation condition has been performed in this paper. The Free Space Optics system has been analyzed with transmission distance of 1 km using Optical Wireless Communication channel and the effect of variation in attenuation value in the scenario of different weather conditions (clear, haze, rain and fog) were also examined. The Optical Fiber Communication is also examined under conditions of attenuations due to physical imperfections. The cross-layer Artificial Intelligence Framework is implemented to perform the prediction of different optical communication. The diffused channel is studied by varying the parameters of transmitter half angle and the distance of separation between the transmitter and the receiver. The attenuation effects of the links are also taken into consideration. Bit Error Rate and Quality factor performance of the different optical links are carried over at different wavelengths; thus the best link for the particular wavelength and the distance is identified.

Keywords FSO · Quality factor · OFC · Attenuation · Mach–Zehnder modulator · L-band · S-band · C-band

1 Introduction

Recently, the increasing demand to send the large amount of information from the source to the destination over extended haul optical communication with high bit rate, fast internet for multimedia applications with broad band wireless access has resulted to propose Radio

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Graph-Based Text Summarization and Its Application on COVID-19 Twitter Data

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Large volumes of structured and semi-structured data are being generated every day. Processing this large amount of data and extracting important information is a challenging task. The goal of an automatic text summarization is to preserve the key information and the overall meaning of the article to be summarized. In this paper, a graph-based approach is followed to generate an extractive summary, where sentences of the article

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An ensemble artificial intelligence-enabled MIoT for automated diagnosis of malaria parasite

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Abstract

Rapid advancements in Information and Communication Technologies (ICT) and artificial intelligence (AI) applications permeating to all spheres of life, including medical prognosis, have led modern clinical systems to tread the path of advanced Internet of Medical Things (IoMT) by infusing advanced learning technologies, particularly deep learning. Automated diagnosis of malarial infection using AI-enabled IoMT holds the promise of sustainable prognosis by reducing diagnosis error significantly with improved recognition accuracy. Existing automated diagnostic systems usually employ classical deep learning models wherein setting parameter values such as automatic learning rate selection, weight management etc. are a major concern. To address these issues, this paper proposes a collaborative ensemble AI-enabled IoMT automated diagnosis model to classify malaria parasitized from microscopic images. The proposed model consists of two main stages. In the first stage, a Snapshot ensemble learning model is conjured upon by a combination of three distinct layers of Convolutional, Batch Normalization, and Relu networks; that alters the learning rate aggressively during training phase thus providing different network weights that gives multiple models by training a single model. In the second stage, an ensemble of three transfer learning models is constructed, and finally the average ensemble result is obtained. The learning rates at both these stages are empirically selected through Cosine Annealing. Experiment on the malaria parasite image dataset demonstrates the superiority of the proposed model with respect to a baseline algorithm.

KEYWORDS
CNN, ensemble learning, IoTM, kappa score, malaria, Matthew's correlation, parasitized

1 | INTRODUCTION

Since last few decades, the rapid advances in information and communication technologies have paved the way for new paradigm known as Internet of Things (IoT; Islam et al., 2015). IoT is an advanced technology that mainly utilizes sensors and actuators for connecting all the objects together within a network through the Internet without human interference (Ali et al., 2015). Ensuring universal computing and context-awareness among objects through the global network is considered as the major objective of the IoT. Nowadays, IoT is emerging as advanced area of research field in various sectors as IoT provides solutions to wide variety of applications. In any country, healthcare sector is an essential requirement of every person. Therefore, healthcare sector has always been a significant area of research among the researchers. Due to the expeditious growth of inexpensive devices, lower energy consumption rates and better quality of service, IoT is emerging as vital technology in

Documents

Anand, V.[a] , Gupta, S.[a] , Koundal, D.[b] , Nayak, S.R.[c] , Nayak, J.[d] , Vimal, S.[e]

Multi-class Skin Disease Classification Using Transfer Learning Model

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Abstract
The human body's major organ is the skin, and it protects human beings from the outside environment. Detecting skin disease at an earlier stage is a big challenge because of the similar appearance of skin disease. Although skilled dermatologists find it challenging to forecast skin lesions due to lack of contrast between adjoining tissues. Therefore, there is a need for an automated system that can detect skin lesions timely and precisely. Recently Deep Learning (DL) has attained outstanding success in the diagnosis of various diseases. Thus, in this paper, a transfer learning-based model has been proposed with help of pre-Trained Xception model. The Xception model was modified by adding layers such as one pooling layer, two dense layers and one dropout layer. A new Fully Connected (FC) layer changed the original Fully Connected (FC) layer with seven skin disease classes. The proposed model has been evaluated on a HAM10000 dataset with large class imbalances. The data augmentation techniques were applied to overcome the unbalancing in the dataset. The new results showed that the model has attained an accuracy of 96.40% for classifying skin diseases. The proposed model is working best on Benign Keratosis and the values of precision, sensitivity and F1 score are 99%, 97% and 0.98 respectively. This method can provide patients and doctors with a good notion of whether or not medical assistance is required, thus, avoiding undue stress and false alarms. © 2022 World Scientific Publishing Company.

Author Keywords
convolutional neural network; Deep learning; HAM10000 dataset; image analysis; skin disease classification; transfer learning; Xception

Index Keywords
Automation, Classification (of information), Convolutional neural networks, Dermatology, Diagnosis, Diseases, Large dataset; Convolutional neural network, Deep learning, Disease classification, Ham10000 dataset, Image-analysis, Skin disease, Skin disease classification, Skin lesion, Transfer learning, Xception; Deep learning

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Socio-economic factor analysis for sustainable and smart precision agriculture: An ensemble learning approach

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ABSTRACT

The socio-economic factor analyses by using the Logit and Probit model have the limitation of representing random taste variation for the unobserved factors and the issues of temporally correlated errors respectively. In socio-economic factor analysis, the observed data are essential in the random distribution for the adequate representation of the random components associated with various factors and lead to poor prediction in the case of the Logit and Probit model. In this work, Extra-trees classifier machine learning model based socio-economic factors selection has been used and found capable to find out the socio-economic factors that contain relevant information to the target variable agricultural productivity. In addition to this, the voting classifiers ensemble learning approach is used for the prediction of agricultural productivity of respondents (farmers) from their socio-economic profiles. This proposed work has been evaluated by using the test case of analyzing the socio-economic factors of the farmers affecting agricultural productivity in Sambalpur District, in Odisha State, India. In this study, the farmers' socio-economic data are collected by using structured interviews through questionnaires that are in line with standard Participatory Rural Appraisal. It is found that, the proposed approach of socio-economic factor identification is found efficient for finding the relationships between socio-economic factors and agricultural productivity, and the proposed ensemble learning-based approach is efficient in terms of agricultural productivity prediction.

1. Introduction

Over the past decades, India has progressed as leading countries for the farming and manufacture of various agricultural goods. Indian agriculture is the major stay of its economy. In maximum net cropped field, India ranked first followed by the US as well as china. More than 58% of the Indian population has been relying on agriculture as their major source of livelihood. It is the world's major manufacturer of milk, spices, and pulses and it consists of the world's leading cattle herd, as well as the largest region in rice, cotton, and wheat. 195 m ha of the country has under the farming of which 63% are rainfed, and the rest of 37% is irrigated. Also, 65 m ha of Indian land has been covered by forest. In cultivating agricultural goods such as banana, apple, guava, onions, papaya, mango, sugar cane, etc., and outsourcing them to other countries, India has become the largest hub. As shares of agriculture in India's economy have gradually been rejected to fewer than 15 percent due to the elevated growth rates of the service and industrial sectors, the region's significance in India's financial and social fabric goes well away from this indicator. Primarily, more than 3 quarters of Indian families rely on rural incomes. Secondarily, most of India's poor are from rural areas. And finally, food security in India relay on the production of cereal crops and rising its manufacture of vegetates, milk, and fruits to rally the demands of a rising population with increasing earnings. In this situation, the country requires to cultivate more agricultural items such as wheat and rice for the progress population as suggested in some national and international reports [1]. Most of the researchers have examined the reasons for the losses and low growth in agriculture such as poor maintenance of infrastructure, contradictory government strategies, inappropriate irrigation facilities, and many more. Besides, some other main factors associated with social, environmental, policy-oriented, and technological requirements to ensure at the extreme level. According to the national sample survey organization (NSSO), India's overall country-level percentage has been severely condensed to 48 percent. The reports of NSSO states that the overall improvements require to be complete at the initial level in the agricultural sectors for attaining more effective as well as efficient results. As per the 2017 estimation, the international labor

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Light gradient boosting machine with optimized hyperparameters for identification of malicious access in IoT network

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ABSTRACT

In this paper, an advanced and optimized Light Gradient Boosting Machine (LGBM) technique is proposed to identify the intrusive activities in the Internet of Things (IoT) network. The followings are the major contributions: i) An optimized LGBM model has been developed for the identification of malicious IoT activities in the IoT network; ii) An efficient evolutionary optimization approach has been adopted for finding the optimal set of hyper-parameters of LGBM for the projected problem. Here, a Genetic Algorithm (GA) with k-way tournament selection and uniform crossover operation is used for efficient exploration of hyper-parameter search space; iii) Finally, the performance of the proposed model is evaluated using state-of-the-art ensemble learning and machine learning-based model to achieve overall generalized performance and efficiency. Simulation outcomes reveal that the proposed approach is superior to other considered methods and proves to be a robust approach to intrusion detection in an IoT environment.

1. Introduction

The Internet-of-Things (IoT) is the most viable technique used by many researchers, and most of the intelligent techniques are utilized in the last decade. The application field of IoT has expanded from some traditional environments to more recent smart environments. The increasing popularity of the IoT has changed the life style of ordinary people by improving the prospects of the smart era. The group of IoT devices originated from many large-scale applications and also influenced common day-to-day life in a delightful way to minimize the effort. The IoT model brings exceptional prospects to industries. The emerging interest in the usage of IoT-based systems is rising in the fields of housing, health manufacturing, and urban planning. One billion devices can be connected through IoT for data collection, interpreting information, sensing devices, monitoring gadgets, etc. IoT solves many complex problems and it may connect 20 million devices via the Internet by the end of 2020. Exponentially the number of IoT devices has increased in an attractive way in a short time, but also in the mean time, the working model and architecture also become more complex.

Unnecessary attacks caused in the computer systems over time become more dangerous for the upcoming future. It becomes more complex to handle the large datasets in a trustworthy manner. As the computer system is regularly connected to the internet, there are more chances to have cyber-attacks which pose threats. Moreover, various applications of IoT involve a large number of security threats. There are two main types of threats present in IoT devices; human threats and natural threats. In natural threats, the risk mainly happens due to natural calamities such as earthquakes, floods, etc., which can be overcome by some planned solutions. In the case of human threats, we overcome the malicious attacks such as violent attacks, cyber reconnaissance and tracking. Some other security threats to IoT devices include Denial of Service (DoS), Distributed Denial of Service (DDoS), spoofing, Jamming, privacy leakage, software attacks, and Man-in-the-Middle (MitM) attacks. A DoS attack is carried out by the criminal to prevent a system,

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ORIGINAL ARTICLE

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An AI powered system call analysis with bag of word approaches for the detection of intrusions and malware in Australian Defence Force Academy and virtual machine monitor malware attack data set

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Abstract

This study propose the use of AI enabled machine learning algorithms with the Bag-of-Word (BoW) methods for the detection of intrusions by analysing the system call patterns. Host based Intrusion Detection System can make use of system call patterns to differentiate between normal and anomalous program behaviours. First, the system call patterns are pre-processed with different approaches like BoW, BoW with Boolean value, BoW with Probability value and BoW with TF-IDF. Next machine learning algorithms are used to evaluate the performance of classifier models. We used J48 (C4.5), Random Forrest, RIPPER, KNN, SVM, and NaiveBayes ML algorithms. This process was carried out on ADFA-LD and on our proposed virtual machine monitor (VMM) malware attack data set for analysis. The proposed work is evaluated based on detection accuracy and false alarm rate metrics. Random Forrest algorithm performs better compared with other ML algorithms in terms of intrusion detection accuracy and false alarm rate on ADFA and VMM malware data set. The proposed data set provide better results compared with ADFA-LD analysed using ML algorithms. The classifier model trained with ADFA and VMM malware system call data sets may do predictive analytics in detecting security issues for Industry 4.0 systems.

KEYWORDS
industry 4.0, intrusions, machine learning, malware, system calls

1 | INTRODUCTION

Nowadays, government take efforts in implementing smart projects like smart city, smart environment, smart factory environment, and so forth, by the use of technologies like 5G, cyber physical system, Artificial Intelligence, and Internet of Things (IoT). The hardware and software components are tightly coupled in a cyber-physical system. Medical monitoring, robotics, industrial control systems, automatic pilot and so forth, are few examples for cyber physical system. These Intelligent Industry are powered by Data and Computing end points which are growing in a much faster pace due to the heavy use of virtual computing and cloud computing. Cloud computing and cloud services provide processing power and

Abbreviations: ADFA, Australian Defence Force Academy; AI, artificial intelligence; ML, machine learning; VMM, virtual machine monitor.

Correction added on 27 May 2022 after first online publication: Author name has been corrected in this version.

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Research Article

Autoencoder for Design of Mitigation Model for DDOS Attacks via M-DBNN

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Distributed Denial of Service (DDoS) attacks pose the greatest threat to the continued and efficient operation of the Internet. It can lead to website downtime, lost time and money, disconnection and hosting issues, and website vulnerability. Conventional machine learning methodologies are being harmed by reduced recognition rates and greater false-positive rates due to the emergence of new threats. As a result, high-performance machine learning classifiers with low false-positive rates and high prediction accuracy are required for the DDoS detection system. Here, a deep belief neural network is preferred, upgraded to the modified deep neural network (M-DBNN) to accurately detect DDoS attacks from the network. Enable the database to change a specific format and range, which helps the M-DBNN classifier easily predict the class. An advanced Chimp Optimization Algorithm (ChOA) is used to minimize the error to find the best weight of the M-DBNN classifier; this leads to accurate DDOS attack detection and predict the classes effectively. The proposed method is evaluated for CAIDA "DDoS Attack 2007" dataset. The accuracy of the proposed method is 0.87%, and the outcome is compared with those of other existing methods of deep neural network (DNN), support vector machine (SVM), artificial neural network (ANN), and neural network (NN). The proposed method demonstrates great detection accuracy with a low error.

1. Introduction

Distributed Denial of Service (DDoS) attacks are presently the most common and sophisticated danger to enterprises, and they are becoming progressively difficult to overcome. For example, GitHub became a victim of one of the greatest DDoS attacks ever in 2018 [1]. In February, attacks on eBay, Amazon, and Yahoo were undertaken [2]. In July 2008, a DDoS attack on the Georgian.gov website brought down multiple Georgian servers. The attack on Register.com in January 2001 was carried out by abusing Domain Name System (DNS) servers as reflectors [3]. Previous software protection techniques and intrusion detection systems (IDSs) can recognize and block the attack or intrusion which is happening or already has to a specified extent. However, with the arrival of an era of big data and the resulting problem of uninterrupted huge data flow, previous software protection techniques and IDSs have been faced with new dares. For today's high-speed networks, classic network intrusion detection systems (NIDS) have a high rate of packet loss and a high rate of missed detection [4].

Conventional machine learning algorithms are based on shallow learning. Usually, emphasize feature engineering and selection models, making them unable to properly deal with the challenge of a dynamically growing huge amount of data, resulting in erroneous detecting attacks. Shallow learning is not suited for intelligent systems to predict malevolent behaviour in huge amounts of data in particular [5]. Deep learning has advanced quickly in recent years, overcoming many of the shortcomings of conventional machine learning models and providing a model that is well fitted for IDS [6]. It is commonly utilized in various

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FOCUS

A rough set theory and deep learning-based predictive system for gender recognition using audio speech

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Abstract

Speech is one of the most delicate medium through which gender of the speakers can easily be identified. Though the related research has shown very good progress in machine learning, but recently, deep learning has imparted a very good research area to explore the deficiency of gender discrimination using traditional machine learning techniques. In deep learning techniques, the speech features are automatically generated by the reinforcement learning from the raw data which have more discriminating power than the human-generated features. But in some practical situations like gender recognition, it is observed that combination of both types of features sometimes provides comparatively better performance. In the proposed work, we have initially extracted and selected some informative and precise acoustic features relevant to gender recognition using entropy-based information theory and Rough Set Theory (RST). Next, the audio speech signals are directly fed into the deep neural network model consisting of Convolution Neural Network (CNN) and Gated Recurrent Unit network (GRUN) for extracting features useful for gender recognition. The RST selects precise and informative features, CNN extracts the locally encoded important features, and GRUN reduces the vanishing gradient and exploding gradient problems. Finally, a hybrid gender recognition system is developed combining both generated feature vectors. The developed model has been tested with five bench mark and a simulated dataset to evaluate its performance, and it is observed that combined feature vector provides more effective gender recognition system specially when transgender is considered as a gender type together with male and female.

Keywords Acoustic features · Feature selection · Rough set theory · Information theory · Machine learning · Deep neural network

1 Introduction

Gender recognition from speech and images has always remained a challenging task. It is a very common and needful requisite in all areas including health care section, forensic laboratory, and any industrial area. Speech and image both are important data to identify the gender. Speech is the medium through which gender can be easily identified. It is known as a physiological signal which represents information at multiple levels such as linguistic content (like language, word, accent, etc.) and paralinguistic content (like gender, age, emotion, etc.). Besides it, speech also carries important information

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Edge Server Deployment for Health Monitoring With Reinforcement Learning in Internet of Medical Things

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***Abstract*— The Internet of Medical Things (IoMT) has recently gained a lot of interest in the health care industry. IoMT enables real-time and omnipresent monitoring of a patient's health status, resulting in massive amounts of medical data being generated. The centralized massive data processing places enormous strain on the typical cloud computing, rendering it incapable of supporting a variety of real-time health care applications. Therefore, edge computing that moves application programs and data processing from central infrastructure to the edge nodes has attracted wide attention. However, adopting existing edge server (ES) deployment strategies for IoMT is not suitable due to the decentralized and high real-time service requirements of IoMT systems. In particular, traditional ES deployment strategies in IoMT system confront major load imbalance across ESs, latency issues, and energy consumption concerns. To address these challenges, a deployment strategy of ESs based on the state-action-reward-state-action (SARSA) learning, named ESL, is designed. Specifically, ESs are quantified by evaluating the silhouette coefficient (SC) and the sum of squared errors. Then, through fuzzy C-means (FCM) algorithm, the preliminary division of health monitoring units (HMUs) and the initial locations of ESs are obtained. Finally, SARSA learning is adopted to determine the deployment of ESs. Furthermore, extensive experiments and analyses confirm that ESL achieves the core objective of optimizing load balancing among ESs while also optimizing request–response latency and request processing energy consumption.**

***Index Terms*— Edge computing, fuzzy C-means (FCM), load balance, reinforcement learning, state-action-reward-state-action (SARSA) learning.**

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I. Introduction

BENEFITING from cutting-edge technologies such as cloud computing, the smart health care system (SHS) has made impressive progress in recent years [1]. As an important part of SHS, the Internet of Medical Things (IoMT) connects scattered medical and health devices (MHDs) for collecting medical data and providing medical services [2], [3]. There are various types of MHDs are in use, including wearable devices (WDs) (e.g., pulse monitor, mobile phones, and smart bracelets), implantable medical devices (e.g., implantable cochlear implant and implantable electromechanical cardiac circulatory system), and stationary medical devices (e.g., networked imaging equipment and home physiotherapy equipment) [4]–[6]. These MHDs monitors patients and generate medical data based on service demands. However, MUDs are resource scarce devices with limited computing and storage resources; a common solution is to assist them with cloud data center (CDC) [7], [8]. To guarantee the quality of service (QoS), IoMT big data from MHDs are offloaded to the cloud. When CDC receives service requests from users, the CDC allocates computing resources for response [9], and sends the processing results back to the terminal users. Generally, CDC is located far from MHDs. Hence, the service implementation, service requests' offloading and results' feedback often faces high latency and energy consumption [10]. Especially for IoMT services with a high real-time requirements (e.g., real-time heartbeat monitoring service), the quality of experience (QoE) is degraded severely [11], [12]. Furthermore, the increasing service requests bring about more frequent data storage and access in CDC, which increases the probability of network congestion [13].

To overcome the shortcomings of cloud computing, edge computing is adopted. In contrast to cloud computing, edge computing has characteristics of real-time data processing, and diversified application development [14], [15]. Since HMUs have insufficient resources, edge servers (ESs) are deployed to help store data and implement computation intensive service [16]. The adoption of edge computing into IoMT to process service requests in collaboration with cloud computing (i.e., edge-cloud computing) has changed the traditional pattern of sending feedback to users from the CDC [17], [18]. With edge-cloud collaboration, ESs carry most service requests, only when a ES is overloaded, some service requests with low-latency sensitivity are offloaded to the CDC [19].

Hybrid Energy-based Secured clustering technique for Wireless Sensor Networks

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Abstract

The performance of the Wireless sensor networks (WSNs) identified as the efficient energy utilization and enhanced network lifetime. The multi-hop path routing techniques in WSNs have been observed that the applications with the data transmission within the cluster head and the base station, so that the intra-cluster transmission has been involved for improving the quality of service. This paper proposes a novel Hybrid Energy-based Secured Clustering (HESC) technique for providing the data transmission technique for WSNs to produce the solution for the energy and security problem for cluster based data transmission. The proposed technique involves the formation of clusters to perform the organization of sensor nodes with the multi-hop data transmission technique for finding the specific node to deliver the data packets to the cluster head node and the secured transmission technique is used to provide the privacy of the sensor nodes through the cluster. The residual energy of the sensor nodes is another parameter to select the forwarding node. The simulation results can show the efficiency of this proposed technique in spite of lifetime within the huge amount data packets. The security of this proposed technique is measured and increases the performance of the proposed technique.

Keywords: Wireless sensor networks, Energy utilization, Multi-hop data transmission, Residual energy, Cluster head

1 Introduction

The WSNs is used to monitor the surroundings for generating the real-time information and to increase the performance of the WSN [1]. According to the various problems, the data collection will be the main issue and transmit the data packets in the network [2]. The cooperation from the sensor node will involve the advantage of secured data transmission. The main functionality for the sensor node is to monitor the communication area and deliver the information. The topology changes are happen in the network for wireless communication so that the network may acclimatize the environment changes [3]. The capability for the single node is very much restricted that the Reachability to monitor the environment in the communication range. Whenever the network is deployed, it is very hard to change the energy supply of the sensor node [4]. Owing to the restricted energy to gather the huge amount of data is another problem in WSN communication model. Several protocols are developed to construct the communication model that the cluster head has directly communicated with the base station for data transmission [5].

The WSNs is utilized to access the time based critical metrics for reliable prediction of efficient detection in the surroundings. The constructed framework has established the prediction to provide the proficient energy consumption for the resource oriented conscientious sensors [6]. Additionally, the time augmented sampling information is implemented for providing the detection in the surrounding outbreak. The WSN based surveillance applications can present an efficient framework to accumulate the situation based knowledge for providing the enhanced security parameters. The most of the existing methods are focusing on the abnormal events through the centralized video surveillance system with WSNs [7].

The wireless sensor network is the widely used network with several amount of sensor nodes utilize the sensing of information from a specific area to transmit it to the base station [8]. It has restricted resources for transmitting and processing of sensing information. The energy efficient is the primary problem in WSN with the mobility technique. The mobile sink is utilized for gathering the data and transmitting it in a random path. WSN also produces several real-time applications which are used in industrial and agriculture field [9]. The sensors are used for supporting the irrigation system, fertilizing and also seeding in agriculture sectors. This will help the formers to utilize the weather conditions well and also identifying the diseases easily with restricted amount of resource utilization. The poor deployment of the senor nodes will cause the coverage hole problem and causes problem in energy utilization [10]. For implementing clustering process, the sensor nodes divide into several clusters for data communication. Within the sensor nodes, a single node is selected as the cluster head after satisfying the different constraints of sensor nodes.

Cluster head is responsible for communication of data packets into the base station. MLBC [11] technique is implemented to produce the cluster balance with achieving reliability and enhanced residual energy. EA-DB-CRP [12] has implemented to produce the density related energy utilization with efficient routing technique; it facilitates the data communication within the base station and the sensor

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Research Article

Banana Plant Disease Classification Using Hybrid Convolutional Neural Network

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Banana cultivation is one of the main agricultural elements in India, while the common problem of cultivation is that the crop has been influenced by several diseases, while the pest indications have been needed for discovering the infections initially for avoiding the financial loss to the farmers. This problem will affect the entire banana productivity and directly affects the economy of the country. A hybrid convolution neural network (CNN) enabled banana disease detection, and the classification is proposed to overcome these issues guide the farmers through enabling fertilizers that have to be utilized for avoiding the disease in the initial stages, and the proposed technique shows 99% of accuracy that is compared with the related deep learning techniques.

1. Introduction

Agriculture is the crucial resource of food for mankind, and it is one of the important factors that decide the economy of a country. Agriculture is considered the main source of income for most developing countries. One of the important parts of the global agro-business is the banana cultivation or banana industry because bananas are rich in minerals such as calcium, manganese, potassium, magnesium, and iron. As this particular crop is having these many vitamins, they are consumed by people all over the world as banana is considered an instant energy booster. As per the statistics from Wikipedia, about 15% of the global banana productions are exported to western countries for consumption. As per the production and export statistics of bananas, about 25.7% of the global banana production is from India, and other major producers of bananas are the Philippines, Ecuador, Indonesia, and Brazil giving a combined contribution of about 20% of the global banana production. The United States is the leading importer of bananas of about 18% of the global imports. The impact of the banana tree getting infected due to disease and due to other climatic changes will cause even 100% loss in the overall countries' banana production and export. Generally, bananas are affected by four major that are black Sigatoka, fusarium wilt colloquially called Panama wilt, Xanthomonas wilt, and bunchy top virus. The details of the various commonly found diseases along with the disease symptoms, appearance, and effects of the disease when it is present as an infection in the banana leaf is described below.

1.1. Banana Leaf Disease. The banana crops are all affected by various diseases. The symptoms are visible in leaf, stem, flower, fruit, roots, and suckers. The major diseases that affect the leaf are Xanthomonas wilt, fusarium wilt, black and yellow Sigatoka.

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Geo Spatial Based Real Time Monitoring on Eutrophic Evaluation of Porunai River Basin for Pollution Risk Assessment

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ABSTRACT

The basic amenity for a highly civilized community needs water and drainage facilities; with uncontrolled population outrage, there arises demand for water consumption which naturally leads to effluent discharge. Even though the district has ample landscape, smart drainage facilities, the rainwater and storm runoff are still collected as pumped source for treatment to a long distance. These wastewaters diverted to the river surface due to insufficient retention time for treatment that naturally grounds a serious ecological damage. The concentration of organic and inorganic heavy metals determines the nature of contamination whether lighter low concentrated or severe high concentrated, meanwhile the level get diluted with streaming in the river surface. Deposited contaminants along the Porunai river basin are in dissolved stages that naturally lead to eutrophication which will cause pollution risk and indirectly affects the dependents covering three districts. With the support of GIS, online monitoring is incorporated to check the gathering of phosphorus, removal of phosphorus from the soil and nitrogen removal. The aim of the research focus is to study eutrophic nutrient limits in river Porunai which is a streaming of Thamirabarani and manimuthar. Nutrient removals from the designed reactors express the available measure of pollution risk. Life cycle study gives the life term of river front and a blueprint is framed based on reducing the mixing of unwanted water sources. In due course make it a place of recreation prevailing with current scenario and future prediction by means of statistical data compared with navigation studies.

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River channel; Remote sensing; River morphology; Nutrient removal; Rejuvenation

Introduction

The running water is aptly considered as the most powerful of all the natural geological agents of change. Small surface bodies of water flowing in channels of their own are called streamlets and streams. Many streams are flowing through a big area and are ultimately joining to form a single major channel of flow taking the shape of a river. Despite of being the fastest developing country, India has poorly managed waterway. Due to 3% loss and 45% water leakage pilferage, which is a big loss for the government and huge threat to the sustainable development of the country, it is vulnerable to water stress as availability declining to 1600 m^3/person/year (Muniraj et al., 2019). Streams and rivers that collectively drain out all the water received from precipitation (rainfall and snowfall) and other sources (melting water and spring water) in a given region from the drainage system of that particular region. Rivers are the most important sources of water for public water supply schemes. River Porunai is originally called as "River Thanporunai" which is otherwise called as "River Thamirabarani". It is originated from Pothigai hills in Western Ghats, flowing continuously for 120 km. For irrigation purpose on both sides of the river, the kings built seven dams and the British had built a dam at Srivaikundam. In Greek literature, it is mentioned that the river Thamirabarani was flowing throughout Srilanka and it was called "Thamirabarane". As the river Porunai comes from the Pothigai hills, it carries all the herbal qualities with it. Porunai River is a main source of water supply to many towns which include Tirunelveli Corporation. The important irrigation channels branching off from both the banks of the river Porunai are, South Kodaimelalagian channel, North Kodaimelalagian channel (Kodaimelalagian anaicut), Kodagan channel (Ariyanayagipuram anaicut), Palayam channel (Palavur anaicut), Tirunelveli channel (suthamali anaicut), Maruthur Melakkal, Marudur Keelakkal (Marudur anaicut), South main channel and North main channel (Srivaikundam anaicut). Of these the first seven anaicuts were constructed during the period of ancient and medieval period and

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S.I. : NEURAL COMPUTING FOR IOT BASED INTELLIGENT HEALTHCARE SYSTEMS

Conquering insufficient/imbalanced data learning for the Internet of Medical Things

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Abstract
This study presents a data augmentation technique that solves insufficient/imbalanced data problems during crowdsensing by the Internet of Medical Things (IoMT) or wireless sensor networks (WSNs), owing to diversified locations and heterogeneous conditions. This may cause problems because the samples in various categories may vary in quantities, which create skew distributions. Besides, pattern analysis of insufficient observed samples also generates biased models. In view of such, this work proposes synthetic minority oversampling generative adversarial networks (SMOGANs) for processing imbalanced data, where insufficient samples in quantities can be automatically expanded, so that different classes contain equal numbers of samples, subsequently avoiding biased modeling. The SMOGAN consists of two modules, where the first one is the synthetic minority oversampling technique (SMOTE), and the second involves a GAN. The former is used to initialize the proposed system, in which insufficient/imbalanced data samples are roughly augmented in quantities. Subsequently, the GAN enriches feature diversities of those pseudoreal samples formerly augmented by the SMOTE. Experiments on open datasets were carried out for evaluation. To assess the capability of data augmentation, only 4.00% of the real data were reserved as minority classes and then sent into different data augmentation methods for comparison. Analytical results showed that the proposed SMOGANs outperformed the baselines. Accuracy was increased compared with the baselines. Such results showed that the proposed SMOGAN could improve data collection problems of insufficient/imbalanced datasets by enhancing data quantities and qualities.

Keywords Imbalanced data · Insufficient data · Synthetic minority oversampling technique · Generative adversarial network

1 Introduction

In intelligent health applications, to widely and largely collect healthcare/medical readings, the Internet of Medical Things (IoMT) [1, 2] and wireless sensor networks (WSNs) have become a useful tool for crowdsourcing and crowdsensing, e.g., smart health management [3], healthcare monitoring [4], and disease prevention [5, 6]. Such management efficiency and service improvement heavily rely on wide deployment of those devices and sensors (e.g., the Visual Internet of Things (Visual IoT) [7–9]) around the infrastructure, including backbones and endpoints. However, wide deployment of IoT and WSNs means diversified locations, heterogeneous devices/sensors, different time, and various sensing objectives. This subsequently results in the following challenges — Imbalanced classes of samples.

In statistics and data analytics, the number of samples in one class far exceeds the number of samples in another class is referred to as imbalanced data distributions, which frequently occur. When such a problem occurs, it is difficult to reobtain the minority data and increase quantities in real datasets. Even worse, such a situation could become even severe when security and privacy policies are imposed due to the fact that sensitive samples become unavailable. Although privacy-preserving data mining [10–12] may be applicable, it did not avoid imbalanced data problems. Imbalanced data result in poor classification

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Research Article

Deep Convolutional Nets Learning Classification for Artistic Style Transfer

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Humans have mastered the skill of creativity for many decades. The process of replicating this mechanism is introduced recently by using neural networks which replicate the functioning of human brain, where each unit in the neural network represents a neuron, which transmits the messages from one neuron to other, to perform subconscious tasks. Usually, there are methods to render an input image in the style of famous art works. This issue of generating art is normally called nonphotorealistic rendering. Previous approaches rely on directly manipulating the pixel representation of the image. While using deep neural networks which are constructed using image recognition, this paper carries out implementations in feature space representing the higher levels of the content image. Previously, deep neural networks are used for object recognition and style recognition to categorize the artworks consistent with the creation time. This paper uses Visual Geometry Group (VGG16) neural network to replicate this dormant task performed by humans. Here, the images are input where one is the content image which contains the features you want to retain in the output image and the style reference image which contains patterns or images of famous paintings and the input image which needs to be style and blend them together to produce a new image where the input image is transformed to look like the content image but "sketched" to look like the style image.

1. Introduction

A decade ago, when machine learning was an emerging application of artificial intelligence providing the ability to automate learning process from foregoing experiences without being explicitly programmed, the only limitation was assumed that a good computer program can never replace a human in creativity [1]. But as the exploration in the field grew, this gave rise to many other subfields like deep learning, which threw the limelight on the solution for replacing humans for their creativity or their process of recognizing objects or people [2]. One of such problems which characterized human from a machine was art. Generating art has no rules which could be used to replicate a man's imagination. This paper renders an input image in the range of well-known art works [3]. This is conceptually close to texture transfer for style transfer. Today, there are few existing systems which replicate art from famous painters. One of these methods is style transfer using a neural network [4].

A neural network can be defined as a circuit of neurons which stimulates the behavior of a human brain. Mathematically, a neural network is a chain of functions which maps the inputs with their respective outputs based on their

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Blockchain-Based Medical Certificate Generation and Verification for IoT-based Healthcare Systems

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***Abstract*—Nowadays, medical certificates are very important for many users as they want to avail health benefits like tax purposes, insurance claims, legal procedures, and many more. Generating, issuing, and maintaining medical certificates remain a significant problem before the invention of the computer, they were available as hard copies. The digitization of medical certificates and documents leads to potential security issues, such as forging of certificates risk the privacy of healthcare documents. Moreover, individuals still need to be physically present and wait at the issuing healthcare centers to get the certificates. Currently, the infrastructure of any healthcare industry connects the Internet of Things (IoT) devices and application software that communicates with the Information Technology (IT) systems. Blockchain technology with IoT can significantly affect the healthcare industry by improving efficiency, security, transparency, and can provide more business opportunities. Therefore, a privacy-preserving technique has been proposed in this paper for IoT-based healthcare systems using blockchain technology. The proposed architecture provides an interface between the users and healthcare centers to generate and maintain health documents. Furthermore, the proposed scheme ensures security by specifying rules with a smart contract. Results and discussion show that the proposed scheme is more efficient than the existing schemes.**

***Index Terms*—Electronic Health Record, Integrity, InterPlanetary File System, Gas, BlockSim.**

I. Introduction

ACCORDING to the World Health Organization (WHO), medical certificates and documents are significantly important to describe a person's medical condition, indicate eligibility of activity, make an insurance claim, obtain benefits from the employer, and for tax or legal procedures. Birth certificate, sick certificate, medical certificate, death certificate, and fit-to-fly certificate related to COVID-19, are some important documents required for personal, business, official, legal and other purposes. These medical documents have been available in digital form in various parts of the world, and these documents are widely used in the form of hard copies. These medical certificates or documents must be always reliable as these are directly related to the patients' health conditions. However, the traditional centralized generation systems are prone to forgery, and there is no mechanism that verifies the authenticity of the user and validates the integrity of the generated certificate. Thus, the IoT-based medical system has been introduced to significantly enhance security and precision, and overcome geographical constraints for the remote tracking and maintaining health documents. The IoT defines smart devices, such as sensors, surveillance, etc., that can sense, maintain, and share information with the other connecting devices. These services can be achieved locally or remotely by using cloud systems. The current healthcare practices for managing medical records are vulnerable to several cybersecurity threats, including malware and ransomware. The healthcare data can be compromised by deploying ransomware, which encrypts the data until a ransom is paid by hacking the repository. The WannaCry ransomware attack on National Health Service (NHS) infected millions of servers and computers, resulting in a loss of healthcare records [1]. Furthermore, the malware attacks compromise unprotected medical devices, breach user identification, and access medical records. Therefore, the healthcare domain suffers from substantial loss of health records, which can cause financial loss, as well as even death of patients.

Therefore, to address the challenges mentioned above, modern technologies are required to secure and preserve the privacy of healthcare records. Since the last decade, the security of healthcare certificates has been innovated through many platforms, software, and communication technologies. In conventional healthcare approaches, researchers use encryption and embedding algorithms to secure sensitive medical data using cryptography techniques [2]. These methods, however, fail to protect the records. In addition, database management systems [3] or cloud management systems [4] are used to maintain medical credentials in most of the existing systems. These methods are ineffective to handle many attacks like man-in-the-middle attacks,

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De-CAPTCHA: A novel DFS based approach to solve CAPTCHA schemes☆

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ABSTRACT

CAPTCHA stands for Completely Automated Public Turing Test to Tell Computers and Humans Apart. CAPTCHAs are used as security mechanism in web applications to differentiate between real users and automated users, also known as bots. Text-based CAPTCHAs are the popularly used CAPTCHA schemes due to their simplicity and thus, they are still being used despite the proposal of several attack mechanisms. In this work, the authors have proposed a novel approach to solve CAPTCHA schemes. In this approach, the authors have used Depth First Search algorithm for the extraction of characters from CAPTCHAs and Convolutional Neural Network for recognizing these extracted characters. The proposed approach was validated on 3000+ CAPTCHA schemes and proved to be efficient by providing an average accuracy of more than 92.0% in detecting CAPTCHA schemes.

1. Introduction

Internet has revolutionized everyone's life and in this inter-connected world information is like oil. With the advancements in Information and Communication Technology, huge amount of data is being generated and managed in digital form. Since there are many procedures and efforts to hack the system for sensitive data, therefore system security has emerged as a critical aspect of any web application [1,2]. Information is generally protected with various security mechanisms to prevent hacking approaches by automated systems called bots. CAPTCHA schemes are the most commonly used of these security mechanisms. A CAPTCHA scheme is typically an image containing different characters that one has to type in before entering or logging in the system or web application. Text based CAPTCHA schemes are used by websites of various popular Indian government institutions (like Aadhar-UIDAI, Digital India, IRCTC, SBI Online, Delhi Police, etc.) as well as the largest internet companies (like Amazon, Yahoo!, Microsoft, eBay, etc.). The primary purpose of CAPTCHA is to safeguard user logins against brute force password guessing by bots, to prevent automated usage of various services. But with the introduction of deep learning and computer vision, CAPTCHAs can now often be defeated by bots [3,4]. While CAPTCHAs have evolved through more complex images to address these risks, wide deployment and use of text-based CAPTCHAs and their increasing vulnerability can result in serious consequences. That is why, through this work, authors have proposed a novel approach to solve complex CAPTCHA schemes. The proposed approach attempts to highlight risks with even the more complex CAPTCHA schemes and raises questions on how to re-design the CAPTCHAs to enhance security.

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Harmony search: Current studies and uses on healthcare systems

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ABSTRACT

One of the popular metaheuristic search algorithms is Harmony Search (HS). It has been verified that HS can find solutions to optimization problems due to its balanced exploratory and convergence behavior and its simple and flexible structure. This capability makes the algorithm preferable to be applied in several real-world applications in various fields, including healthcare systems, different engineering fields, and computer science. The popularity of HS urges us to provide a comprehensive survey of the literature on HS and its variants on health systems, analyze its strengths and weaknesses, and suggest future research directions. In this review paper, the current studies and uses of harmony search are studied in four main domains. (i) The variants of HS, including its modifications and hybridization. (ii) Summary of the previous review works. (iii) Applications of HS in healthcare systems. (iv) And finally, an operational framework is proposed for the applications of HS in healthcare systems. The main contribution of this review is intended to provide a thorough examination of HS in healthcare systems while also serving as a valuable resource for prospective scholars who want to investigate or implement this method.

1. Background and introduction

Before the year 2001, several search algorithms were already introduced and applied in different fields of applications. HS is one of the search algorithms that Zong Woo Geem has introduced. His vision was to develop a better-performing algorithm as an alternative to the other predefined algorithms. The intention of designing the algorithm is to have a generalized optimization technique for continuous, constrained, and discrete optimization in several types of optimization problems. Both the algorithm name and idea are inspired by the principle of the musician's improvisation; just like how musicians are always trying to choose the best and most potent harmony during their performances, this algorithm looks for the best solution (harmony) [1].

During the past years, the HS gained popularity, which can be observed through the diversified problems applied by the algorithm. HS's ability to solve various optimization problems attracted researchers and proved an effective optimization technique. Nowadays, the HS algorithm is still involved in engineering, computer science, industry, healthcare, construction, and robotics [2,3]. The factors that made the HS competitive with other algorithms are [3]:

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REVIEW ARTICLE

25 Years of Particle Swarm Optimization: Flourishing Voyage of Two Decades

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Abstract
From the past few decades many nature inspired algorithms have been developed and gaining more popularity because of their effectiveness in solving problems of distinct application domains. Undoubtedly, Particle swarm optimization (PSO) algorithm is the most successful optimization algorithm among the available nature inspired algorithms such as simulated annealing, genetic algorithm, differential evolution, firefly, cuckoo etc., because of its high efficiency and capability to adjust in different dynamic environments. This year marks its 25th anniversary of PSO, one of the base inspirations for many modern-day metaheuristics development. Because of its simple structure and few number of algorithmic parameters, PSO from its origin has acquired widespread popularity amongst researchers, technocrats and practitioners and has been proven to provide better performance in various functional areas such as networking, robotics, image segmentation, power generation and controlling, fuzzy systems and so on. PSO is a population based global heuristic optimization approach motivated by the social behavior of animals chasing for food such as flock of birds, schools of fish. PSO attempts to stabilize exploration and exploitation by combining local search capabilities with global search capabilities. In this article, an in-depth analysis of PSO with its developments from 1995 to 2020 has been presented. Mainly, the improved variants of PSO along with solvable application areas are discussed in detail to provide a scope for the further development. At the end of the paper, the growth of the PSO in various application areas has been presented with factual representation. The main motive of this survey is to inspire the researchers, practitioners and technocrats to develop improved and innovative solutions for solving complex problems in various domains using PSO.

Keywords Optimization · PSO · Swarm optimization · Nature inspired algorithm

1 Introduction

In all engineering disciplines, optimization is the commonly found term in mathematical problems. Optimization means selecting the best possible solution from a series of available alternatives in concern with certain criteria. Optimization problems are classified as either deterministic or stochastic in nature. In many real-world applications, optimization problems are wide in range and large in number. As most of the applications deal with NP-hard problems, it is often challenging to solve optimization problems using optimization tools. In fact, solving NP-hard problems require lot of computations, which may fail when the extent of the problem enhance. As most of the problems in computer science

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Review Article

Improved Fitness-Dependent Optimizer for Solving Economic Load Dispatch Problem

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Economic load dispatch depicts a fundamental role in the operation of power systems, as it decreases the environmental load, minimizes the operating cost, and preserves energy resources. The optimal solution to economic load dispatch problems and various constraints can be obtained by evolving several evolutionary and swarm-based algorithms. The major drawback to swarm-based algorithms is premature convergence towards an optimal solution. Fitness-dependent optimizer is a novel optimization algorithm stimulated by the decision-making and reproductive process of bee swarming. Fitness-dependent optimizer (FDO) examines the search spaces based on the searching approach of particle swarm optimization. To calculate the pace, the fitness function is utilized to generate weights that direct the search agents in the phases of exploitation and exploration. In this research, the authors have used a fitness-dependent optimizer to solve the economic load dispatch problem by reducing fuel cost, emission allocation, and transmission loss. Moreover, the authors have enhanced a novel variant of the fitness-dependent optimizer, which incorporates novel population initialization techniques and dynamically employed sine maps to select the weight factor for the fitness-dependent optimizer. The enhanced population initialization approach incorporates a quasi-random Sabol sequence to generate the initial solution in the multidimensional search space. A standard 24-unit system is employed for experimental evaluation with different power demands. The empirical results obtained using the enhanced variant of the fitness-dependent optimizer demonstrate superior performance in terms of low transmission loss, low fuel cost, and low emission allocation compared to the conventional fitness-dependent optimizer. The experimental study obtained 7.94E−12, the lowest transmission loss using the enhanced fitness-dependent optimizer. Correspondingly, various standard estimations are used to prove the stability of the fitness-dependent optimizer in phases of exploitation and exploration.

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ORIGINAL ARTICLE

Directive clustering contrast-based multi-modality medical image fusion for smart healthcare system

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Abstract
Smart healthcare is being adopted gradually as information technology advances. The enormous increase in demand for smart medical imaging has resulted in the fusion of a number of important imaging technologies. In smart imaging, many times single modality images are not sufficient to extract the major or minor information from medical images. Therefore in this paper, a new fusion algorithm is introduced for multi-modality medical images to extract maximum information and provide an efficient fused image. In proposed scheme, NSCT is used to get low- and high-frequency components of the medical images. Further, clustering-based fusion technique is used for fusing low-frequency components by analysing cluster features. Similarly, contrast-preserving image fusion on the high-frequency coefficients is accomplished by the use of directed contrast based on cluster-based components. The experimental results and comparison analysis is conducted on the multi-modal medical image dataset. Test results and evaluations of the proposed technique show that it outperforms the leading fusion strategies in terms of contrast and edge preservations.

Keywords Contrast-preserving · Clustering · Image fusion

1 Introduction

The usage of "smart" technology in healthcare is increasing because of IBM's Smart Planet concept, which was proposed in 2009. To put it simply, Smart Planet is an intelligent infrastructure that uses sensors to detect information, and sends that information over the internet via the IoT. Further, the IoT utilises supercomputers and cloud computing to analyse this information. Systems coordination is crucial for human civilization to operate at such a high level of complexity and sophistication. Conceptually, the thought of building intelligent healthcare seems intimidating, but it is actually fairly simple. Care delivery in the future will be significantly influenced by new technology such as wearable technology, the Internet of Things (IoT), and mobile internet, and the data generated by these technologies is tied to

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A novel cluster head selection using Hybrid Artificial Bee Colony and Firefly Algorithm for network lifetime and stability in WSNs

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ABSTRACT

Wireless Sensor Networks (WSNs) are capable of achieving data dissemination between them such that exploration of their potential could be performed based on their frequency range. It is considered to be highly difficult for recharging sensor devices under adverse situations. The main drawbacks of WSNs concern to the issue of network lifetime, coverage area, scheduling and data aggregation. In particular, prolonging network lifetime confirms the success together with the energy conservation of sensor nodes, data transmission reliability and scalability of their operation in data aggregation. Clustering schemes are considered to be highly suitable for effectively utilising the resources with lower overhead, such that energy consumption is enhanced for upgrading the network lifespan. In this paper, a Hybrid Modified Artificial Bee Colony and Firefly Algorithm (HMABCFA) -Based Cluster Head Selection is proposed for ensuring energy stabilisation, delay minimisation and inter-node distance reduction for improving the network lifetime. This proposed HMABCFA integrates the benefit of the Firefly optimisation algorithm for generating a new position that which has the capability of replacing the position, which is not updated in the scout bee phase of ABC. This incorporation of Firefly optimisation algorithm into the ABC algorithm prevents the limitations of premature convergence, slow convergence and the possibility of being trapped into the local point of optimality in the clustering process. The modified ABC-based clustering process is phenomenal in improving the feasible dimensions for enhancing the process of exploitation and exploration. The results of the HMABCFA, on an average are confirmed to enhance the network lifetime by 23.21%, energy stability by 19.84% and reduce network latency by 22.88%, compared to the benchmarked approaches.

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1. Revathi, N., Sankarganesh, M., Dhaveethu Raja, J., Johnson Raja, S., Gurusamy, S., Nandini Asha, R., Jeyakumar, T.C. **Synthesis, spectral, DFT calculation, antimicrobial, antioxidant, DNA/BSA binding and molecular docking studies of bio-pharmacologically active pyrimidine appended Cu(II) and Zn(II) complexes** (2023) *Journal of Biomolecular Structure and Dynamics*, .**DOI:** 10.1080/07391102.2023.2196696 **(SCI with IF: 5.253)**
2. Ravisankar, N., Sarathi, N., Maruthavanan, T., Ramasundaram, S., Ramesh, M.,Sankar, C., Umamatheswari, S., Kanthimathi, G., Oh, T.H.**Synthesis, antimycobacterial screening, molecular docking, ADMET prediction and pharmacological evaluation on novel pyran-4-one bearing hydrazone, triazole and isoxazole moieties: Potential inhibitors of SARS CoV-2**(2023) *Journal of Molecular Structure*, 1285, art. no. 135461, .**(SCI with IF: 3.841)**
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Research Article

Synthesis, spectral, DFT calculation, antimicrobial, antioxidant, DNA/BSA binding and molecular docking studies of bio-pharmacologically active pyrimidine appended Cu(II) and Zn(II) complexes

Nagaraj Revathi, Murugesan Sankarganesh, **Jeyaraj Dhaveethu Raja**, Samuelraj Johnson Raja, Shunmugasundaram Gurusamy, Radhakrishnan Nandini Asha & ...show all

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Abstract

A new pyrimidine derivative Schiff base (**HL**) [**HL** = 2-((4-amino-6-chloropyrimidin-2-ylimino)methyl)-4-nitrophenol] has been synthesized using 2,6-diamino-4-

Zn(II) complexes [CuL(OAc)] (**1**), [ZnL(OAc)] (**2**) are prepared with **HL**/metal(II) acetate with molar ratio of 1:1. The Schiff base (**HL**) and the complexes **1** and **2** are evaluated by UV-Visible, 1H-NMR, FT-IR, EI-MS and ESR spectral techniques. Complexes **1** and **2** are confirmed as square planar geometry. Electrochemical studies of the complexes **1** and **2** are used to analyse the quasi reversible process. Density Functional Theory (DFT) using the B3LYP/6-31++G(d,p) level basis set was used to get the optimised geometry and non-linear optical properties. The complexes **1** and **2** are good antimicrobial agents than Schiff base (**HL**). The interactions of the **HL** and complexes **1** and **2** with Calf Thymus (CT) DNA are investigated by electronic absorption methods and viscosity measurements. Various molecular spectroscopy techniques, such as UV absorption and fluorescence, were used to explore the mechanism of interaction between the BSA and the ligand **HL** and complexes **1** & **2** under physiological settings. Complexes **1** and **2** are act as potential antioxidants than free Schiff base (**HL**) by DPPH radical scavenging assay. Furthermore, the purpose of the molecular docking studies was to better understand how metal complexes interact with biomolecules (CT-DNA and BSA). From these biological analyses, complex **1** acts as good intercalator with CT DNA & BSA and potent antioxidant with DPPH radical than complex **2**.

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Keywords: Pyrimidine derivative antimicrobial activity DNA binding BSA interaction antioxidant

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The authors report that there are no competing interests to declare.

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Synthesis, antimycobacterial screening, molecular docking, ADMET prediction and pharmacological evaluation on novel pyran-4-one bearing hydrazone, triazole and isoxazole moieties: Potential inhibitors of SARS CoV-2

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ABSTRACT

The respiratory infection tuberculosis is caused by the bacteria Mycobacterium tuberculosis and its unrelenting spread caused millions of deaths around the world. Hence, it is needed to explore potential and less toxic anti-tubercular drugs. In the present work, we report the synthesis and antitubercular activity of four different (hydrazones 7–12, O-ethynyl oximes 19–24, triazoles 25–30, and isoxazoles 31–36) hybrids. Among these hybrids 9, 10, 33, and 34, displayed high antitubercular activity at 3.12 g/mL with >90% of inhibitions. The hybrids also showed good docking energies between -6.8 and -7.8 kcal/mol. Further, most active molecules were assayed for their DNA gyrase reduction ability towards *M. tuberculosis* and *E.coli* DNA gyrase by the DNA supercoiling and ATPase gyrase assay methods. All four hybrids showed good IC50 values comparable to that of the reference drug. In addition, the targets were also predicted as a potential binder for papain-like protease (SARS CoV-2 PLpro) by molecular docking and a good interaction result was observed. Besides, all targets were predicted for their absorption, distribution, metabolism, and excretion - toxicity (ADMET) profile and found a significant amount of ADMET and bioavailability

1. Introduction

Tuberculosis (TB) is an air-bone transferable and extremely aggressive disease caused by *Mycobacterium Tuberculosis*. Millions of people have died globally as a result of it frequently infecting the lungs. Based on the World Health Organization (WHO) 2021 reports, 10.6 million people fell ill with in 2021, an increase of 4.5% from 10.1 million in 2020 [1]. Many nations have been affected by tuberculosis infections, but south-East Asia (45%), Africa (23%) and the Western Pacific (18%), countries have been particularly hard hit by the disease and TB-HIV co-morbidities [2]. Drug-resistant tuberculosis (TB) and multidrug-resistant tuberculosis (MD-TB) are prevalent in practically every country on the globe, making the disease even more complicated to eradicate. The situation has been further worsened for patients by the link between tuberculosis and HIV/AIDS, particularly tuberculosis is the key for the death of HIV-positive patients [3,4]. Due to these factors, the WHO estimates that there are two million tuberculosis-related fatalities and eight million new tuberculosis infections per year [1].

The present management of tuberculosis is a complex task because of the lengthy medication term of 6 to 12 months and the multi-drug-resistant (MDTB) response. The search for novel anti-tuberculosis drugs with *M. tuberculo*sis activity is one of the major areas of medicinal chemistry attention. Several techniques are now being used to create new anti-tuberculosis drugs [5–8].

Likewise, the global disaster corona virus 2019–nCoV, commonly known as the COVID-19 corona virus, is at the forefront of everyone's mind [9]. It has affected the lives and the work of people around the world including researcher. Yet researchers are also

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Research article

Synthesis, molecular docking study and anticancer activity of novel 1,3,4-oxadiazole derivatives as potential tubulin inhibitors

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ABSTRACT

The current study reports on the synthesis and anticancer efficacy of novel oxadiazole derivatives (8a-f) as tubulin polymerization inhibitors. NMR, mass, and elemental studies were used to confirm the newly produced compounds. In contrast to the conventional medicine colchicine, compounds 8e and 8f demonstrated stronger sensitivity and improved IC_{50} values in the range of 3.19–8.21 μM against breast MCF-7, colorectal HCT116, and liver HepG2 cancer cell lines. The target compounds were tested for enzymatic activity against the tubulin enzyme. Compounds 8e and 8f were shown to have the most effective inhibitory action among the new compounds, with IC_{50} values of 7.95 and 9.81 nM, respectively. As compared to the reference drug, molecular docking investigations of the developed compounds revealed the crucial hydrogen bonding in addition to the hydrophobic interaction at the binding site, assisting in the prediction of the structural requirements for the found anticancer activity. These findings indicate that the 1,3,4-oxadizole scaffold has the potential for future research into new anticancer medicines.

1. Introduction

Cancer is a category of disorders defined by uncontrolled cell growth with the ability to expand into or invade neighboring tissues in a process known as metastasis, which is the leading cause of mortality from cancer [1]. Cancer is currently considered a severe health issue on a global scale. Without appropriate treatments, the number of cancer-related fatalities among cancer patients is predicted to

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Synthesis and structural investigation of *o*-Vanillin scaffold Schiff base metal complexes: Biomolecular interaction and molecular docking studies

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ABSTRACT

Schiff base metal complexes such as VNPV (VO(IV)), VNPCo (Co(II)), VNPNi (Ni(II)), VNPCu (Cu(II)) and VNPZn (Zn(II)) have been synthesised by using the ligand (VNP) which was prepared by the condensation reaction of *o*-Vanillin and *N*-phenyl-*o*-phenylenediamine. Elemental analysis, UV–visible, FT-IR, ESI-MS, ESR, ^{1}H NMR, XRD, SEM and Cyclic Voltammogram methods were used to evaluate the above metal complexes. The metal center in the complexes is four coordinated by using the tetradentate N_2O_2 donar Schiff base ligand to form square pyramidal geometry for VO(IV) metal complex and square planar geometry for other metal complexes. The disc well-diffusion method was used on agar plate to assess the in vitro antibacterial activities of the ligand and its metal complexes against bacteria such *B. amyloliquefaciens, B. cereus, B. subtilis, S. epidermidis* and *S. aureus*. From the results demonstrate that the metal complexes of the ligand exhibit better antibacterial behaviour on *S. aureus* bacteria than the other bacterial strains. The antioxidant studies were carried by DPPH free radical scavenging assay method and from the results it is found that the VNPCu complex has better antioxidant activity than the ligand and other metal complexes. Additionally, the spectral techniques like UV–visible absorption, fluorescence and molecular docking methods were used to examine the interactions between the ligand and metal complexes with biomolecules (DNA and BSA). The CT-DNA cleavage activities of metal complexes with CT DNA were examined by gelelectrophoretic method. From the results, the VNPCu complex has only cleave the DNA molecules than the other metal complexes. According to the results of the investigations, the metal complex VNPCu exhibits better interaction with the biomolecules than the free ligand and other metal complexes.

1. Introduction

Schiff bases have received a lot of attention due to their excellent pharmaceutical applications and biological activities due to their chelating properties. It has previously been reported that the presence of the —N═CH— moiety is primarily responsible for biological activity [1–7]. As a result, compounds containing azomethine moiety represent an important class of compounds as pharmaceutical and medicinal agents with a wide range of pharmacological activities with antimicrobial, antibacterial, antifungal, antioxidant, antiinflamatory, anticancer, herbicidal and antianthelmintic properties [8,9]. The Schiff base ligands have been widely used in analytical chemistry, where the application of Schiff base is due to their ability to complex with various metal ions. These were used as sensing materials to detect various metal ions and anions in various solutions [10]. Metal ions are architected with Schiff base ligands to form metal complexes, which enhance the biological activity of metals that have been the focus of metal coordination chemistry [11]. Because of their stability and low toxicity in nature, transition metal ions such as VO(IV), Co(II), Ni(II), Cu(II) and Zn(II) are commonly used to synthesise metal complexes with Schiff base ligands [12].

o-Vanillin- based compounds have recently been discovered to have promisingly excellent biological properties. The transition metal complexes can penetrate into the microorganisms, halting

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Catalytic synthesis and characterization of aryl benzimidazole and its interaction with TiO_2 nanoparticles: ESIPT process

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ABSTRACT

2-(1-phenyl-1H-benzo[*d*]imidazol-2-yl)-4-(trifluoromethyl)phenol(PBITP) has been synthesised and the compound structure was confirmed by proton NMR, carbon NMR, mass spectral studies and elemental analysis. The binding interaction between PBITP and different phases of TiO_2 nanoparticles were investigated. We have observed surprising result. Synthesized PBITP enhanced the fluorescence of rutile phase of TiO_2 on account of the lowering of frontier orbital levels of the PBITP. But the opposite trend was observed for anatase phase of TiO_2. So that, we can identify the rutile and anatase phase. The mechanism of electron transfer was discussed in detail. Emission spectroscopy has been employed to probe on the process of excited state intra-molecular proton transfer (ESIPT) in hydroxy imidazole.An abnormal Stokes – shifted emission band, at shorter and longer wavelengths has been observed in the fluorescence spectra of the sample PBITP / dioxane, which is an indication towards the existence of two different forms of intra-molecular hydrogen bonded isomers.

1. Introduction

The distinct and striking properties such as ring stability, multi functionality, enhanced electron accepting ability, sensing capability, microbial activity and chelation tendency of Benzimidazole derivatives made them as inevitable and much sought after heterocyclics in the field ofmaterials science [1–8]. Synthetic route of benzimidazole and its derivatives were reported [9–12] but the high yield synthesis in this field in short time was not reported. It has been understood that the catalyst plays a very vital role in the synthetic route, in which, the mechanism progresses through the activation process of aldehyde by means of boron trifluoride and results in the formation of imine. Novel applications and development of benzimidazole in different field shows its unique properties. These derivatives are having important rolein the field of biology as in drugs and pharmaceuticals, bio imaging, Chemistry as in Catalysis), Optics as in photovoltoics and optoelectronic materials [13,2]. In particular, the high fluorescence quantum yield of benzimidazole moiety facilitates its applicability in sophisticated optical instruments and multi-functional chemosensors [14,15]. As the target moiety is capable of getting associated into D- π- A structures, it is easier to fine tune the desriable physico-chemical properties and to create specific and selective binding sites in a wider spectrum. The hegemony of benzimidazole based fluorescent sensors to detect various metal ions relies on their remarkable selectiveness, specific chelating nature, enhanced fluorogenic property, high sensitivity, reversibility and non-toxicity.

The extraordinary physicochemical properties, firmness, non-poisonous and less expensive of TiO_2have widened the venues of its applicability in various domains. Three different phases of Titanium dioxide nanomaterial is possible namely, brookite, anatase and rutile. Interestingly, the metastable brookite and anatase, upon heating, are converted into rutile. Thanks to its higher photo catalytic activity, out of the three phases, anatase is normally chosen for large-scale applications. Recently it has been reported that the florescence maximum is suppressed by various nanomaterials which leads to fluorescence quenching [16–18]. In this context, synthesis of benzimidazole derivatives and the study of their binding interaction with various materials have attracted

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Spectroscopic studies on DNA interaction and anticancer activities of pharmacologically active pyrimidine derivative mixed ligand Co(II) and Ni(II) complexes

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ABSTRACT

This article reports the synthesis and its structural elucidation of pyrimidine based mixed ligand complexes [CoL(phen)](OAc) (**1**), [CoL(bpy)](OAc) (**2**), [NiL(phen)](OAc) (**3**) and [NiL(bpy)](OAc) (**4**), where, **HL** = 2-(4,6-dimethylpyrimidin-2-ylimino)methyl-4-nitrophenol, (phen) =1,10-phenanthroline, (bpy) = 2,2′-bipyridine and OAc = acetate. The prepared complexes are structurally pigeonholed by analytical and spectroscopic techniques. According to the findings, the hypothesized structure of prepared complexes has a square planar shape. This article deals with the spectroscopic, viscometric, and theoretical investigation of binding between synthesized compounds and calf-thymus DNA (CT DNA). Spectroscopic (UV-Visible absorption and fluorescence) and viscometric measurements in combination with the molecular docking data reveal that produced compounds bind to DNA double helix in an intercalation mode. According to the in vitro anticancer activity data against various cancer cell lines (MCF-7, HeLa and HEp2), complexes **1–4** exhibit a modest anticancer impact. Investigation of the antioxidant property of prepared compounds showed that complexes **1–4** have a more antioxidant nature than Schiff base. A significant inhibition activity was predicted with complexes **1–4** against various bacterial inoculums typed as gram-positive bacteria (*S. aureus, S. pneumoniae, Stap. pneumoniae, B. subtilis*) and gram-negative bacteria (*S. flexneri, S. typhi, K. pneumoniae, H. influenza*) and various fungal inoculums such as *A. niger, C. albicans*, C. *tropicalis, M. campestris*. The chelating capacity of the Schiff base with Co(II) and Ni(II) ions led to the conclusion that complexes **1–4** are effective antimicrobial agents.

1. Introduction

In the past four epochs, organometallic chemistry has been established to be the biggest and essential branch by connecting the domains of organic and inorganic chemistry. Pyrimidines are naturally occurring obligate heterocycles that exemplify the diazine family, with uracil and thymine constituting ribonucleic acid (RNA) and deoxyribonucleic acid (DNA), respectively, and cytosine constituting cytosine. Natural products including vitamin B1 (thiamine) and synthetic substances like barbituric acid and vernal, both of which are employed as hypnotics are found in pyrimidine carcass [1]. Pyrimidine derivatives have been shown to have sedative properties in the central nervous system [2,3], as well as acting as calcium channel blockers [4]. Because of the two electronegative N atoms, pyrimidine is a -deficient heterocyclic. For the treatment and management of nematode parasites, pyrimidine pills are used in long periods in nearly all types of domestic animals [5]. Due to its excellent safety profile, a broad range of activity in the face of numerous concurrent nematodes and ease of use in a variety of different and in some cases, extremely unique ideas, the pyrimidine class has received widespread acceptance [6]. Pyrimidines

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ORIGINAL ARTICLE **OPEN ACCESS**

Optimization and Validation of RP-HPLC Stability Indicating Method for Determination of Gliclazide in Pure and Bulk Drug

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ABSTRACT
A simple, accurate and economical reverse phase high performance liquid chromatography (RP-HPLC) was developed for the estimation of gliclazide (GLZ) in pure and dosage form the method was carried out on hypersil BDS C-18 column (250mm x4.6mm, particle size) column with mobile phase composition of Acetonitrile, water and phosphoric acid in the ratio of 80:15:5 (v/v/v) at flow rate 1.0 mL/min. With this mobile phase gliclazide eluted at a retention time of ~ 3.65 minutes (Fig.1.12). with an injection volume of 20 and UV detection at 235nm. The developed method was validated according to ICH guidelines.
Key Words: *gliclazide, RP-HPLC, accuracy, tablets.*

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INTRODUCTION

Gliclazide (1-(3-azabicyclo [3.3.0] oct- 3- yl) - 3- ptolylsulfonylurea or 1-(hexahydrocyclo -penta[c]pyrrol-2(1H)-yl)-3-(p-tolylsulfonyl) urea is an oral hypoglycemic agent used in the treatment of type-II diabetes mellitus (Fig.1.01) [1-5]. It belongs to the sulfonylurea class which act by stimulating β cells of the pancreas to release insulin. It reduces blood glucose levels by correcting both defective insulin secretion and peripheral insulin resistance, increasing the sensitivity of ßcells to glucose, decreasing hepatic glucose production, and increasing glucose clearance. It also has anti-platelet adhesive activity and reduces levels of free radicals, thereby preventing vascular complications. It also has been reported to reduce plasma cholesterol and triglyceride levels after repeated administration.

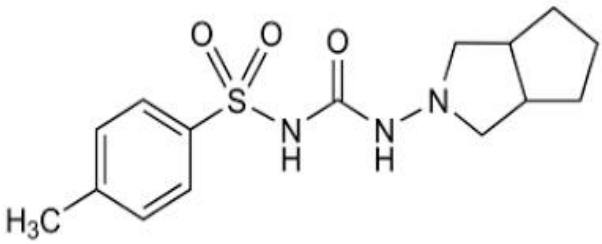

Fig.1.01.MOLECULAR STRUCTURE OF GLICLAZIDE

It has a molecular weight 323.4, and exists as a white or almost white crystalline powder, odorless, tasteless, M.P. 165-170^{0}C. It is official in British Pharmacopoeia 2007. It is marketed in the brand name of Azukon (label claim 80mg) manufactured by torrent pharmaceutical Ltd used for the treatment of type-II diabetes mellitus.

A survey of literature has revealed few analytical methods [6-20] were reported for the estimation of gliclazide in human serum and in pharmaceutical formulation. In view of its therapeutic importance the author developed and validated few analytical methods using HPLC technique.

A detailed literature survey revealed few RP-HPLC methods for the determination of assay of gliclazide in bulk and in dosage forms [9-20]. In the view of the above importance of stability testing, the author therefore, "developed and validated a stability-indicating RP-HPLC assay method for gliclazide in pure

Department of Mathematics – Journal Publications

1. Subasree, R., Basari, K.K., Sathikala, L., Subramanian, K. **A Study on various Pentapartitioned Neutrosophic generalized closed sets** (2023) *International Journal of Neutrosophic Science*, 20 (4), pp. 235-240.
2. Anish Poorna, T., Jayalakshmi, P.S., Alagarsamy, R., Joshna, E.K., Sathikala, L. **Frequency and Difficulty in the Usage of Face Shields Among Oral and Maxillofacial Surgeons During the COVID-19 Era: An Online Survey,** (2023) *Journal of Maxillofacial and Oral Surgery*, **DOI:** 10.1007/s12663-023-01928-1
3. Subasree, R., Basari Kodi, K.**A Study on Nψβ and Nβψ - Closed sets in Neutrosophic Topological spaces** (2023) *Baghdad Science Journal,* 20(1 Special Issue) ICAAM: 283-287
4. Subasree, R., Basari Kodi, K. **On Nβ*-Closed sets in Neutrosophic Topological spaces** (2022) *Neutrosophic Sets and Systems*, 50, pp. 372-378. (Scopus)
5. Anish Poorna, T., Mohan, S., Jayakumar, N., Ek, J., Ramya Arangaraju, R., Sathikala, L., Anish Poorna, T. **Pattern and presentation of panfacial fractures at a tertiary reference center based in Central Kerala, South India** (2022) *Journal of Oral Medicine and Oral Surgery*, 28 (3), art. no. 31.

A Study on various Pentapartitioned Neutrosophic generalized closed sets

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Abstract

The purpose of this paper is to introduce the concept of various Pentapartitioned neutrosophic generalized closed sets such as PNg-closed set, PNω-closed set, PNgb-closed set in Pentapartitioned Neutrosophic Topological spaces. We also study some of their properties with counter examples.

Keywords: Pentapartitioned neutrosophic set; PNg-closed set; PNω-closed set; PNgb-closed set.

1. Introduction

Florentin Smarandache [12] in 1999, introduced the independent concept - Neutrality, the degree of indeterminacy. He also defined the neutrosophic set on three components (t, f, i) = (truth, falsehood, indeterminacy). Wang et al. [4] defined Single Valued Neutrosophic Set (SVNS) in 2010. In 2020, Rama Mallick[15] and Surpati Pramanik introduced Pentapartitioned Neutrosophic Set. In 2021, Suman Das[17] and Binod Chandra Tripathy introduced various sets namely pentapartitioned neutrosophic pre-open, semi-open, α-open and b-open sets and formulated basic results on pentapartitioned neutrosophic topological spaces.

The purpose of this paper is to introduce various Pentapartitioned neutrosophic generalized closed sets such as PNg-closed set, PNω-closed set, PNgb-closed set in Pentapartitioned neutrosophic topological spaces and to obtain its basic properties with counter examples.

2 Preliminaries

Definition 2.1. [6] Let X be a non-empty fixed set. A neutrosophic set (NS) A is an object having the form A = $\{\langle x, \mu_A(x), \sigma_A(x), \nu_A(x)\rangle: x \in X\}$ where $\mu_A(x)$, $\sigma_A(x)$, $\nu_A(x)$ represent the degree of membership, degree of indeterminacy and the degree of non-membership respectively of each element $x \in X$ to the set A.

A Neutrosophic set A = $\{\langle x, \mu_A(x), \sigma_A(x), \nu_A(x)\rangle: x \in X\}$ can be identified as an ordered triple $\langle \mu_A(x), \sigma_A(x), \nu_A(x)\rangle$ in $]-0, 1+[$ on X.

Definition 2.2. [15] Let X be a universe. A Pentapartitioned neutrosophic set A on X is an object of the form A = $\{< x, T_A, C_A, I_A, U_A, F_A >: x \in X\}$ where $0 \leq T_A+C_A+I_A+U_A+F_A \leq 5$.

Here, T_A (x) is the truth membership, $C_A(x)$ is contradiction membership, $I_A(x)$ is an unknown membership, $U_A(x)$ is ignorance membership and $F_A(x)$ is the false membership.

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ORIGINAL ARTICLE

Frequency and Difficulty in the Usage of Face Shields Among Oral and Maxillofacial Surgeons During the COVID-19 Era: An Online Survey

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Received: 12 August 2022 / Accepted: 26 April 2023

Abstract

Aim During the COVID-19 era, personal protective equipment (PPE) has become a necessary part of surgeons' routines, and face shields are considered an additional barrier to prevent disease transmission via aerosols. This study aimed to evaluate how often oral and maxillofacial surgeons (OMFS) use face shields and the challenges they face while using them.

Methods An online survey consisting of fourteen questions was distributed to OMFS, and the responses were collected and analyzed using the chi-square test to determine any associations between categorical variables. A *P*-value of ≤ 0.05 was considered statistically significant.

Results Out of the 310 OMFS who responded to the survey (181 males, 129 females, 235 residents, 10 fellows, and 65 practitioners), 42.9% (133/310) and 39.4% (122/310) reported using face shields for minor and major surgical procedures, respectively. The majority of the respondents (74.1%, 230/310) reported decreased efficiency while using a face shield. Reasons for non-compliance included vision-related issues, headache, difficulties with disinfection, and ergonomic factors.

Conclusion Based on the survey results, the regular use of face shields by OMFS was less frequent, and almost three-fourths of the surgeons found it challenging to use due to various reasons. The reduced compliance with face shield usage highlights the need for more ergonomic face shields to improve compliance.

Keywords Personal protective equipment · Oral and maxillofacial surgeons · Face shield · COVID-19 · Infection control · Sterilization

Introduction

The Corona virus disease-19 (COVID-19) pandemic has changed the panorama and pattern of surgical practice by oral and maxillofacial surgeons (OMFS) [1]. Since the emergence of the COVID-19 pandemic, healthcare personnel are required to use personal protective equipment (PPE) to prevent the aerosol transmission of disease. Various guidelines and protocols have been put forth by the World Health Organisation (WHO) and other authorities on the importance of PPE to prevent the transmission of COVID-19 [2]. The face shield has been one of the equipments commonly used by healthcare workers (HCWs) that help in hindering the splashes, sprays, and spatters from directly contacting the face. They are seldom used alone and hence referred to as adjunctive PPE [3]. From out-patient (OP) reviews to performing major and emergency procedures, the use of adjunctive PPE such as goggles and face shields plays a crucial role in preventing droplet infection [3].

Predominantly spread by contact or droplet transmission, the approximate distance the large aerosol infective particles can travel is said to be one meter [4]. This airborne transmission of virus particles may occur during oral and maxillofacial surgical procedures which need to be effectively thwarted. The use of surgical or N95 masks is preferred to reduce the chances of contracting the infection. Howbeit, the infective particles can still enter other exposed areas of the

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A Study on Nψβ and Nβψ - Closed sets in Neutrosophic Topological spaces

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Abstract:

The aim of this paper is to introduce the concept of Nψβ and Nβψ-closed sets in terms of neutrosophic topological spaces. Some of its properties are also discussed.

Keywords: Neutrosophic set, Neutrosophic Topology, Nψβ-closed set, Nβψ-closed set, Nβ*-closed set.

Introduction:

In general topological space, several authors introduced various open sets such as Pre-stable set by Anmar Hashim Jasim[1]and G-open set by Jalal Hatem Hussein[2]. Florentin Smarandache[3] defined the neutrosophicset on three components (t,f,i) = (truth, falsehood, indeterminacy).This opened up a wide range of investigation in terms of neutosophic topology and its application in decision-making algorithms. Dhavaseelan.R and Jafari[4] introduced generalized Neutrosophic closed sets in 2018.Mani Parimala et al.[5]introduced neutrosophic αψ-closed sets in 2018. Pushpalatha A et al.[6] introduced generalized closed sets via Neutrosophic topological spaces in 2019.Renu Thomas et al.[7] introduced and studied semi pre-open(or β-open) sets in neutrosophic topological spaces. Recently, Subasree R and Basari Kodi K[8], introduced and studied Nβ*-closed sets in Neutrosophic Topological spaces in 2022. In this article, a new class of sets namely N***ψβ***-closed sets and Nβ***ψ***-closed sets are introduced in neutrosophic topological space. Moreover, some of its properties are investigated.

Preliminaries

Definition 1: Let X be a non-empty fixed set. A neutrosophic set (NS) A is aobject having the form $A = \{\langle x, \mu_A(x), \sigma_A(x), \nu_A(x)\rangle : x \in X\}$ where $\mu_A(x)$, $\sigma_A(x)$, $\nu_A(x)$ represent the degree of membership, degree of indeterminacy and the degree of non-membership respectively of each element $x \in X$ to the set A.

A Neutrosophic set $A = \{\langle x, \mu_A(x), \sigma_A(x), \nu_A(x)\rangle : x \in X\}$ can be identified as an ordered triple $\langle \mu_A(x), \sigma_A(x), \nu_A(x)\rangle$in $]-0, 1+[$ on X.

Definition 2: Let $A = \langle \mu_A(x), \sigma_A(x), \nu_A(x)\rangle$ be a NS on X, then the complement C(A) may be defined as
1. $C(A) = \{\langle x, 1-\mu_A(x), 1-\nu_A(x)\rangle : x \in X\}$
2. $C(A) = \{\langle x, \nu_A(x), \sigma_A(x), \mu_A(x)\rangle : x \in X\}$
3. $C(A) = \{\langle x, \nu_A(x), 1-\sigma_A(x), \mu_A(x)\rangle : x \in X\}$

Note that for any two neutrosophic sets A and B,

4. $C(A \cup B) = C(A) \cap C(B)$
5. $C(A \cap B) = C(A) \cup C(B)$.

Definition 3: For any two neutrosophic sets $A = \{\langle x, \mu_A(x), \sigma_A(x), \nu_A(x)\rangle : x \in X\}$ and $B = \{\langle x, \mu_B(x), \sigma_B(x), \nu_B(x)\rangle : x \in X\}$. The following definitions hold:

1. $A \subseteq B \Leftrightarrow \mu_A(x) \leq \mu_B(x)$, $\sigma_A(x) \leq \sigma_B(x)$ and $\nu_A(x) \geq \nu_B(x) \forall\, x \in X$

2. $A \subseteq B \Leftrightarrow \mu_A(x) \leq \mu_B(x)$, $\sigma_A(x) \geq \sigma_B(x)$ and $\nu_A(x) \geq \nu_B(x) \forall\, x \in X$

3. $A \cap B = \langle x, \mu_A(x) \wedge \mu_B(x), \sigma_A(x) \wedge \sigma_B(x)$ and $\nu_A(x) \vee \nu_B(x)\rangle$

4. $A \cap B = \langle x, \mu_A(x) \wedge \mu_B(x), \sigma_A(x) \vee \sigma_B(x)$ and $\nu_A(x) \vee \nu_B(x)\rangle$

5. $A \cup B = \langle x, \mu_A(x) \vee \mu_B(x), \sigma_A(x) \vee \sigma_B(x)$ and $\nu_A(x) \wedge \nu_B(x)\rangle$
6. $A \cup B = \langle x, \mu_A(x) \vee \mu_B(x), \sigma_A(x) \wedge \sigma_B(x)$ and $\nu_A(x) \wedge \nu_B(x)\rangle$

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University of New Mexico

On Nβ*-Closed sets in Neutrosophic Topological spaces

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Abstract: The aim of this paper is to introduce the concept of β*-closed sets in terms of neutrosophic topological spaces. We also study some of the properties of neutrosophic β*-closed sets. Further we introduce Nβ*-continuity and Nβ*-contra continuity in neutrosophic topological spaces.

Keywords: neutrosophic topology, Nβ*-closed set, Nβ*-Continuity and Nβ*-Contra Continuity.

1. Introduction

Zadeh [19] introduced and studied the fuzzy set theory. An intuitionistic fuzzy set was introduced by Atanassov [9]. Coker [10] developed intuitionistic fuzzy topology. Neutrality, the degree of indeterminacy, as an independent concept, was introduced by Smarandache [3,4] in 1998. He also defined the neutrosophic set on three components (t, f, i) = (truth, falsehood, indeterminacy). The Neutrosophic crisp set concept was converted into neutrosophic topological spaces by Salama etal. in [3]. This opened up a wide range of investigation in terms of neutosophic topology and its application in decision-making algorithms. Renu Thomas etal.[17] introduced and studied semi pre-open(or β-open) sets in neutrosophic topological spaces. R. Dhavaseelan and S. Jafari[11] introduced generalized neutrosophic closed sets. In this article, the neutrosophic β*-closed sets are introduced in neutrosophic topological space. Moreover, we introduce and investigate neutrosophic β*-continuous and neutrosophic contra β*-continuous mappings.

2. Preliminaries

Definition 2.1. [6] Let X be a non-empty fixed set. A neutrosophic set (NS) A is an object having the form $A = \{\langle x, \mu_A(x), \sigma_A(x), \nu_A(x)\rangle : x \in X\}$ where $\mu_A(x)$, $\sigma_A(x)$, $\nu_A(x)$ represent the degree of membership, degree of indeterminacy and the degree of non-membership respectively of each element $x \in X$ to the set A.

A Neutrosophic set $A = \{\langle x, \mu_A(x), \sigma_A(x), \nu_A(x)\rangle : x \in X\}$ can be identified as an ordered triple $\langle \mu_A(x), \sigma_A(x), \nu_A(x)\rangle$ in $]-0, 1+[$ on X.

Definition 2.2. [6] Let $A = \langle \mu_A(x), \sigma_A(x), \nu_A(x)\rangle$ be a NS on X, then the complement C(A) may be defined as

1. $C(A) = \{\langle x, 1 - \mu_A(x), 1 - \nu_A(x)\rangle : x \in X\}$

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Original Research Article

Pattern and presentation of panfacial fractures at a tertiary reference center based in Central Kerala, South India

Anish Poorna T[1,*], Mohan S[1], Jayakumar N[1], Joshna EK[1], Ramya Arangaraju R[1], Sathikala L[2]

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Keywords:
Panfacial trauma / panfacial fracture / associated injuries / emergency / airway

Abstract – Aim: We aimed to describe the pattern and clinical presentation of panfacial fractures and to analyze if the panfacial fractures differ from other maxillofacial injuries concerning the time of intervention and duration of hospital stay, thereby evaluating if panfacial fractures place a burden on our hospital which is a tertiary reference center in South India. **Materials and methods**: This was a prospective study conducted for a duration of two years from January 2018 to January 2020 among 28 patients who reported with panfacial fractures. Descriptive data were entered and chi-square test was done to find out the association between categorical variables. **Results**: Patients who reported with panfacial fractures were young adults (n = 17, 60.7%), males (92.8%) predominantly. Among those with a history of Road Traffic Accidents (n = 23, 82%), 91% (n = 21) did not use any protective devices. **Conclusions**: Males, young adults, use of two-wheelers, consumption of alcohol before driving, and avoidance of protective devices were most commonly associated with panfacial fractures ($p < 0.05$). Based on the study, panfacial fractures place a burden on the hospital in terms of the need for special care and prolonged stay period and operating time compared to other maxillofacial injuries ($p < 0.05$).

Introduction

When facial bone fractures were studied decades ago, the prevalence of high energy accidents producing panfacial fractures was not common. Due to increased transportation and speed at which the world moves, development in terms of communication and mobility lead to not only increased and faster connectivity, but also to unavoidable mishaps such as road traffic accidents (RTAs). Panfacial trauma is one such, which involves de-construction of the facial aesthetics and function involving both the hard and soft tissues.

Panfacial fractures are facial fractures that simultaneously involve the upper, middle, and lower thirds of the face, usually caused by high-velocity injuries [1,2]. They are often accompanied by head, cervical, and long bone injuries at the time of presentation. Dilapidation to the bony framework along with the damages to the soft tissue may produce aesthetic problems like alterations in vertical facial height, transverse or anteroposterior projection, and functional disturbances like derangement of occlusion, diplopia, or trismus making reconstitution of original facial architecture a challenge even to an experienced surgeon because of the severe degree of fragmentation and loss of anatomy that guides in the reconstruction of facial harmony [3].

Taking into consideration the complexity in the management and the presence of concomitant injuries warranting the need for emergency intervention in panfacial trauma, our study aimed to analyze the pattern, etiology, concomitant injuries, emergency intervention, clinical presentation, and management strategies of panfacial fractures reporting to our tertiary reference center in South India. The study is unique in the sense that there is no reported literature on the elaborate study of panfacial fractures in South India. We also intended to analyze the difference between panfacial fractures and other maxillofacial fractures in terms of duration of hospital stay required, length of surgical procedure in the operation theater, and the need for special care, thereby observing if they place a burden to the hospital.

Materials and methods

Study population and criteria

This was a prospective study conducted at a Tertiary Reference Centre in Kerala, South India. Patients sustaining fractures of the upper, middle, and lower third of the face

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Achievements of Faculty Members

Academic Year 2022-2023

Number of Research Papers published in International Conferences: **79**

S.No.	Name of the Department	No. of Publications
1.	Civil Engineering	10
2.	Computer Science and Engineering	10
3.	Electrical and Electronics Engineering	06
4.	Electronics and Communication Engineering	18
5.	Mechanical Engineering	23
6.	Physics	03
7.	Chemistry	02
8.	Mathematics	05
	Total publications	**77**

Department of Civil Engineering – International Conference Publications

1. Dharmar M.S., Karthikeyan G, Ragavan V, Partha Sarathi, **Experimental Study On Paver Block Using Prosopis Julifora Ash**, International Conference on Sustainable Technology In Civil Engineering And Applied Sciences-2023 (ICSTCA-2023) pp27
2. Sudhakaran A, Manicka Mamallan A, E.Thanigai Selvan, **Analysis of Natural Coolant On The Rooftop To Lower Room Temperature** International Conference on Sustainable Technology In Civil Engineering And Applied Sciences-2023 (ICSTCA-2023) pp22
3. Indhumathi Anbarasan, M., Leema Margret, A., Ragavan, V., Ramprashath, J. **Investigation on corrosion behaviour of geopolymer concrete using DMS and M-Sand as a fine aggregate under ambient curing conditions** (2023) *Materials Today: Proceedings*, . **DOI:** 10.1016/j.matpr.2023.01.383 (Scopus)
4. Ayyanar, D., Vishnuram, B.G., Muthupriya, P., Indhumathi Anbarasan, M. **An experimental investigation on strength properties and flexural behaviour of ternary blended concrete**(2023) *Materials Today: Proceedings*, .**DOI:** 10.1016/j.matpr.2023.03.020
5. Dhanalakshmi, A., Jeyaseela, J., Karthika, S., Margret, A.L.**An Experimental Study on Concrete with Partial Replacement of Cement by Rice Husk Ash and Bagasse Ash**(2023) *E3S Web of Conferences*, 387, art. no. 03004.
6. Indhumathi, M., Ragavan, V., Dhanalakshmi, A., Iydia, D.D.H.**A Study on non Destructive Tests and Flexural Strengths of Geopolymer Concrete Using Combination of Different Fine Aggregates**(2023) *E3S Web of Conferences*, 387, art. no. 04001, .
7. Kalaimani, R., Subha, C., Reymond, D.J., Kumar, C.V.**Investigation on Strength Characteristics of Self Compacting Concrete incorporated with AR Glass Fibers** (2023) *E3S Web of Conferences*, 387, art. no. 03005.
8. Karthikeyan, G., Margret, A.L., Vineeth, V., Harshani, R.**Experimental study on mechanical properties of Textile Reinforced Concrete (TRC)**(2023) *E3S Web of Conferences*, 387, art. no. 04002, .
9. Riyana, M.S., Sathyan, D., Haridharan, M.K. **Effective Utilization of Industrial and Agricultural Waste for Developing Sustainable Self-Compacting Concrete** (2022) *Materials Science Forum*, 1048 MSF, pp. 376-386.
10. Dharmar, S., Gopalakrishnan, R., Mohan, A. **Environmental effect of denitrification of structural glass by coating TiO2** (2020) *Materials Today: Proceedings*, 45, pp. 6454-6458.

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lightweight concrete material for the production of structural concrete applications in the construction industries today.

Keywords: Polyvinyl Alcohol Fibre, Foaming Agent, Flyash, Compressive strength, and Acid Attack.

CE 032

AN EXPERIMENTAL STUDY ON CONCRETE WITH PARTIAL REPLACEMENT OF CEMENT BY RICE HUSK ASH AND BAGASSE ASH

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ABSTRACT

The utilization of waste materials in concrete manufacture provides a satisfactory solution to some of environmental concerns and problems associated with waste management. Agro waste such as rice husk ash and bagasse ash are used as pozzolanic material for development of blended cement. The rice husk ash and bagasse ash are rich in amorphous silica. Rice husk ash is used as insecticides, pesticides and as a flue gas desulphurization agent. Bagasse ash are used as a fertilizer and used to produce ceramic material. Both rice husk ash and bagasse ash reduces the permeability, shrinkage, heat of hydration. It increases the compressive strength, flexural strength and durability. The properties of concrete with partial replacement of cement by rice husk ash and bagasse ash for about 30% were investigated which includes its compressive strength, split tensile, flexural strength, durability property test namely water absorption, acid attack and sulphate attack. Among the various percentage replacement of cement by rice husk ash and bagasse ash, the strength test result shows that the optimum percentage replacement was about 70 : 20 : 10 (Cement : RHA : BA) which gives the optimum proportion of 30% replacement of cement with rice husk ash and bagasse ash to produce high performance concrete and contribute to sustainable construction. This optimum proportion also gives better durability properties when compared to control cement concrete. In this project work Superplasticiser (SP) was used to improve the workability of concrete with replacement materials.

Keywords: RiceHusk Ash, Bagasse ash, Compressive strength, Acid Attack.

CE 033

ANALYSIS OF NATURAL COOLANT ON THE ROOFTOP TO LOWER ROOM TEMPERATURE

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ABSTRACT

This research article examines a thermal examination of a building in its traditional state as well as the coolant paint that was utilized, and compares the two. The goal of the application-oriented study is to fully remove the usage of artificial cooling agents while lowering building temperature to offer occupants comfort in a sustainable manner. The goal of this research is to use roof cooling

paints in conjunction with Prosopis juliflora extraction to reduce heat within a building and provide a comfortable temperature for residents. To do this, we employed the soxhlet extractor method to first remove the leaves from the juliflora plant, which naturally have low thermal conductivity, so that we could separate the material, transform it into a liquid that is soluble, and combine it with a uniform application of regular paint, and combine it. We employed two coatings and produced several samples using various ratios. This coated sample was assessed one at a time using Lee's disc method with a four-hour interval between coating and drying. The sample mentioned above underwent special treatment to obtain thermal conductivity. The desired value was then generated by applying and simulating these settings in the analysis software. The results show that at specific extract the water to paint ratio. Finally, a temperature drop of 0.5 degrees Celsius was attained when these two samples were contrasted.

Keywords; Prosopis juliflora, Coolant paint, Cement mortar

CE 034

INVESTIGATION ON STRENGTH CHARACTERISTICS OF SELF COMPACTING CONCRETE INCORPORATED WITH AR GLASS FIBERS

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ABSTRACT

This project presents the experimental study on self-compacting concrete (SCC) with replacement of cement by various percentage of Silica Fume and FlyAsh. The main objective is to determine the Flexural strength, Compressive strength and Split tensile strength on Self compacting concrete by partial replacement of cement by Silica Fume and Fly Ash. The use of fly ash in concrete today is an important subject and is of growing importance day by day. Using fly ash in concrete many provide both economic advantages and enhanced properties in the production of concrete. The addition of super plasticizer increases the workability of concrete. The work involves making seven types of SCCs mixes. For each mix preparation, twentyone cube specimens, twenty one cylinder specimens and twenty one beam specimens are cast and cured. The specimens are cured in water for 7 days, 14 days & 21 days. The results shows that SCC with 5 % SF and 10% FA gives higher values of Compressive strength, Split Tensile strength and Flexural Strength compared for other percentages of Silica Fume and Fly Ash. According to the SCC result, various percentages of AR Glass Fiber (0.1 % to 0.4 %) added with the optimum SCC (5% of SF+ 10% of FA) and super plasticizer is mixed with optimum SCC. After each mix proportion, specimens are casted and cured for 28 days in water and hardened properties are determined. The results show that the highter the percentage of flass fiber, the highter the values of concrete Compressive strength, Split Tensile Strength and Flexural Strength.

Keywords: Flyash, Silica Fume, AR Glass Fiber, Self compacting Concrete, Hardened properties.

concrete breaks, it results in the formation of several minute cracks ranging from 50 to 60 nanometers.

Keywords: Textile Reinforced Concrete, compressive strength, flexural strength and impact strength.

CE 041

EXPERIMENTAL STUDY ON PAVER BLOCK USING PROSOPIS JULIFORA ASH

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ABSTRACT

This study aims to minimise the cost of paver blocks compared to traditional concrete paver blocks by partially replacing cement with prosopis juliflora ash (PJA), coarse aggregate, and fine aggregate. In this project, prosopis juliflora ash (PJA) is used in place of cement. Currently, concrete paver blocks are used to pave roadways, sidewalks, parking lots, and other surfaces. to lessen the amount of cement in paver blocks. It aids in lowering the price of paver blocks. The slump cone test was used to determine the mechanical and microstructural qualities of cement concrete, as well as the mechanical attributes of paver blocks, including compressive strength, impact resistance, and flexural characteristics. When cement is partially substituted with PJA, it was found from the experimental examination that there were no such noticeable changes in the mechanical properties of the paver block. This leads to a higher decrease in groundwater loss caused by the expansion of PJA as well as a decrease in pollution rate caused by effective PJA utilisation and lower cement production. The prepared paver blocks underwent testing, and the findings were reviewed.

MAT 01

ON sg_a-CLOSED SETS IN TOPOLOGICAL SPACES

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ABSTRACT

The purpose of this paper is to define and study a new class of sets called semi generalized alpha closed sets in topological spaces. We prove that this class lies between the class of sg-closed sets and the class of gs-closed sets. Basic properties of semi generalized alpha closed sets are analysed. Also the new characterization of semi generalized alpha closed sets are introduced and their relation with alreadyexisting well known sets are also investigated.

Keywords: sg_a-closed sets, semi- closed sets, α- open sets, g-closed sets

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Investigation on corrosion behaviour of geopolymer concrete using DMS and M−Sand as a fine aggregate under ambient curing conditions

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ABSTRACT

Finding an alternative to cement concrete has become critical for the long-term sustainability of the environment. Because of its lower carbon footprint, geopolymer concrete has shown to be an excellent substitute for traditional concrete. Fly ash, GGBS, metakaolin, red mud, and other raw materials for geopolymer concrete are high in silica and alumina. Geopolymer matrix is created when these raw materials are mixed with alkaline solutions. Fine and coarse aggregates, as well as superplasticizers, are all essential ingredients in geopolymer concrete. The goal of this study is to see if fly ash, GGBS, Manufactured Sand (M−Sand), and Dredged Marine Sand (DMS) can be used to make geopolymer concrete. In terms of corrosion resistance, carbonation and alkalinity, DMS could easily replace the typical scarce material (River Sand) in the manufacturing of geopolymer concrete under ambient curing conditions.

Selection and peer-review under responsibility of the scientific committee of the Fourth International Conference on Recent Advances in Materials and Manufacturing 2022.

1. Introduction

In terms of sustainable building, geopolymer concrete has emerged as a possible alternative to cement concrete. The need of the hour is to preserve the environment from carbon footprints that are too large. In the manufacturing of traditional binding materials, such as cement, carbon dioxide emissions are disturbing. Cement manufacture accounts for around 80 % of CO_2 emissions. Furthermore, the creation of it will necessitate a significant amount of energy. (Approximately 3.5 times the energy required for Geopolymer Concrete.) Geopolymer is an inorganic polymer that uses silica and alumina- rich earth source materials as a binder in combination with an alkaline solution. The mixture, which includes source material (fly ash, GGBS, metakaolin, rice husk ash, and so on), alkaline liquids, fine aggregates, coarse aggregates, and super plasticizer, will be exposed to steam curing, hot air curing, and ambient curing conditions.

The concrete industry has recently given geopolymer binders a lot of attention, and this interest has grown steadily over the past few decades. According to research done in 1978 by Professor J. Davidovits, "the polymerization process happens under alkaline conditions on Si and Al materials, resulting in a tri polymer network and ring structure formed of Si-O-Al-O linkages."Further, during the chemical process that results in the creation of geopolymer, "water is expelled." When water is ejected from the Geopolymer during the curing and following drying processes, the matrix develops nano-pores that improve the performance of the Geopolymer. because of this, the moisture in a Geopolymer solution does not participate in the chemical process; instead, it lends the combination workability while being handled. However, the physical property has been significantly diminished. when the amount is greater than 12 % (by mass of fly ash) in Self Comacted Geopolymer concrete.

Hardjito et al study.'s examined the impact of *N*-based SPs on the properties of fresh and hardened fly ash-based Geopolymer concrete. They found that the compressive strength was virtually unaffected up to a dose of 2 % by mass of fly ash, whereas dosages over 2 % resulted in compressive strength loss. By enhancing the molar concentration of the NaOH solution, the start and final setting times were reduced. According to Hardjito the solid performance of geopolymer specimens produced of fly ash is significantly influenced by the molar content of the NaOH solution utilized as an acti-vator solution. Raising the molarity in the geopolymer reaction causes an increase in the quantity of soluble silicate, which speeds up the reaction rate. Increased NaOH

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An experimental investigation on strength properties and flexural behaviour of ternary blended concrete

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ABSTRACT

Depletion of natural resource materials has resulted from an increase in the consumption of component materials in the manufacturing of concrete. Recycling is the most effective method for dealing with the effective management of waste for preservation of the environment. Recently researchers are being conducted to utilize industrial waste by product as an admixture in the concrete production. In this study silica flour which is a waste from silica industry and waste glass powder from glass industry used for the replacement of cement. The concrete mixes were cast with replacement level such as 20%, 30% for OPC in this study. The target compressive strength of 40 MPa for the grade of M40 Concrete and specimens were casted such as cubes and beams and tested after the completion of curing to find the characteristic compressive strength and flexural behavior of beams. The compressive strength at the age of 7,14 and 28 days of curing were determined in the Compressive Testing Machine of 2000kN capacity and the results were compared and also discussions are presented on the trend of strength gain for such Ternary Blend Concrete (TBC) mixes. The RC Beams were tested in the loading frame of 500 kN Capacity and the results obtained from the testing of beam, the load versus deflection pattern were drawn and compared for various beams cast with different TBC mixes. The ductility index of the beam was calculated from load versus deflection curve. The results obtained from the investigation compared with the test specimens cast with normal concrete tested in the laboratory. From the result it is found that the TBC shall be an alternative to the conventional cement concrete and found well suitable for structural applications.

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1. Introduction

Concrete is the most consumed global man-made material after water due to its common usage in most of structural applications. The concrete mix design creates complex concerns, and the accurate ways of performing its design can be finalized with expert information in the field with their experience. Over the last few years, efforts to improve the performance of concrete have suggested that cement substitute products, as well as mineral and chemical admixtures, will improve the strength and durability of concrete. The concrete mixes thus produced will minimize carbon footprint and prevent the atmosphere from the pollution [1]. The environmental results indicate that replacing pozzolanic materials with Portland cement is not always beneficial to the climate [2]. To make high-strength and durability concrete, active mineral additives such as fly ash, blast furnace slag, rice husk ash and SiO_2 nano particles have been added to the cement, aggregates and water in conventional concrete [3,4]. In this study attempts have been made to find out the scope for attainment of high strength concrete when industrial waste glass powder and silica flour are added in the concrete mixes to aim for the better mechanical properties of such concrete mixes. The addition of limestone powder improves the early age strength of concrete while fly ash improves the late age of concrete due to its pozzolanic properties in nature. The most select mixture of constituents like cement, fly ash, and limestone is essential for material design of ternary blended concrete. This research presents a simulation program for evaluating the hydration process and strength characterization of ternary blended concrete. Finally, the optimal combinations of cement, flyash and limestone with different age were determined based on the parameter studies [5–7]. The natural coarse aggregate which was partially replaced by 50 percentage recycled coarse aggregate. The

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An Experimental Study on Concrete with Partial Replacement of Cement By Rice Husk Ash and Bagasse Ash

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ABSTRACT: Utilization of waste materials in concrete manufacture provides a satisfactory solution to some of environmental concerns and problems associated with waste management. Agro waste such as rice husk ash and bagasse ash were used as pozzolanic material for development of blended cement. The properties of concrete with partial replacement of cement by rice husk ash and bagasse ash for about 30% were investigated which includes its compressive strength, split tensile, flexural strength, durability property such as acid attack and sulphate attack. Among the various percentage replacement of cement by rice husk ash and bagasse ash, the strength test result shows that the optimum percentage replacement was about 70 : 20 : 10 (Cement : RHA : BA) which gives the optimum proportion of 30% replacement of cement with rice husk ash and bagasse ash to produce high performance concrete and contribute to sustainable construction. The cement in the concrete replaced by Bagasse Ash and Rice Husk Ash by the percentage of 5%, 10%, 15%, 20%, 25% and 30%. This optimum proportion result obtained is beneficial in improving the mechanical strength and durability property of the concrete. In this project work Conplast 340 Superplasticizer was used to improve the workability of concrete with replacement materials.

Keywords: Rice Husk Ash, Bagasse Ash, Mechanical Strength, Acid Attack.

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A STUDY ON NON DESTRUCTIVE TESTS AND FLEXURAL STRENGTHS OF GEOPOLYMER CONCRETE USING COMBINATION OF DIFFERENT FINE AGGREGATES

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Abstract: Geopolymer concrete is a new technology that deserves more attention in the rapidly evolving sustainable construction industry. Furthermore, to avoid the depletion of natural resources, by-product waste management technologies are essential. Today, river sand is in short supply. DMS (Dredged Marine Sand), on the other hand, which faces disposal and land acquisition issues, proves to be a viable alternative to river sand. In this paper, a mixture of M-Sand and DMS was used in place of river sand, and non-destructive, Flexural strength of beam by monotonic loading and cyclic loadings were investigated. The findings indicated that DMS has attained flexural characteristics and with regard to cracks, very minor and vertical cracks are observed in all beams as in the case of monotonic loading. Further, they originate from the tension zone

Keywords*:*Geopolymer concrete, Flexural Strength, DMS,M-sand,Non Destructive Tests.

1. Introduction

Joseph Davidovits (1989) conducted extensive research on the chemistry of geopolymers and geopolymeric materials. Geopolymer undergoes exothermic reactions as a result of the polycondensation process, as previously stated. The geopolymer materials are clearly stated to be derived from mineral earth resources. Composites are created without the use of fire, smoke, toxins, or excessive energy during the manufacturing process. The investigations conclusively demonstrated that geopolymeric materials immobilise harmful elemental wastes within the geopolymeric matrix. Hazardous components in flyash reacted with

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Investigation on Strength Characteristics of Self Compacting Concrete incorporated with AR Glass Fibers

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Abstract. This project presents the experimental study on self-compacting concrete (SCC) with replacement of cement by various percentage of Silica Fume and Fly Ash. The main objective is to determine the Flexural strength, Compressive strength and Split tensile strength of Self compacting concrete by partial replacement of cement by Silica Fume and Fly Ash. The use of fly ash in concrete today is an important subject and is of growing importance day by day. Using fly ash in concrete many provide both economic advantages and enhanced properties in the production of concrete. The addition of super plasticizer increases the workability of concrete. The work involves making seven types of SCCs mixes. For each mix preparation, twenty-one cube specimens, twenty-one-cylinder specimens and twenty-one beam specimens are cast and cured. The specimens are cured in water for 7 days, 14 days and 21 days. The results show that SCC with 5 % SF and 10 % gives higher values of Compressive strength, Split Tensile strength and Flexural Strength compared to other percentages of Silica Fume and Fly Ash. According to the SCC result, various percentages of AR Glass Fiber (0.1 % to 0.4 %) added with the optimum SCC (5% of SF+ 10% of FA) and super plasticizer is mixed with optimum SCC. After each mix proportion, specimens are cast and cured for 28 days in water and hardened properties are determined. The results show that the higher the percentage of glass fiber, the higher the values of concrete Compressive strength, Split Tensile Strength and Flexural Strength.

1 Introduction

Since the 1980s, self-compacting concrete (SCC) has been widely used in Japan's building sector. [1] At the same time, SCC has its weight without compaction by using an external vibrator and low air content. [2] Due to its high viscosity, which prevents segregation and bleeding, SCC is also known as a specific form of concrete. [3] Compared to conventional concrete, SCC has several advantages, including reducing skilled labor expenses, consuming

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Experimental study on mechanical properties of Textile Reinforced Concrete(TRC)

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Abstract. Textile-reinforced concrete (TRC) is a variant of reinforced concrete in which textiles are used in place of steel reinforcing bars. Reinforcing the concrete with steel means increasing its tensile strength, but steel also corrodes and wears out over time. The TRC is a novel idea that has the potential to overcome these drawbacks. TRC is a composite reinforcing material that is made from cement and has the benefits of being resistant to corrosion, having a high bearing capacity, and performing well in terms of its fracture limit. The principal function of TRC in buildings has been as reinforcement and as a means of enhancing the ductility and performance of concrete. This experimental work utilizes a 145 gsm (grams squared per meter) alkali-resistant (AR) glass fiber textile mesh. Specimens were cast with and without fibers, and the number of layers was increased from 1 to 3 at 25 mm spacing. In this experimental work, the mechanical behavior of TRC was investigated by conducting tests on its impact, compressive, and flexural strengths. From these results, the TRC specimen exhibits more flexibility than the control specimen. The TRC specimen bends under force and returns to a new position when the load is removed, indicating a good energy absorption capability. As a result, it infers that the specimen with fibrehave the capacity to withstand a higher maximum load than conventional specimens. TRC has a greater fracture control system compared to conventional steel-reinforced concrete.

Keywords: *Textile reinforced concrete, compressive, flexural, and impact strength.*

1 Introduction

New building materials and technologies have made it more important to study long-lasting engineering structures that use fewerMaterials, are lighter, and have bettereconomicbenefits. The new method of embeddingreinforcingfabricsintoinorganic

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Effective Utilization of Industrial and Agricultural Waste for Developing Sustainable Self-Compacting Concrete

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Keywords: Self compacting concrete, Fly Ash, Rice Husk Ash, Ternary Blends.

Abstract. SCC (Self compacting concrete) can fill formwork and encloses reinforcing bars under gravity and maintains homogeneity without vibration. SCC shortens the period of construction, guarantees compaction in confined zones, moreover terminates noise due to vibration. The wide spread application of SCC is restricted because of the high cost for the production of SCC with high cement content and chemical admixtures. In order to make the production of SCC economical, and to reduce the high cement content the Ordinary Portland Cement in SCC can be blended with pozzolanic materials like rice husk ash and supplementary cementitious materials like fly ash. In this paper the fresh state properties and mechanical properties such as compressive strength, split tensile strength and flexural strength of SCC with ternary blends of rice husk ash (RHA) and fly ash (FA) were studied. For this purpose, different mixes were prepared by replacing Ordinary Portland Cement (OPC) with 5%, 10%, 15% and 20% of rice husk ash (RHA) and the percentage of addition of fly ash (FA) is fixed as 15% for all these mixes. It was observed that the specimen incorporating 10% of rice husk ash (RHA) and 15% of fly ash (FA) as ternary blend exhibits better mechanical properties such as: Compressive, split tensile and flexural strengths at 28 days of age as compared to traditional mix of SCC without RHA (Rice Husk Ash) and FA (Fly Ash). This research demonstrates that the ideal percentage for a mixture of rice husk ash (RHA) and fly ash as ternary blend is 10% and 15% respectively.

1. Introduction

In recent decades, the increased demand of conventional building materials like cement has resulted in various environmental problems like high CO_2 emission, during cement production. Also there exists the essentiality of sustainable development and waste management in the field of construction. By taking in to consideration of all these facts, the researchers are keen on lessening the use of cement in concrete by the successful usage of industrial wastes or debris and agricultural refuses and thereby developing blended cements for the production of concrete. SCC (Self compacting concrete), usually known as self consolidating concrete, is first evolved in Japan in the last part of the 1980's [1]. SCC is a unique solid that can sink into formworks, and does not require compaction by means of external mechanical vibration [2]. SCC can be characterized as a designed concrete comprising of cement, aggregates, water, filler, and chemical as well as mineral admixtures which possesses, high passing ability, flow ability, deformability and Seggregation resistance [1]- [7]. The cement production units contribute around 8-10% of worldwide ozone harming substance emanations [8]. The industrial and agricultural by-product such as fly ash, GGBS, silica fume, metakaolin, rice husk ash causes pollution and thus disturbs the balance of environment because of issues related with its disposal [9][10].The usage of mineral compounds in high strength concrete reduces the usage of cement with certain economic and ecological benefits such as cost effectiveness, low energy consumption and reduction in CO2 emissions[11].The utilization of pozzolanic materials in concrete reduces the usage of cement

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Environmental effect of denitrification of structural glass by coating TiO_2

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Silica Gel

ABSTRACT

This study aims to reduce the concentration of nitrogen in the indoor and outdoor atmosphere and its harmful compounds. Nitrogen dioxide is a gas emitted mainly by automobiles, trucks, power plants, and some industrial plants, with the highest concentrations of nitrogen dioxide in terms stops the good distribution of atmospheric pollution which led to higher COVID-19 cases in recent trends. By establishing chemical coatings on the building materials will have a significant effect. The exterior modification on the glass is done by mixing silica gel along with titanium dioxide to adsorb the accumulated NO_2 present in the buildings. Here, spray coating and dip coating technologies were used to coat the solution on the normal glass. The coating was found to be hydrophobic and showed better performance in the fastness test results. The size of the film is 45 to 55 nm. The percentage of adsorption confined to 20%. The least number of days of the period of replacement was found to be 24 days in this research for the most vulnerable conditions having air pollution levels greater than $500\frac{\mu g}{m^3}$. Finally, our study proves that establishing coatings can significantly reduce air pollution by reducing the percentage of NO_2 by 20% in a particular environment.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Mechanical, Electronics and Computer Engineering 2020: Materials Science.

1. Introduction

Nitrogen monoxide (NO) is the one of the general toxic gas polluted by industries during their combustion process. (1–3) Emission of NO to the global environment not only will lead to a defect on earth hemisphere, but also worst effect on human lungs system. (4–7). At the present situation, there is an global trend to reduce the effect of NO to atmosphere for improving the human's long term health life. However, number of survey were reported that NO Concentration are more high is some places such as car parking in indoor area, welding industries.(8–10).

Qiwen Jiang, et.al. (2019) (16) addressed "The removal by photo catalytic of no in outdoor and indoor air in service light" and concluded that, in account for Taguchi orthogonal array configuration, the calcinaed temperature had a crucial effect in photocatalytic operation of this type of new ceramic tiles with an efficiency of approximate 43% in the removing nitrogen (11–15).

Hui Ye, et.al. (2017) (17) demonstrated "Simple Spray Deposition of the Water-based Super hydrophobic Coatings with High Stability for Flexible Applications" and suggested that the stabilized cross-linked chain in the structure in the composite superhydrophobic coating lead to all long term durable properties.

Zhihui Ai, et.al. (2009) (18) explored the "Efficient Photocatalytic Removal of NOin Indoor Air with Hierarchical Bismuth Oxybromide Nano plate Microspheres under Visible Light" and found that as prepared BiOBr microspheres which is stabilized with sustain long operation removes 8 percent NO in 10 min reveal extraordinary photocatalytic.

Th. Maggos, et.al. (2007) (18) dealt with Photo-catalytic degradation suggesting the TiO_2- containing photocatalytic paint, added to the ceiling in the car park. Considering the reduction in pollution in variation in automobile emissions, the photo catalytic reduction of NO and NO_2 was approximately 19% and 20%.

The main aim of this rersearch is to reduce the variations of Nitrogen Dioxide concentration (NO_2) in both indoor and outdoor environment by coating a hydrophobic chemical film of Titanium dioxide (TiO_2) using Sol – gel technique by spray coating. Several methods have been proposed to combat this. By establishing chemical coatings on the building materials will have a significant

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Department of Computer Science and Engineering - International Conference Publications

1. Anusuya, V., Bejoy, B.J., Ramkumar, M., Shanmugaraja, P., Dhiyanesh, B., Kiruthiga, G. (2023). Maximum Decision Support Regression-Based Advance Secure Data Encrypt Transmission for Healthcare Data Sharing in the Cloud Computing. In: Suma, V., Lorenz, P., Baig, Z. (eds) Inventive Systems and Control. Lecture Notes in Networks and Systems, vol 672. Springer, Singapore. https://doi.org/10.1007/978-981-99-1624-5_3
2. Mareeswari, G., Dinesh, E.V. **Deep Neural Networks based Detection and Analysis of Fake Tweets** (2023) *ICSPC 2023 - 4th International Conference on Signal Processing and Communication*, pp. 56-61.
3. Santhosh, R., Abinaya, M., Anusuya, V., Gowthami, D. **ChatGPT: Opportunities, Features and Future Prospects** (2023) *7th International Conference on Trends in Electronics and Informatics, ICOEI 2023 - Proceedings*, pp. 1614-1622.
4. Haritha, V., Latha, J., Swetha Reddy, A., Divya Bharathi, N., Upadhyay, S., Venkatesh, R. **Energy Efficient Data Management in Health Care** (2023) *Proceedings of the 3rd International Conference on Artificial Intelligence and Smart Energy, ICAIS 2023*, pp. 682-688.
5. Rajalakshmi.R.U, Shakthi.S and Manjula.S, **Fishsnap: A Deep Learning-Based Mobile App For Fish Species Recognition** (2023), International Conference on Recent Trends in Science, Engineering, and Management (ICRTSEm 2023), pp.83.
6. P.Preetha, S.VishnuPriya, Dr.V.Anusuya, S.Manjula, **Self-Care Made Easy: The Health Care Application** (2023), International Conference on Recent Trends in Science, Engineering, and Management (ICRTSEm 2023), pp.110.
7. Jothi Thilag, P., Vasuki, S. **Speech emotion recognition using deep learning** (2022) *AIP Conference Proceedings*, 2444, art. no. 0078251, .
8. Srikanth, V., Walia, R., John Augustine, P., Venkatesh, R., Simla, J., Jegajothi, B. **Chaotic Whale Optimization based Node Localization Protocol for Wireless Sensor Networks Enabled Indoor Communication** (2022) *Proceedings of the International Conference on Electronics and Renewable Systems, ICEARS 2022*, pp. 702-707.
9. Manjula S, Valarmathi K, SwarnaSudha," **Data Division using Fuzzy Logic and Blockchain for data security in Cyber Space**, (2022), *Procedia Computer Science,* 215, pp 452-460.
10. S.Manjula, K.VigneshSaravanan, G.Umasudhan, **AI based Online Attendance Record System using Face Recognition and Random Queries, i**n CSIR & TCS Sponsored International Conference on Recent Revolution in Mathematics, Computer Science and Applications (ICRRMCSA'22), pp 9-15

Maximum Decision Support Regression-Based Advance Secure Data Encrypt Transmission for Healthcare Data Sharing in the Cloud Computing

V. Anusuya, B. J. Bejoy, M. Ramkumar, P. Shanmugaraja, B. Dhiyanesh, and G. Kiruthiga

Abstract The recent growth of cloud computing has led to most companies storing their data in the cloud and sharing it efficiently with authorized users. Health care is one of the initiatives to adopt cloud computing for services. Both patients and healthcare providers need to have access to patient health information. Healthcare data must be shared and maintained more securely. While transmitting health data from sender to receiver through intermediate nodes, intruders can create falsified data at intermediate nodes. Therefore, security is a primary concern when sharing sensitive medical data. It is thus challenging to share sensitive data in the cloud because of limitations in resource availability and concerns about data privacy. Healthcare records struggle to meet the needs of security, privacy, and other regulatory constraints. To address these difficulties, this novel proposes a machine learning-based Maximum Decision Support Regression (MDSR)-based Advanced Secure Data Encrypt Transmission (ASDET) approach for efficient data communication in cloud storage. Initially, the proposed method analyzed the node's trust, energy, delay, and mobility using Node

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V. Suma et al. (eds.), *Inventive Systems and Control*, Lecture Notes in Networks and Systems 672, https://doi.org/10.1007/978-981-99-1624-5_3

Deep Neural Networks based Detection and Analysis of Fake Tweets

Publisher: IEEE

G Mareeswari ; Erana Veerappa Dinesh **All Authors** •••

Abstract: Social networking is a wedge for interchanging thoughts, individual perspectives and views but without adversely affecting the sentimental, religious, or maybe private th... **View more**

Metadata

Abstract:
Social networking is a wedge for interchanging thoughts, individual perspectives and views but without adversely affecting the sentimental, religious, or maybe private thoughts of the group. Furthermore, the spread of fake news flashes continues to be a pattern on social networking. This paper discusses a hybrid method used towards the control over this kind of ill intentions by developing a method that analysis and also detects posts, toxic comments, or fake news inside any multimedia or text format. This particular paper will help to identify the precision of fake news utilizing Deep Neural Networks. News articles extracted from Twitter is represented as embedding vectors. The hybridized Convolutional Neural Network and LSTM (Long-Short Term Memory) framework is built to learn the contextual dependencies between the words present in news articles. We compare many methods for detecting fake news. The Natural Language Interference (NLI) designs may also be qualified. The information compilation, interpretation, and then tests procedure are clarified completely along with existing different study analyses in the identity of linguistic variants to come down with truthful and false information. Next, we check as well as train a pair of learning breakthroughs to produce exact fake information detectors.

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Conference Location: Coimbatore, India

Contents

For centuries, Online Social networking has been a part of our lives for generations and has now spread to even remote villages. Although social networking makes existence within the perspective of reaching individuals, numerous individuals posting and spreading phony information is a significant issue within the last several decades [1]. 92% of the public rely on social networking for news reading due to the accessibility of the use and the internet of sensible products. Google and Facebook are continuously shooting steps contemplating the problems. For instance, learning phony news flashes by flagging them as fake, utilization of fake websites, fact-checking product labels, and so on [2]. These methods haven't but acquired the purpose of Google and Facebook, that's the reason why individuals have to become alert to what they should trust and never trust, despite the fact that the series in between the genuine and also fake is tiny, furthermore the spreading number of this phony information is quicker giving better barrier to forecast the credibility of this information. Generally, there occurs a requirement for phony news flash detection [3]. The motivation of this work is to reach an answer which could be utilized by individuals to determine as well as study the sites which contain misleading and false information. All-natural words processing is part of Artificial Intelligence (AI), which comprises methods that may employ textual content, produce designs as well as algorithms that aids in prediction [4]. This particular effort is designed to produce a unit that will utilize the info or maybe information of yesteryear or maybe existing current information accounts as well as foresee if the media is fake/not [5].

ChatGPT: Opportunities, Features and Future Prospects

Publisher: IEEE

R. Santhosh ; M. Abinaya ; V. Anusuya ; D. Gowthami All Authors

Abstract: ChatGPT is an AI-based Natural Language Generation (NLG) system developed by Microsoft that enables users to converse with virtual agents in a conversational manner. Chat... **View more**

Metadata

Abstract:
ChatGPT is an AI-based Natural Language Generation (NLG) system developed by Microsoft that enables users to converse with virtual agents in a conversational manner. ChatGPT is based on the transformer-based architecture, a type of deep learning algorithm that can be used to generate text directly from raw inputs. ChatGPT is designed to enable natural conversations, with the goal of making it easier for people to interact with virtual agents in a conversational manner. ChatGPT has the potential to revolutionize the way people interact with virtual agents, as it can be used to generate natural language responses to userinput. The system could also be used to create virtual agents that can respond to user queries in a more natural manner, allowing for more efficient customer service interactions. In the future, ChatGPT could be used to create more sophisticated virtual agents that can understand user intent and provide more accurate responses. Additionally, ChatGPT could be used to generate more engaging content for virtual agents, such as stories, jokes, and conversations. This paper provides the power of ChatGPT with its various features, opportunities and impact of ChatGPT in various sectors.

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Contents

Sam Altman is the CEO of OpenAI, a leading artificial intelligence research and development firm. He is also the co-founder of Y Combinator, a venture capital firm. Altman is an engineer and entrepreneur who have been involved in the development and deployment of a wide range of AI technologies, including chatbots. Altman has long been a proponent of chatbots and AI-powered customer service. He has been a vocal advocate for the use of chatbot and AI technologies to enhance customer service and improve customer experience. OpenAI has developed a chatbot called ChatGPT, which is an AI-driven customer service chatbot. The chatbot is trained to recognize language and respond to customer inquiries, making it an effective and efficient tool for customer service.

Energy Efficient Data Management in Health Care

Publisher: IEEE

Haritha V ; Latha. J ; Swetha Reddy A ; N. Divya Bharathi ; Shrikant Upadhyay ; Venkatesh R All Authors

Abstract: In healthcare WSN applications, data loss due to congestion may trigger a "death alert" for a crucial patient. Because of this, a system must be designed to either preven... **View more**

Metadata

Abstract:
In healthcare WSN applications, data loss due to congestion may trigger a "death alert" for a crucial patient. Because of this, a system must be designed to either prevent or reduce congestion. This study presents an energy-efficient and reliable multi-path data transmission protocol for healthcare Wireless Sensor Networks (WSN). Spare data and sensitive data packets are sent through a route with little transmission interference when the system is jammed. The recommended technique assesses the danger of congestion at intermediate nodes and adjusts their transmission rate to prevent congestion. Each node's buffer is partitioned to make data transport fair and efficient. The protocol's high reliability is maintained through hop-by-hop loss recovery and acknowledgement. Simulations are used to test the recommended method's functionality. In terms of energy economy, reliability, and end-to-end delivery ratio, it exceeds existing healthcare congestion management algorithms. This study evaluates and compares the routing techniques. They present a concept for developing an energy-efficient routing protocol. This approach designs quick, compact, more energy-efficient routes than existing ones. NS2 is used to run and test the proposed system. The proposed method beats the current protocol in terms of average delay, energy savings, and packet delivery ratio.

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Contents

It is not practicable to replace or recharge the battery in a WSN device since WSN applications are often positioned in inaccessible places with harsh environmental conditions. For this reason, it is very necessary to lessen the amount of power used from the batteries in order to delay the lifespan of the network. Data communication is the activity that uses the most energy out of detecting, storing, sending, and receiving data by sensor nodes. Other sensor node operations include sensing and storing data. Because of this, query optimization methods are seeing a significant surge in demand in WSN. This article describes the major query optimization devices that are castoff in WSN to answer the delinquent of energy efficiency. These algorithms are utilized to advance the recital of queries. It will attempt to afford an indication of the present research challenges and literature concerning query optimization approaches in WSN [1]. In this study, the authors examine the methods in clustering techniques, comparing and contrasting them, and providing a thorough analysis of their performance over a variety of scales, data types, and levels of heterogeneity and noise. Authors also provide a comprehensive overview of the clustering methods that have been implemented in the past, with a detailed comparison of these methods. Validation is completed with sensor data [2] using a number of distinct external validation techniques. To make effective use of massive concurrent sensor networks in healthcare, it is necessary to integrate many levels of medical knowledge with data streams from the sensors. In this article, identified certain problems that may be solved through testing. These problems include: Additionally, medical expertise is utilized for both the process of the system and the interpretation of the facts. Finally, IoT-based calibration is accepted out with the assistance of certified linked diagnostic devices [3]. The vast volume of data that is produced by a variety of sensors and then uploaded into the server over WSN confronts a number of issues relating to security, privacy, adaptability, and scalability. The currently available constructions for the collecting of data are devoid of many forms of security concerns. In this research outcomes provide a proposal for a protected health cloud architecture for the collecting of patients' health data. The final work is based on WSN technology that is combined with cloud computing. Authors have suggested using Cypher text Policy-ABE into our cloud architecture so that the proposed work can ensure the safety of data, protect users' privacy, and exercise fine-grained regulator over who may access what data. In addition, placed limitations on the characteristics of the various categories of patients in order to cut down on the storage of data that isn't essential [4]. The authors highlight the difficulties that certain demonstrative submissions in the medical field present to WSN because of the necessary level of worthiness while also having to ensure the confidentiality and security of medical data. These challenges are brought about by the need to ensure that medical data is protected. In the context of providing some typical applications in the healthcare area, these problems are outlined below. These difficulties are difficult by the limited availability of resources that is inherent in wireless sensor network systems. From the suggested work, an overview of prototype systems that cover an extensive range of request fields, from physiological and behavioral investigations to monitoring of physiological and behavioral activity, and highlight continuing research issues [5]. In this research, suggested an efficient data management strategy for use in WSNs with graph topologies, with the intention of increasing the power efficiency. By calculating the likelihood of congestion at the intermediary nodes, the suggested protocol makes an effort to steer clear of bottlenecks to the greatest extent feasible. In the event that this is not the case, it relieves the congestion by diverting the traffic via other routes. The suggested protocol is able to attain its high level of dependability thanks to the hop-by-hop loss recovery and acknowledgment procedures.

Authors

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158. HEART ARRHYTHMIA PREDICTION USING DEEP LEARNING ALGORITHMS

V. Devipriya, *Dr. D. Sumathi
Dept. of CSE, Kuppam Engineering College, Kuppam

ABSTRACT

Arrhythmias are anomalies of the pulse and musicality (now and then felt as palpitations). They can be isolated into two general classes: quick and moderate pulses. Some reason not many or insignificant side effects. Others produce more genuine side effects of unsteadiness, dazedness and swooning. A few patients with in any case typical hearts can have unusual electrical pathways in their hearts that reason arrhythmias. Patients with fundamental issues in the capacity and construction of the heart are more inclined to heart musicality issues. As patients who've had effective heart medical procedure live more, specialists are diagnosing more heart mood anomalies. A heart mood anomaly is assessed in manners similar as those used to assess other medical conditions. The historical backdrop of your indications, including vibe of your heart pulsating quick, unsteadiness and blacking out are vital. The primary care physician can utilize a few tests to analyse an arrhythmia. In this review, we outline the recent advances in statistical and computational techniques that take into account physiological variability, and move beyond the traditional cardiac model-building scheme that involves averaging over samples from many individuals in the construction of a highly tuned composite model. We discuss how these advanced methods have harnessed the power of big data to study the mechanisms of cardiac arrhythmias, with a special emphasis on atrial fibrillation, and improve the assessment of proarrhythmic risk and drug response.

KEYWORDS: Arrhythmias, Physiological variability, statistical analysis, Machine Learning, ANN, atrial fibrillation

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159. FISHSNAP: A DEEP LEARNING-BASED MOBILE APP FOR FISH SPECIES RECOGNITION

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ABSTRACT

Fish identification is an essential task for both recreational and commercial fishing. Processing of underwater imagery is constantly in demand, particularly the identification of fish species. This activity is vital for the aim of education as well as for biologists, scientists, and fishermen. According to reports, India is home to more than 877 species of freshwater fish in which about 450 are Small Indigenous Fish. However, the majority of the present work is produced for the identification of saltwater fish species and employed for a specific group of users. Many attempts have been made to develop the fish identification and categorization via image processing approach. The goal of this research is to develop a prototype system termed Ocean Glossary that utilizes image processing to recognize the species of freshwater fish that can be found in India. The EfficientNet-Lite, a convolutional neural network architecture and scaling method, is used to create the prediction model of the Ocean Glossary application that has been proposed. The proposed FishSnap has been evaluated on a large dataset of fish images, and the results show that it can accurately identify fish species with high accuracy.

KEYWORDS: Deep learning, Computer vision, Neural networks, Image processing, Artificial Intelligence

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212. SYNTHESIS AND CHARACTERIZATION OF ZINC DOPED COPPER OXIDE NANOPARTICLES BY CO-PRECIPITATION METHOD FOR SUPER CAPACITOR APPLICATIONS

K.Chandrasekaran[a], *K.Sambathkumar[b*]
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ABSTRACT

The current work deals with the preparation of Pure and Zinc doped Copper oxide was assimilate by the co-precipitation method. In this preparation method copper acetate monohydrate and zinc acetate dihydrate has been utilized as a precursor material. X-ray diffraction (XRD), High resolution scanning electron microscopy (HRSEM), Fourier Transform Infrared spectra (FTIR), Photoluminescence spectroscopy (PL), UV-visible absorption spectroscopy, and Transmission Electron Microscope (TEM). The predominant electrochemical capacitive execution using Cyclic Voltammeter which indicates that the material has the ability to form a capable electrode material for stable and high-performance electrochemical super capacitors. It is therefore expected to be a promising alternative material in the area of energy storage.

Keywords: Copper oxide, Zinc, Co-precipitation method, nanoparticles, Optical properties, band gap energy and XRD pattern, HRSEM image, electrochemical super capacitors.

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213. SELF-CARE MADE EASY: THE HEALTH CARE APPLICATION

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ABSTRACT

The Health Care Application is an innovative solution that empowers individuals to take control of their health without relying on others. Many people face challenges such as health issues, transportation risks, and other obstacles that prevent them from visiting hospitals. Additionally, individuals with health issues may struggle to attend health check-ups and obtain necessary medications, which can be a burden on others. To address this social issue, we have designed a user-friendly app that enables individuals to easily manage their health and well-being. With this app, individuals can access a range of health services from the comfort of their own home, including health check-ups, ordering medications, and more. By providing a convenient and accessible platform, the Health Care Application promotes self-sufficiency and helps individuals achieve optimal health outcomes. It features multiple pages, including a secure Login and Registration page. The Lab Test page displays various package details for users to add to their cart and place orders for lab tests. Users can also browse a list of medicines and place orders on the Medicine page. The Find Doctor page enables users to search for specialist doctors and book appointments with them. Additionally, the Health Articles page provides informative articles on health and wellness. The Order Details page allows users to track their orders, and the app includes a Logout feature for secure log out. The Healthcare Application is a user-friendly and efficient tool for managing healthcare needs.

KEYWORDS: Health care, Mobile Application, User Friendly, Innovative.

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Speech Emotion Recognition using Deep Learning

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Abstract: . Emotions are elementary for humans, impacting perception and everyday activities like communication, learning and decision-making. Speech emotion Recognition (SER) systems aim to facilitate the natural interaction with machines by direct voice interaction rather than exploitation ancient devices as input to know verbal content and build it straightforward for human listeners to react. During this SER system primarily composed of 2 sections called feature extraction and feature classification phase. SER implements on bots to speak with humans during a non-lexical manner. The speech emotion recognition algorithm here is predicated on the Convolutional Neural Network (CNN) model, that uses varied modules for emotion recognition and classifiers to differentiate feelings like happiness, calm, anger, neutral state, sadness, and fearful. The accomplishment of classification is predicated on extracted features. Finally, the emotion of a speech signal will be determined.

Keywords—Speech Emotion Recognition, Deep Learning, Spectrogram, Mel Frequency Cepstral Coefficient, Convolutional Neural Network

INTRODUCTION

One of the most natural ways of expressing human emotion is through speech signals. Emotions give language colour and serve as a necessary component of normal two-way human contact and interaction. As listeners, we respond to the speaker's emotional state and alter our behaviour in response to the feelings the speaker conveys.

Recent technological advances have enabled the human to act with a computer through non-traditional modalities (e.g., keyboard, mouse) like voice, gesture, facial features, etc. This interaction still lacks the part of emotions. It's argued that to actually bring home the bacon emotional human-computer intelligent action there is a necessity for the computer to be able to act naturally with the user, quite just like the methodology human-human interaction takes place. Numerous studies are directed comprises of classical method of human interaction and human-computer interaction. They terminated that for intelligent interaction emotions play a vital ingredient. We tend to gift some basic analysis among the sphere of emotion recognition from speech. The task of distinguishing the emotional components of speech, in spite of the linguistics content, is thought of as Speech emotion Recognition (SER). Whereas humans are capable of acting this task effectively as a natural part of voice communication, the flexibility to try and do this automatically with programmable devices remains a work in progress.

Characteristics of speeches are basicallyexplained by some chief features, which includesspeech flow, loudness, intonation and intensity of overtones. Speech flow describes the speed at those utterances are created additionally attributable to the vary and length of temporary breaks in speaking. Loud represents the amount of energy relevant

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Chaotic Whale Optimization based Node Localization Protocol for Wireless Sensor Networks Enabled Indoor Communication

Publisher: IEEE

V. Srikanth ; Ranjan Walia ; P. John Augustine ; Venkatesh R ; Jerrin Simla ; B. Jegajothi **All Authors**

Abstract: In recent times, wireless sensor networks (WSN) assisted indoor communication offers an effectual and dynamic approach for local area networks majorly in large structures... **View more**

Metadata

Abstract:

In recent times, wireless sensor networks (WSN) assisted indoor communication offers an effectual and dynamic approach for local area networks majorly in large structures or in group of many structures. Node localization is treated as an effective procedure that assists in determining the coordinate points of unidentified nodes by the use of anchor nodes. Previous works have treated the node localization as the optimization issue which can be resolved by the design of evolutionary algorithm (EA). This article introduces a novel Chaotic Whale Optimization based Node Localization Protocol for WSN (CWOLN-WSN) enabled indoor communication. The intention of the CWOLN-WSN method is for identifying the location of the unknown nodes that exist in the WSN enabled indoor communication by the utilization of known nodes with lower error and higher performance. The CWOLN-WSN technique involves the design of CWOA technique by the integration of chaotic concepts into the traditional whale optimization algorithm (WOA). For ensuring the enhanced performance of the CWOLN-WSN approach, a series of simulations are implemented and the results are inspected under several measures. The simulation outcomes reported the enhanced outcomes of the CWOLN-WSN approach on the existing methods.

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4th International Conference on Innovative Data Communication Technology and Application

Data division using Fuzzy Logic and Blockchain for data security in cyber space

Manjula Seenivasan[a], Valarmathi Krishnasamy[b]*, Swarna Sudha Muppudathi[a]

[a]*Department of Computer Science and Engineering, Ramco Institute of Technology, Rajapalayam- 626 117, Tamil Nadu, India*
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Abstract

The Internet has become a powerful way to connect with people in the modern world. The Cloud provides a great computing platform that enables people and organizations to do variety levels of tasks. Recently, the number of people using cloud services has radically greater than before and plenty of data has been stored in cloud computing storage. Data breaks in cloud services are also increasing every year due to hackers. To initiate cyber-attacks, cybercriminals use a variety of ways. Security becomes one of the most critical issues, and stringent security measures are required when keeping data on the cloud. In this proposed work, the fuzzy logic is used to analyze the trust level of data entering the Blockchain network and also guide cloud manager to divide the file to provide more security. In addition, the divided file is hashed using Blockchain and decrypted at the receiving end.

Keywords: Fuzzy Logic; Fuzzy inference system; Blockchain; SHA-256; Cloud storage

1. Introduction

The evolution of distributed systems now favours a cloud-based architecture. In today's digital world, the ways of business tactics in the cloud computing strategy are paramount. For several years, cloud adoption has been increasing, and the pandemic has accelerated it. However, as a post-pandemic world emerges, new cloud usage trends emerge.

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AI based Online Attendance Record System using Face Recognition and Random Queries

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Abstract

Now a days, education system is advancing day-by-day due to the COVID-19. It has caused millions of students and instructors to switch their contact online. Online learning in virtual classrooms is being used by teachers and students as a substitute for face-to-face learning in physical classrooms. However, keeping track of students' attendance during virtual learning is a difficult task. It's tough to spot students who are disengaged. The "AI based Online Attendance Record System using Face Recognition and Random Queries" is a novel solution for attendance monitoring difficulties, student disengagement, and attendance faking during virtual learning. To increase the system's efficiency face recognition and auto query at random intervals is developed. The proposed idea helps to gain the students' attention and interest in virtual learning. The proposed work uses the RPN (Region Proposal Network) for object recognition and the DCNN (Deep Convolutional Neural Network) to extract features from the picture. This work demonstrates that emotion recognition based on facial expressions is feasible in distance education, permitting identification of a student's learning status in real time. Therefore, it can help teachers to change teaching strategies in virtual learning environments according to the student's emotions.

Keywords: Deep Learning, Region Proposal Network, Deep Convolutional Neural Network, Stochastic Auto Query

I. INTRODUCTION

Higher education, public school systems, and private school systems around the world have all been severely impacted by the common viral coronavirus illness 2019 (COVID-19). In order to reduce the danger of infection, many colleges, universities, and schools have been forced to remain closed or function with incredibly low resources as a result of the epidemic, which has also increased the workload for teachers and staff [1]. Even though the COVID-19 can only be stopped from spreading by breaking the chain of transmission through a lockdown and social isolation, many pupils have been impacted by the closure of educational facilities. As the schools and colleges are shut for an indefinite period, both educational institutions and students are experimenting with ways to complete their prescribed syllabi in the stipulated time frame in line with the academic calendar. These measures have certainly caused a degree of inconvenience, but they have also prompted new examples of educational innovation using digital interventions. During this time, most of the universities have shifted to online mode using Blackboard, Microsoft Teams, Zoom, or other online platforms. It must be noted that extreme caution and scenario planning activities need to be undertaken to provide optimal learning experiences to students [2].

The epidemic increased the need for innovative answers to emergency problems in all aspects of society. When face-to-face learning is replaced by online virtual learning, significant difficulties in the education sector and related learning technologies arise. The existing structures and practises of face-to-face learning have been modified as a result of the unexpected circumstance that resulted from COVID-19. Due to the pandemic's mandated separation, educational institutions all around the world have radically changed their traditional functioning style to virtual mode[3]. Some nations have temporarily closed educational facilities to stop the spread of COVID-19. Student participation in a class is reflected in their attendance, which is connected to their

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Department of Electrical and Electronics Engineering
International Conference Publications

1. Dora Arul Selvi, B., Kannan, S.**A Performance Comparison of Machine Learning Methods for Short-Range Wind Power Estimation**(2023) *E3S Web of Conferences*, 387, art. no. 05013.
2. Thangasankaran, R., Parthasarathy, S.**Proteus/Simulink Analysis of Rectifier based E-Vehicle Charger Circuit**(2023) *E3S Web of Conferences*, 387, art. no. 01011, .
3. D. Sabapathi, Yogesh Shivaji Pawar, Sumagna Patnaik, E.Sivanantham, D. Karthik Prabhu, N.B.Prakash, **Energy Load forecasting with Demand Side Management in Industrial Sectors using Neuro-Fuzzy Controller and Deep Learning**(2023) *Proceedings- IEEE International Conference on Artificial Intelligence and Smart Energy (ICAIS 2023), 2023*, pp. 1432-1437.
4. Sivasakthi, S., Devi, K.M., Yamunaa, P., Mahendran, N., Prakash, R.B.R., Vigneshwar, A.S., Jegajothi, B. **Automated Hyperparameter Tuned Deep Learning Enabled Reactive Power Optimization Model for Power Distribution System** (2022) *Proceedings - International Conference on Augmented Intelligence and ustainable Systems, ICAISS 2022*, pp. 1410-1414.
5. Dhana Sekaran, S., Rufus, N.H.A., Anand, D., Rama, R.S., Kumar, A., Vigneshwar, A.S. **Evolutionary Optimization with Deep Transfer Learning for Content based Image Retrieval in Cloud Environment** (2022) *Proceedings - International Conference on Augmented Intelligence and Sustainable Systems, ICAISS 2022*, pp. 826-831.
6. Vijayakumar, K., Bhuvhanesan, R., Devadharshini, M., Reddy, C.O.S., Kannan, S. **Analysis of Performance Parameters of Electric Vehicle Using MATLAB Simulink** (2022) *2022 2nd International Conference on Advance Computing and Innovative Technologies in Engineering, ICACITE 2022*, pp. 1465-1471.

A Performance Comparison of Machine Learning Methods For Short-Range Wind Power Estimation

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Abstract— Renewable energy generation is increasingly employed nowadays for multitudes of reasons such as global warming, depletion of conventional sources of energy and emission constraints. Even though the wind generators constitute a potential source of energy, the uncertainties associated with them make the operation complex. As a consequence, the successful operation and planning of the present distributed generation dominated power systems requires exact estimate of wind power. Numerous wind power estimation techniques based on Machine Learning were available. This work attempts to compare the wind power estimation efficiency of a few machine learning approaches. At first, the performance of a Feed Forward Neural Network with different activation functions is considered. Next, Support Vector Regression Machine with different kernels is utilized for estimating the wind power. Then, deep Learning networks such as Long Short-Term Memory network, Convolutional Neural Network and Recurrent Neural Network are employed for assessing the future wind power and their ability is analyzed. Finally, a comparative chart is prepared to evaluate the efficacy and usefulness of the different machine learning techniques employed for estimating wind power.

Keywords— *Machine Learning Approaches, Short-Range, Wind Power Estimation*

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Proteus/Simulink Analysis of Rectifier based E-Vehicle Charger Circuit

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Abstract. In this paper, an AC to DC rectifier circuit has been discussed and the simulation results are provided. This converter is very useful for the upcoming development of the electric vehicles charging technology. For producing steady DC from a rectified AC supply requires a smoothing circuit or filter. The main purpose of the filter circuit is to remove the ripple or ac components from the output of the diode circuit. So, to make the output DC pure, the filter circuit is used. The filter circuit may be inductive (built with only inductors in series) or capacitive (built with only capacitors in parallel) or Inductive-Capacitive (built with both inductors and capacitors). A voltage regulator which is used to maintain the constant output DC voltage. Design of the controller is detailed for reference. The converter will operate in continuous conduction mode (CCM). Finally, some selected experimental results are presented to verify the proposed theory.
Keywords – AC to DC rectifier, Electric vehicle, CCM, Battery charging, Smoothing capacitor, Voltage regulator

1. Introduction

These days, there are many purposes behind the advancement of electric vehicles (EVs). The most important reasons are increasing of fuel cost, lacking in energy resources and reduce the greenhouse gas emission [4]. The advantages of using the EVs can be stated as, being a source of the clean energy, having high efficiency when compared to the conventional vehicles and producing less noise than the conventional vehicles [13]. But the supply for the EV is from the battery. This paper provides a solution for charging of EV batteries.

L. Sri Sivani, Nagi Reddy B, K. Subba Rao, A. Pandian has proposed a paper on A New Single Switch AC/DC Converter with Extended Voltage Conversion Ratio for SMPS Application, which is an AC/DC converter having a buck-boost PFC circuit that operates in discontinuous conduction mode (DCM) to attain unity input power factor and a buck converter to achieve tightly regulated voltage along with wide conversion range [1]. The proposed converter doesn't require extra control technique to achieve unity power factor.

M. Bhaskara Rao, T. Lokanadha Rao, Nagalla Sowjanya, T. Jaganmohan Rao proposed a paper which titled as An Efficient AC-DC Step up Converter for Low voltage Harvesting Applications. In this paper, presents an efficient ac-dc power converter that avoids the bridge rectification and directly converts the low ac input voltage to the required high dc output voltage at a higher efficiency [18]. The proposed converter consists of a

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Energy Load Forecasting with Demand Side Management in Industrial Sectors using Neuro-Fuzzy Controller and Deep Learning

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***Abstract*—Load forecasting plays a vital role in generation and distribution sectors in the power system. This helps to obtain optimum load scheduling which helps to predict future consumption to increase reliability in the system. The demand side management helps to optimize the consumption of energy based upon the priority of the consumers. The load forecasting helps to predict the usage of power through the priority scheduling of the loads which helps to minimize and maximize the operating cost. The optimization technique plays a versatile role in the load scheduling based on demand side management in the industrial sectors. The combination of advanced technologies with communication infrastructure makes the system more reliable and smarter. The demand side management is achieved through shifting the loads from peak hours to non-peak hours. Thus, to enhance the automatic scheduling of loads in the industrial sector is achieved by the neuro-fuzzy controller and deep learning techniques.**

Keywords—Load forecasting, load scheduling, demand side management, priority scheduling, communication infrastructure, neuro-fuzzy controller, deep learning

I. INTRODUCTION

The electrical power system involves variety of operations which includes generation, transmission and distribution. To have an efficient usage of power consumption, certain advanced technologies with communication systems are employed. This makes the system smarter in nature. To obtain efficient usage of power consumption, energy load forecasting is implemented [1].

The energy load forecasting is defined as the early prediction of energy usage accompanied with demand side management. The demand side management is done by identifying the optimum combination of power produced to that of power consumed based on the demands of the consumer [2]. Energy load forecasting is employed to have a proper utility of power consumption. This leads to consumption of power with continuous power supply without any fluctuations to obtain lower cost parameter [3]. The load forecasting is classified as long-term load forecasting, mid-term load forecasting and short-term load forecasting techniques. The demand side management is obtained through artificial intelligence technique such as neuro-fuzzy controller and deep learning techniques to balance the load system [4]. The load forecasting is an important parameter which is used to determine and make various decisions regarding the generation, transmission and distribution of the electricity. This includes two-way communication system from distribution grid to utility system and vice versa. The load forecasting helps to obtain appropriate information to function the system to obtain economic and reliable solutions [5]. The switching of loads and development of infrastructure depends upon the load forecasting techniques. Various complex problems with non-linear relationships are solved through the load forecasting techniques. The load scheduling is the important parameter in the future prediction and allocation of loads with respect to time [6]. Another parameter used for the effective usage of power consumption includes the load scheduling. This is done by artificial intelligence techniques.

The artificial intelligence is defined as the machines that are tend to function automatically through testing and training process as similar to human intelligence. This involves the scheduling of loads from peak hours to non-peak hours based upon the priority of the consumers. By using the artificial intelligence techniques, the loads are scheduled automatically with the predefined values [7]. Thus, the load scheduling helps to obtain the optimum power consumption to increase productivity in the power system.

II. PROPOSED SYSTEM

The major objective of the proposed system is to achieve the automatic load scheduling and energy load forecasting in industrial sector through deep learning techniques. This helps to obtain and analyze the optimum power consumption with reduced cost. The load scheduling plays an important role in the allocation of loads to schedule the demands of the consumers. In industrial sectors, the demand side management plays a versatile role in the development and production sectors to increase productivity. The demand in the industrial sectors vary due to the increase and decrease in the production and manufacturing of goods. To obtain a complete automation in

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Automated Hyperparameter Tuned Deep Learning Enabled Reactive Power Optimization Model for Power Distribution System

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***Abstract*—With a great quantity of Electric Vehicles and Distributed Generator (DG) complied in the power distribution system, the complications of distribution systems' function are higher, which generates the superior need for online Reactive Power Optimization (RPO). The RPO is a distribution network that could enhance the quality of voltage and the economical function, and diminish the power losses of a dispersal network. RPO could understand rational dispersal of reactive power in the dispersal network and decrease the node voltage deviations and power losses. Currently, only a few heuristic intellectual methods are broadly employed for RPO. Therefore, this article introduces a new Jellyfish Search Optimization with Deep Stacked Autoencoder (JSO-DSAE) model for RRO in power distribution systems. The proposed JSO-DSAE model enables the DSAE model to receive previous data from DGs to identify the connection among power control and system characteristics. To bolster the performance of the JSO-DSAE algorithm, the JSO method is used. The experimental validation of the JSO-DSAE model is tested and the outcomes are examined over distinct aspects. The simulation outcome demonstrated the supremacy of the JSO-DSAE model over the recent approaches.**

Keywords*— *Power distribution; Reactive power optimization; Jellyfish search optimizer; Deep learning; Hyperparameter optimization

I. INTRODUCTION

The Reactive Power Optimization (RPO) of the distributed network eliminates the energy loss and enhances the quality of voltage and the economic function of dispersed networks [1]. By controlling the reactive energy compensation apparatus namely online tap changing transformer, Static VAR Compensator (SVC), fixed shunt capacitor banks, and so on, the RPO could perceive rational dispersal of reactive energy in the dispersal network and diminish the node voltage deviations and energy losses [2]. The system is regarded as the main problem of the RPO of the dispersal network [3]. The nonlinear feature becomes important in RPO and contains multi-constraint, multivariate, continuous parameters, and discrete parameters [4]. The traditional optimization techniques are based on the variables and modules of the dispersal network, that consists of demerits of worst stability and convergence [5, 6]. In realistic implementation, the optimization computational price value was huge and the decision-making duration was longer, hence it was very hard to imply such techniques to the real-time control needs of the complex active dispersal methods [7].

Recently, few heuristic intellectual systems have been broadly employed for RPO and even though such techniques could operate the discrete parameters precisely, the primary values of such system have been implemented arbitrarily, that might outspread the computational duration, and fall in the local minima [8, 9]. Currently, Distributed Generators (DG) and Electric Vehicles (EV) are broadly utilized, although the energy flow of the dispersal network are destructed through the intermittency and randomness of DGs and EVs, raising the struggle of RPO of dispersal network system [10].

Pirouzi et al. [11], proposed a strong bundled active and reactive power management of EV incorporated in

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Evolutionary Optimization with Deep Transfer Learning for Content based Image Retrieval in Cloud Environment

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***Abstract*—Recently, image model in cloud computing (CC) grabbed great deal of interest to guarantee confidentiality of data and secure data communication among clients cloud storage and cloud server, and end-users. Conventional secure image retrieval (IR) approaches are not suitable to adopt a large-scale IR in cloud environment. In the field of computer vision (CV), an effectual representation of image feature vectors for image retrieval will remain a significant issue. various research was conducted on CBIR by utilizing machine learning (ML) techniques and numerous descriptors. This article designs a Dwarf Mongoose Optimization with Transfer Learning for Content based Image Retrieval in Cloud Environment, named DMOTL-CBIRC. The presented DMOTL-CBIRC technique intends to retrieve similar images in the cloud sever based on QIs. It follows a three stage process namely feature extraction, parameter tuning, and similarity measurement. Initially, the presented DMOTL-CBIRC technique exploits SqueezeNet method for an effectual generation of feature vectors (FVs) for the input image and QIs. Besides, the DMO technique is used for the hyperparameter tuning of the SqueezeNet model. For similarity measurement, Manhattan distance is applied which retrieves the highly similar images. The experimental evaluation of the DMOTL-CBIRC technique is investigated on Corel10K dataset and the outcomes highlighted the improvements of the DMOTL-CBIRC technique over other models.**

Keywords— Cloud computing; Content based image retrieval; Deep learning; Corel 10K dataset

I. INTRODUCTION

Recent advancement of computer vision (CV) platforms was suggestively influenced by the increasing number and accessible cloud computing (CC) platforms hosted by IT companies (Azure, AWS, GCP) [1]. They allowed the advancement of various cloud interfaces, which will extract the difficulty over CV applications. The latter leverage a particular workflow for cloud architectures, which renders accessibility to a high computational power without the necessity of any hardware adaptation or low-level software programming [2]. CBIR mechanism searches large databases for images that match a query image. CBIR mechanisms automatically search, index, or retrieve image data. With the evolution of digital technology, massive volumes of spatial data, medical images, and data analysis can be immediately available in multimedia format [3, 4]. The image content searching depends upon 2 techniques they are TBIR and CBIR. Fig. 1 demonstrates the overview of CBIR.

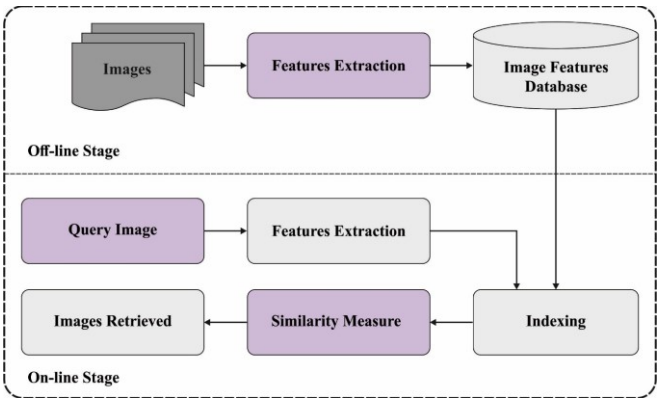

Fig. 1. Overview of CBIR

In the CBIR organization, the user will enter a search query, after that low features (e.g., color, text, and shape,) of images were excerpted by making use of visual content descriptors or feature extractors [5]. The similarity index among the image search query and retrieved image was found via the distance that can be measured via the investigation of search and query image feature vector of dataset images [6]. There will be a substantial gain in the similarity reduction gap among the extracted image and search query through CBIR, which further enables authors to sightsee areas such as ancient

Analysis of Performance Parameters of Electric Vehicle Using MATLAB Simulink

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Abstract: An Electric Vehicle (EV) has a tremendous growth in the present Scenario, with expected growth of 25 % GDP in India by 2022. There are a lot more beneficiaries of using Electric vehicles. The number of Electric vehicles manufactured increases day by day, thus increasing the complicacy in their customization and reliability. The major consequence of battery-operated vehicles is their unreliability. This unreliability is because of the absence of monitoring and analysis of parameters in the EV once it has been manufactured and running on the road. A traveler should know their vehicle information when travelling from source to destination. If not, there may be a risk of sudden stalling of the vehicle. The State of Charging (SOC) data alone will not be sufficient. Thus, the battery state, which changes concerning the driving cycle and other parameters, will help the user approximate how far they can travel with the available battery level. We can make EVs more reliable by properly analyzing their parameters to study the EV characteristics. Also, we can further transform EVs more economical by customizing the design of electric vehicle components considering the driving cycle and vehicle parameters. The real key parameters and driving cycle data have been deliberated to create an enhanced model in this work. The simulation of EV is carried out in MATLAB Simulink for its performance based on parameter estimation. The electric vehicle's optimal performance is examined by analyzing the vehicle's actual speed, input drive speed and driving cycle data concerning the design parameters. The EV's energy consumption value is analogized based on the status of battery's charge. Along with SOC data, the battery state, which changes concerning the driving cycle and other vehicle parameters, will help the user approximate how far they can travel with the battery available with them. The impact of various factors on vehicle performance and energy consumption has been investigated in this work. An optimal solution can be devised for selecting the appropriate motor rating and battery capacity for EV through this analysis. Also, this work serves as a test bench for EV manufacturers and users to estimate and analyze the vehicle's performance for the betterment of the design or user experience.

Keywords: Electric Vehicle, Driving cycle, State of Charging, MATLAB Simulink

I. INTRODUCTION

The electric vehicle has been becoming popular since 2010. Almost 1 million Electric cars were sold globally in 2016, 4.8 million cars were sold by 2019 and reached 10 million units by 2020. India's GDP is expected to grow 25 % by 2022 in the E-Mobility market by reducing the crude oil import by $60 billion of money. The overall fuel cost of about Twenty thousand rupees is reduced for every 5000 km by using an EV, i.e., 1.1 rupees per kilometre. This facilitates the private car owners to switch for an EV. The EV propulsion system comprises Electric motors which convert Electrical energy into mechanical torque. The EV is categorized into three namely i) Entirely battery-operated EV, ii) Solar powered EV iii) Hybrid EV. There are lot more manufacturers in the EV market, namely BMW, Hyundai, Mercedes-Benz, Audi, Nissan, Tesla, Peugeot, Renault, Venturi, Volkswagen, are some of the manufacturers of EV with top speed of 355km/hr. and an acceleration of 2.4 sec to 15.9 sec. The charging duration varies between 30 minutes and 12 hours with a minimal of 40 km to 560 km range, with the capability of 2 - 7 passengers [1]. The price variety of the EV mainly depends on speed, range, battery capacity and load.

A driving cycle, typically speed versus time, represents how a vehicle trips over a route (uphill or downhill or normal road). This Driving cycle varies concerning vehicle parameters, electrical parameters, location parameters etc. So, the continuous monitoring of those parameters can help select EV components such as batteries and motors. Monitoring EV parameters can prompt the manufacturer to optimize and customize the EV components according to the Driving cycle. Further, this monitoring of EV parameters at the vehicle side will assist the user with a better experience with the vehicle.

II. DRIVING CYCLES

The driving cycles are used to assess a vehicle's performance based on fuel, economy, and emission tests. To investigate state of battery and energy consumption in Electric vehicles, the driving cycle inputs play a major role. Also, the selection of absolute motor rating and battery capacity for the particular driving cycle can be utilized in EV for better vehicle efficiency. The driving cycles can also simulate the vehicle

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International Conference Publications

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A Novel Method for Multiple Object Detection on Road Using Improved YOLOv2 Model

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Object detection is a branch of machine vision and image processing that deals with instances of a certain class of semantic items. One of the most significant habits of object detection in intelligent transportation schemes is vehicle detection. Its aim is to extract clear-cut vehicle-type information from photographs or videos of automobiles. A fully convolutional network (FCN) is employed in sophisticated driver assistance systems for high performance and quick object identification (ADAS). A novel vehicle detection model employing YOLOv2 is presented to tackle the difficulties of prevailing vehicle detection, such as the absence of vehicle-type recognition, stumpy detection accuracy and sluggish speed. The detection model is trained using the VOC and COCO datasets, and the detection enactment is evaluated quantitatively using KITTI training pictures. In addition, the performance of the YOLOv2 model was compared to that of prior models.

Povzetek: Razvita je nova metoda zaznavanja več objektov na cesti s pomočjo YOLOv2 modela.

1 Introduction

Moving object detection is a computer technique that compacts with recognizing occurrences of semantic matters of a precise class (such as humans, automobiles, etc.) in a digital picture or video. It is connected to computer vision, image processing, and neural networks. Vehicle detection and pedestrian detection are two well-studied fields. In the field of machine vision, moving object detection has a variety of applications, including picture retrieval and video monitoring.

While new research datasets have increased the number of training sets and testing instances to get closer to real-world situations, detectors' capacity to process big data sets in an acceptable period of time has become a significant concern in addition to accuracy. It is not just the number of classes that matters, but also the training examples.

Detecting moving items in a video clip entail finding them in the frame. Item detection is required by every tracking technique, whichever in all frame or when the object first shows in the video. Various backdrop removal approaches from the literature were simulated for moving object detection. Background subtraction uses the relative difference between the current image and the reference updated backdrop over time. Background subtraction that works well should be able to deal with fluctuating lighting conditions, background clutter, shadows, camouflage, bootstrapping, and foreground segmentation in real time.

The tracking of moving objects in video images has flickered a lot of interest in machine vision. Surveillance systems, navigation systems, and object identification all flinch with object tracking. Object tracking is extremely important in a real-time environment because it allows for an improved sense of refuge through visual information, security and surveillance to recognize people, analysis of customer shopping behavior in retail spaces, video abstraction to attain involuntary annotation of videos, generation of object-based synopses, traffic management to examine flow, and design futuristic video effects.

Huieun Kim et al. offered "On-road object identification using Deep Neural Network" [4], which advocated SSD as a quicker object detection method than R-CNN by 41 frames per second. The model is built on SSD and tweaked with the KITTI dataset, which is made up of on-road environment object classes (SSD is a pre-trained model by Pascal VOC pictures). This work proposes an on-road object identification method based on SSD that overcomes the difficulties of detecting on-road objects using a camera in instantaneous and allows for robust object detection. It creates appearance characteristics from input pictures using convolutional layers and trains object position in 2D image coordinates by calculating loss of object box position (IoU) during the training step. SSD, on the other hand, has the disadvantage of overlooking tiny things due to its grid methodology.

The furthermost representative FCN-based object identification approaches are region-based fully convolutional networks (R-FCN), single shot multi-box detector (SSD), and you only look once (YOLO). To obtain good detection performance, these approaches

Documents

Gopinath, D.[a] , Nayagam, R.D.[a] , Sivakumar, G.[a] , Karthik, S.[b] , Chakravarthi, P.D.[a]

Intelligent Intravenous Syringe Pump

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Abstract
Convenient and independent siphons are in basic interest for ease point-of-care testing (POCT) applications in microfluidic fields. In microfluidic research facilities, business siphons (e.g., needle siphons, pressure siphons, or peristaltic siphons) are broadly utilized for exact liquid conveyance. The ceaseless checking of the glucose level is hard for medical attendants and guardians as they lamentably neglect to see because of their bustling timetable that prompts the risk of the patient. The extensive utilization intravenous (IV) dosage forms, weight-based tiny dosages, numerous calculations, and dilutions make the medication-usage procedure in Neonatal Intensive Care Unit is particularly difficult. Medicine blunders in ICU are normal bringing about tolerant injury and conceivable demise, expanded stay, and critical extra expenses. For amending these kinds of manual errors, the following framework is proposed. A de engine-driven needle siphon is planned to utilize a microcontroller board with important driver hardware. Here Armature voltage of the DC servo engine is fluctuated to produce distinctive stream rates. Here microcontrollers and timers are utilized to control the progression of medications. By programming the time in the microcontroller, it can consequently be infused with the glucose drip. © 2023 IEEE.

Author Keywords
ATMEGA 382P microcontroller; DC Servo motor; Syringe; Timer module

Index Keywords
Controllers, DC motors, Engines, Glucose, Intensive care units, Microcontrollers, Microfluidics, Needles, Nozzles, Syringes, Timing circuits; ATMEGA 382p microcontroller, DC servo, DC servo motor, Dosage forms, Glucose level, Point-of-care testing, Research facilities, Servo-motor, Syringe pumps, Timer module; Siphons

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Pondurai, M.[a] , Balaji Vignesh, L.K.[b] , Chandralekha, R.[a] , Vairaprakash, S.[a] , Neerathilingam, K.[a] , Paranitharan, V.[a]

Rectangular Microstrip Patch Array Antenna for Short Wave Radio Band Applications

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Abstract
In this article, rectangular microstrip patch array antenna is applied for short range radio band applications. The substrate layer is maintained by the dielectric material as 4.4 with substrate thickness as 1.6 mm. At the initial level, the rectangular patch dimensions are measured as 37.96*29.499 mm2. The resonating frequency of proposed patch antenna is examined as 2.45 GHz. Further, the two sets of rectangular patch antenna combined to form the antenna array by the center of microstrip feed. Frequently, the rectangular patch will not attain the proper return loss. Finally, the array antenna achieves good return loss by combination of two rectangular patches. The gain of the proposed antenna array is better observed as 8.729 dB. The proposed antenna array is sketched by Advanced Design System 2009 simulation software with center feed technique followed by determining the antenna parameters through Electromagnetic Design System. © 2023 IEEE.

Author Keywords
Advance Design System 2009 Simulator; Antenna Array; Microstrip center feed; Rectangular Microstrip Patch

Index Keywords
Antenna feeders, Computer software, Dielectric materials, Microstrip antennas, Microwave antennas, Slot antennas; Advance design system, Advance design system 2009 simulator, Center-feed, Micro-strips, Microstrip center feed, Microstrip patch arrays, Patch array antennas, Radio bands, Rectangular microstrip patch, Rectangular patch; Antenna arrays

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A Novel Sensing System to Detect the Overflow of Septic Tanks

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Abstract
The detection of overflow of septic tank is being carried out manually only after finding the leakage from the outlet because of its enclosed underground structure. However, direct human handling is dangerous due to the formation of poisonous gases from the decomposed storage of human wastes which causes unpleasantness to human, and communicable diseases such as cholera that are challenging for public health. Here, in septic tanks, the contaminated water that has low density is discharged from the outlet whereas the colloidal or semi-solid waste is stored. Hence the detection of exact leakage other than the contaminated water from the septic tank is difficult. To resolve this problem, a density sensing system that can sense the density of the colloidal fluid and a sensor that can detect the gases especially methane is placed at the appropriate place on the septic tank with a battery-operated sensing system that needs low maintenance. This system can be applied to every household that has a septic tank for earlier detection of overflow of sewage. © 2023 IEEE.

Author Keywords
gas sensor; public health; septic tank; wireless fluid sensor

Index Keywords
Diseases, Public health, Sols, Water pollution; Communicable disease, Contaminated water, Fluid sensors, Gas-sensors, Human disease, Human waste, Lower density, Poisonous gas, Sensing systems, Wireless fluid sensor; Sewage

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Documents

Krishnakumari, L.[a] , Ramalakshmi, R.[a] , Srirenganachiyar, V.[a] , Ragavan, K.[a] , Ramalakshmi, K.[b]

Analysis of Liver Tumor Segmentation using Deep ResUNet

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[b] Psr Engineering College, Department of Electronics and Communication Engineering, Sivakasi, India

Abstract
Liver cancer has been the second most fatal cancer to claim a life in men and the sixth most fatal cancer in women. It would be difficult, expensive, time-consuming, and error-prone to manually go through all the Computed Tomography (CT) slices for thousands or even millions of patients, but an early diagnosis with computed tomography could lead to a high recovery rate. On the 3DIRCADb01 dataset, which contains CT slices for patients as well as masks for the liver, tumours, and other physiological areas,Convolutional Neural Network(CNN) is used to solve all the problems. To automate this process, they desired a reliable method that is both straightforward and precise. A hybrid of the Unet and ResUNet models, the ResUNet model uses residual blocks in place of standard convolutional blocks are used here. By using this the liver is segmented and ROI is extracted using the first cascaded CNN, and the tumours were segmented using ROI from the first CNN. Up to 98% real value accuracy and dice efficiency were reached. © 2023 IEEE.

Author Keywords
Computed Tomograph.y; ResUNet; Two cascaded Convolutional Neural Networks(CNNs)

Index Keywords
Computerized tomography, Convolution, Diagnosis, Diseases, Patient rehabilitation, Tumors; Computed tomograph., Convolutional neural network, Error prones, Fatal cancers, Liver cancers, Liver tumor segmentations, Resunet, Tomographs, Two cascaded convolutional neural network, Y; Convolutional neural networks

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Ragavan, K.[a] , Ramalakshmi, R.[a] , Srirenganachiyar, V.[a] , Priya, G.G.[a] , Jeyageetha, K.[b]

Smart Health Monitoring System in Intensive Care Unit using Bluetooth Low Energy and Message Queuing Telemetry Transport Protocol

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Abstract
Smart healthcare monitoring is very essential for people who are in the Intensive Care Unit (ICU) in hospitals which provides continuous monitoring of health parameters, which cannot be afforded outside the hospitals. Because of the ever-increasing population of the world, smart health care has become increasingly crucial. The traditional patient-doctor consultation has lost its usefulness. The effective way of monitoring the patient's health within ICU has great potential to introduce Bluetooth Low Energy (BLE) and Message Queuing Telemetry Transport (MQTT) protocol. The patient's survival can be improved by the daily care of parameters such as heart rate, Hemodynamic, skin temperature, capillary refill, mental status, etc., which can be wirelessly monitored in smart way using BLE and MQTT. In addition, the Short Message Peer to Peer (SMPP) protocol could also be used for alerting the doctors if the sensor values go to a critical level as per the threshold value. It uses BLE and MQTT in monitoring the health of an ICU patient and also it will compare the ZigBee technology, which is already used in monitoring health parameters in following criteria low power, performance, cost, availability etc., with the proposed method. ZigBee will not support android version which is very important to access the smart phones. But the proposed method can support android version with low power consumption. © 2023 IEEE.

Author Keywords
Bluetooth Low Energy (BLE); health monitoring; Intensive Care Unit (ICU); Message Queuing Telemetry Transport (MQTT) protocol; Short Message Peer to Peer (SMPP) protocol; ZigBee

Index Keywords
Android (operating system), Bluetooth, Peer to peer networks, Queueing theory, Smartphones, Telemetering, Telemetering equipment, Zigbee; Bluetooth low energy, Health monitoring, Health parameters, Intensive care unit, Lower energies, Message queuing telemetry transport protocol, Peer-to-peer protocols, Short message, Short message peer to peer protocol, Transport protocols; Intensive care units

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Secure the smart grid by machine learning

Srinivas Kolli ; M Hasan ; Bramah Hazela ; A.Azhagu Jaisudhan Pazhani All Authors

Abstract: Smart Grid Technology has to tighten its security because of the growing threat of cyberattacks. Machine learning approaches are more effective in detecting assaults than... **View more**

Metadata

Abstract:
Smart Grid Technology has to tighten its security because of the growing threat of cyberattacks. Machine learning approaches are more effective in detecting assaults than conventional methods. The difficulties of detecting hostile activity and infiltration in intelligent grid communication networks were investigated with machine learning techniques. In this work, we apply machine learning methods to determine if the measurements came from an attack or a secure environment. By using several machine learning methods, including Perceptron, Logistic Regression, Support Vector Machine, and the K-Nearest Neighbors algorithm, the suggested system hope to foresee the occurrence of erroneous data injections in the smart grid.

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Contents

It is commonly anticipated that this decade would see the proliferation of machine-to-machine (M2M) communications carried out across wired and wireless connections. For instance, according to the estimates, there will be 1.5 billion wirelessly linked gadgets that are not mobile phones and do not need any interaction from a human being by the year 2014. Because of this, there will be an unprecedented growth in the volume of data traffic generated by computers conversing with one another and without human involvement. M2M technology is already being used in various applications across various industries, including healthcare, transportation, and innovative home technologies.

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Modelling and Analysis of different types of TSV for Three Dimensional Integrated Circuits

G. Subhashini ; S. Vairaprakash ; R. Chandralekha ; R. Rajalakshmi ; A.S. Amudhadevi ; R. Ishwarya All Authors

Abstract: The majority of systems on the market today are made up of intricate SoCs with integrated processors, large quantities of memory and FPGAs, but they do not offer a comple... **View more**

Metadata

Abstract:
The majority of systems on the market today are made up of intricate SoCs with integrated processors, large quantities of memory and FPGAs, but they do not offer a complete system solution for real-world systems [1]. Designers are faced with numerous technological and financial obstacles when attempting to combine such different technologies onto a single chip [2]. Additionally, vertical integration was shown to be a desirable alternative due to the continuously growing needs for low cost, smaller chips with more capability, and shorter time to market for portable systems [3]. Three-dimensional integration is the vertical interconnection of unpackaged or packaged semiconductors [3]. The most promising technique for designing ICs and systems with high performance, functionality, and lower power consumption than the 2D technologies is three dimensional integrated circuits (IC) in the form of three-dimensionally stacked chips. Using inter-tier interconnects that directly cross the substrate, various dice can be joined in 3D integration [4]. This is referred as Through Silicon Via (TSV) based 3D integration technology. To provide uniform environmental conditions throughout all tiers, TSV tapering is done to achieve the least amount of voltage drop and delay difference possible. When the resistance values and current demand for each tier are known, thevenin network architecture may be used for TSV sizing.

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Contents

1. Introduction

Despite the fact that many of today's systems are made up of complicated SoCs with integrated processors they do not offer the complete system solution for real-world systems. Many more functional devices, including analog/RF, passive components, sensors, and biological processes Cohabit with the digital and storage blocks of such electronic systems [5]. Non-CMOS and non-silicon technologies with various design and implementation styles can be used for these sensors and biological functions. In order to integrate all the components on a single substrate, system-on-chip (SoC) was developed. As more computing resources are added to a system-on-chip, such as CPU, DSP, and particular IPs, connectivity between them becomes a more difficult problem. 3D ICs offer hope for the heterogeneous integration of many technologies Performance can be increased and integration level raised by using a three dimensional integration with many active layers[6]. Using inter-tier interconnects, various dice can be joined in 3D integration. This is called Through Silicon Via (TSV) The advantages of 3D IC technology over traditional 2DSoC include reduction in interconnect length which lowers power consumption, propagation delay, and wire parasitic high density of interconnects which increases data bandwidth. A simple lumped TSV model is created by modelling TSV resistance, inductance, and capacitance using the TSV RLC Parameter. TSVs are tapered to achieve the least amount of voltage drop and delay difference between tiers in order to ensure uniform environmental conditions throughout all levels[4]. Thevenin networks, in which the resistance values and current demand for each tier are known, can be built up for TSV scaling.

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Figures

References

Keywords

Metrics

10GB MAC CORE Verification Reference (Input Monitor) Module

P. Sivakumar ; R. Rajalakshmi ; P. Dhanush ; M. Vinay ; B.Adithya Chowdary ; K.Jagadeeshwar Reddy All Authors

Abstract: The project “10GB MAC CORE Verification – Reference (input monitor) Module” involves the verification of a 10 gigabit Ethernet Media Access Control (MAC) core. Specifical... **View more**

Metadata

Abstract:
The project “10GB MAC CORE Verification – Reference (input monitor) Module” involves the verification of a 10 gigabit Ethernet Media Access Control (MAC) core. Specifically, this study focuses on the reference or input monitor module, which is responsible for monitoring the incoming data and verifying its integrity. The verification process includes functional testing, performance analysis, and simulation-based testing. The aim of this study is to ensure that the reference module meets the design specifications and is capable of handling the intended data rates and protocols. The study is important because it helps to ensure the overall reliability and performance of the MAC core, which is a critical component of many networking systems.

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Contents

Several verification approaches have already been invented in recent decades to make the process of ASIC verification designs easier. These techniques are often created by EDA tool providers and are frequently incompatible with tools from other distributors. The need for verification became more standardised with the advent of said Open Verification Methodology (OVM), it encourages the utilise of System Verilog testbench. OVM thus paved the same UVM, that has become an authorised Accellera criterion and is supported among all EDA tool vendors, paved the way

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A Novel Technique to Detect the Muscle Disorder

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Abstract: One of many critical components in biomedical technology is the development of wireless EMG for remote muscle action monitoring. Wireless EMG can provide signals to a com... **View more**

Metadata

Abstract:
One of many critical components in biomedical technology is the development of wireless EMG for remote muscle action monitoring. Wireless EMG can provide signals to a computer via wireless transmission for monitoring. This technology is utilized for patient monitoring and cost-effective medical service at home. This technology was made possible by developing a multichannel EMG data acquisition device that records EMG signals. The Data Collection Protocol was developed to enable the development of a precise load pattern detection system based on the EMG signal.

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Contents

Electromyography (EMG) is a biological signal that detects electrical currents generated by skeletal muscles during contraction to quantify neuromuscular activity. Understanding EMG signals requires knowledge of skeletal muscles and the mechanisms that allow them to create bioelectrical signals. It also considers the numerous systems and events that influence the signals. EMG is a complicated signal that is influenced by a variety of factors, including physiological and anatomical qualities, as well as equipment parameters. It varies from individual to person. The EMG signals are useful since they are monitored in real-time. It contains real-time information on a muscle's electrical activity, which is related to muscle force. During isometric and dynamic contractions, the link between muscle force and EMG was examined is a one-dimensional time series signal of electrical muscle activity that reflects the neuromuscular system's physiology in reaction to a specific stimulus.

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Figures

Documents

Kumari, L.K.[a] , Ramalakshmi, K.[b] , Srinivasaraghavan, V.[c]

Robust Visual Object Tracking in Clustered Environment

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Abstract
To perform visual object tracking in clustered environment, kernel methods based Support Vector Machines (SVMs) can be used. A Scale adaptive Kernel support correlation filter Algorithm (SKSCF) is employed here for visual object tracking. In this method, the SVM models with circulant matrix formulation have been used. For visual tracking and its related applications it enhances the process of optimization. SVM models with circulant matrix formulation use the discrete Fourier transform operation to accomplish visual object tracking. The issue of visual objects is illustrated as a recursive command of Support Correlation Filters (SCFs). A Scale Adaptive Kernel Support Correlation Filter (SKSCF) has an O(n2 log n) computational complexity. The SVM-based techniques' computational complexity is at O (n4). Along with the Scale Adaptive Kernel Support Correlation Filter Algorithm, factors like multi-channel features, scale adaptive approach, and kernel methods are applied. For a sizable standard dataset, the Scale Adaptive Kernel Support Correlation Filter Algorithm provides finer outcomes in terms of reliability and speed. © 2022 IEEE.

Author Keywords
circulant matrix; Support Correlation Filters; Support Vector Machines; Visual object Tracking

Index Keywords
Adaptive filtering, Adaptive filters, Computational complexity, Discrete Fourier transforms, Tracking (position); Adaptive kernels, Circulant matrix, Correlation filters, Filter algorithm, Kernel-methods, Matrix formulation, Support correlation filter, Support vector machine models, Support vectors machine, Visual object tracking; Support vector machines

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Design of U-Slot Microstrip Patch Antenna for Wireless Applications

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***Abstract*—We have been using antennas for wireless communication for several years and looking to reduce noise at increased information rate and fast response at low cost in Wired communication. Nowadays, new technologies are evolving in communications where Microstrip antennas are in use due to compact sizeable compared to typical antennas and easy installation. Wireless communications have established extensive and prompt modernization, specifically in the centre of the past two generations. The upcoming concept of the individual communication structure intends to furnish data communications at all time over the world. The authors have presented a U-shaped Slot loaded patch antenna for the wireless communication range in this paper. The presented patch antennas have high accuracy in transmitting the information rate. Therefore, microstrip patch antennas are persistent competitors for numerous wireless communications application programs. This paper presents a design, maximization, and simulation of a dual-band amended U-slot microstrip patch antenna for WiMAX/WLAN application. The operational characteristics are in the range of *2.45-2.57* GHz and 5.09-5.27 GHz range. The radiating patch fabricated on the Rogers RT/duroid 5880 substrates of dielectric constant of *2.2*. The co-axial feeding technique connects the antenna with a 50Ω impedance. The presented u-slot antenna results return loss of -*19.5* dB at *2.5* GHz and -*30* dB at *5.27* GHz.**

Keywords—Microstrip patch Antenna (MPA), HFSS Software, WLAN, Optimization and Simulation

I. INTRODUCTION

Microstrip in higher-accomplishment plane spacecraft and satellite applications, wherever expensive, load, dimensions, execution, and accessible foundation, contemptible antennas would be essential. Currently, numerous alternative government and business demands have similar specifications, like mobile radio and wireless communications. Sharma et al. investigated that to satisfy these necessities; Microstrip antennas are used. Microstrip Patch Antenna play a extraordinary responsibility in the dissemination of wireless services. These have unparalleled advantages over another modes, similar as agreement size, ease of construction, versatility, and magnificent implementation [9].

Ahmed Khidreet. Al. (2013) investigated communication and proposed a wideband dual-beam microstrip antenna. Pendry et al. (1999) proposed the Bandwidth enhancement of a DGS implemented Rectangular microstrip patch antenna (RMPA). Initially, a simple RMPA was designed for an operating frequency of 2.4 GHz. This paper proposes utilizing a patch antenna with 2 formed slots to achieve dual-band approach. An epitome antenna is unreal and verified for the desired performance by experimentation. The first advantage of this procedure is that a comfortable invention because the elegance does not need alignment between multiple layers of dielectrics and metals. U-slots are confined to supply on top of the operative frequency

Weng et al. (2008) proposed spectrum allocated by the FCC, i.e., 1.559–1.610, 2.520–2.655 and 7.55–7.75 GHz for a range of broadcasting satellite (5.413, 5.416), radio navigation (5.208B, 5.328B, and 5.329A) and mobile satellite space to earth communication (5.461A), respectively.

Ikonen et al. (2006) proposed a paper on harmonics that has been suppressed while antenna designing to reduce the efficiency to cause electromagnetic interference because antenna performance can be affected by high order harmonics.

Vishvakarma et al. (2011), in their article, have proposed a versatile antenna structure that received much interest and attention among researchers. Moreover, their design was observed to be suitable for various applications at other improvements.

The researchers have devised many ways to extend the information measure of Microstrip antennas and the traditional practice of microstrip patch height and reducing substrate's permittivity.

The device surface employs a layered assembly consisting of numerous parasitic divergent components with diverse trivial sizes on top of the driven component (stacked patch antenna) [3] or planar antenna enclosed by narrowly spaced parasitic elements (a 2D parasitic sub-array) [4-6]. The curvaceous patch antenna expands the antenna thickness and dimensions, whereas the two-side length escalate the lateral dimension of the antenna.

II. PROPOSED ANTENNA DESIGN

The Microstrip patch antenna width is specified by Eq. (1) as [7-9] :

$$W = \frac{c}{2f_r}\sqrt{\frac{2}{\varepsilon_r + 1}} \tag{1}$$

Effective dielectric constant calculation (ε_{ruff}) Eq. (2) specified the effective dielectric constant as [10,11]:

$$W = \frac{c}{2f_r}\sqrt{\frac{2}{\varepsilon_r + 1}}$$

$$\varepsilon_{reff} = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2[1 + 12(h/W)]^{-1/2}} \tag{2}$$

Exploration on Reusability of Universal Verification Methodology

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Abstract- The Universal Verification Approach is a robust verification methodology for a wide range of design sizes and types. The term "universal" refers to the methodology's ability to check everything and everything in the universe — or at least everything in integrated circuits. Through analysis of UVM verification methodology, research is focused on verification reusability. The reuse of the component, platform, test cases, and sequences is reflected in this paper's reusability. Initially the paper discusses about the reusability of UVM platform and test case, followed by a look at a standard UVM verification platform. The I2C protocol is created based on reusable verification environment and the verification results are analyzed.

Index terms: UVM, I2C, OVM, DUT

I. INTRODUCTION:

Traditional verification methods and procedures have failed to fulfil today's verification needs [1]. The design of verification module allows for the completion and effective improvement of verification efficiency. UVM [2] is derived from OVM and incorporates several VMM features, such as the callback function and RAL (Requirements Analysis Language) (Register Abstract Layer).

UVM reusable verification is possible because to UVM class inheritance, Factory mechanism overloading, and callback function. This research researches the reusability of UVM methodology verification and creates a verification platform based on the I2C protocol. On the basis of analysing UVM methodology and the conventional UVM platform [3]. It also does reusable verification using the verification platform.

II. UVM VERIFICATION

UVM has inheritable standard classes such as uvm object, uvm component, and uvm sequence. Test, Environment, Agent, Driver, Monitor, Scoreboard, Sequencer, and other components make up the UVM verification platform. The uvm component class [4] is inherited by these components. A typical UVM verification platform is depicted in Figure 1. In this platform, two Agent classes are created. The member variable active is used to specify one Agent as active mode, which contains instantiated Driver and Monitor, which are responsible for driving the transaction to Design Under Test. (DUT) and monitoring the bus. Only the Monitor object is constructed to monitor the DUT output, while the other is set to passive mode. Using the virtual interface, the driver will transform Transactions into pin level signals. The DUT module connects to the platform classes through the virtual interface module. The Coverage Model, which is accountable for fundamental protocol checks and coverage analysis, can be instantiated by agent classes. Factory mechanism registers the components in a platform for quick updates and high flexibility [5].

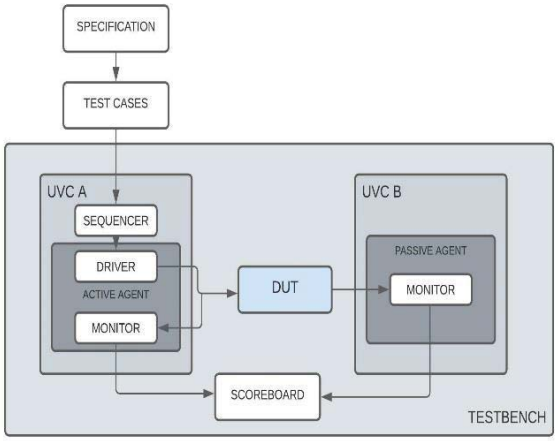

Fig. 1. Complete Structure of Universal Verification Methodology

1) *uvm_tst*
2) *uvm_environment*
3) *uvm_agt*
4) *uvm_seqr*
5) *uvm_drvr*
6) *uvm_subr*
7) *uvm_seq*
8) *uvm_seq_ite*
9) *uvm_anals_prt*

III. RESEARCH ON REUSABILITY

A reusable verification platform can help reduce verification time and improve verification efficiency. The UVM verification platform can automatically complete transactions that must be driven, aggregated, and compared. Sequence generates and sends transactions. Class uvm _component inherits the driver and other components, while class uvm_sequence inherits the sequence. As a result, Sequence is not one of the UVM verification platform's components. In this research, reusable verification modules, environments, test cases, and sequencing are examined.

A Framework for Big Data Analytics with Wireless Communication of Network, Internet of Things and Cyber Security

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Abstract— **Nowadays, big data is being implemented in various fields due to its advantages in risk management, healthcare and other business fields. The conventional big data analytics system is not highly promising for implementation in every system. Therefore, the developers are integrating the Internet of Things (IoT), wireless communication and cyber security systems to strengthen the capability of big data analytics. The current research has explained the framework for big data analytics with IoT, wireless communication and cyber security. Initially, past literature was explained, and then, the research methodology has been described. Primary survey-based research has been conducted with 54 data analysis experts to understand the framework of big data, its applications and solutions for cyber security-based issues.**

Findings showed that a VPN system with a firewall is a great choice for preventing external attacks. Moreover, as the primary data suggested the use of encryption systems, the researchers used SHA-256 ("Secure Hashing Algorithm") for protecting the collected big data. Internet of Things (IoT) devices is used for collecting customer and operational data. After that, the data is collected via a wireless network and transferred to the respective access points. Users can access the data from access points and can generate meaningful information for executing various purposes.

Keywords— Internet of Things, Machine Learning, Big data analytics, Artificial Intelligence, security

I. INTRODUCTION

Big data analytics is a recent approach in the field of business management, healthcare management, supply chain management and finance management. While considering big data analytics, the Internet of Things (IoT) is the hardware and software tool for its facilitation [1]. IoT in the field of big data analytics has shown promising applications when the theoretical foundations are combined. Big data is analysed for predicting and forecasting the external market condition, stock market condition, and to navigate their track [2]. Several issues have also been observed in big data analytics when IoT hardware and software are being used. These issues cannot be mitigated by using conventional theoretical foundations and will require advanced theories and practices.

The common issue in big data analytics is its cyber security. As the connection is wireless, man-in-the-middle attack, malware transfer, data manipulation and several other issues occur in the IoT [3]. These attacks have potential consequences in the extracted information from big data. Thus, the new wireless technology is on further development by establishing new policies and strengthening the security system [4].

According to the available studies, wireless big data analytics is used in *traffic flow prediction*. The IoT sensors and devices collect the real-time information of the vehicles and traffic. After that, the traffic flow is predicted by analysing those data along with analysing big data [5]. The wireless big data analytics in the traffic helps to reduce traffic congestion. Reports suggest that in the US, the cost of the extra energy wasted in traffic congestion is around 160 billion dollars. It also increased the carbon footprint. Therefore, wireless big data analytics and the use of IoT is essential for supporting the environment's health and reducing energy waste [6]. However, during the use of IoT and wireless systems, cyber security is a major concern that needs to be addressed.

This research is going to identify the framework for big data analytics where wireless network, IoT and cyber security systems are integrated. Previous paragraphs upheld the applications and background of big data, IoT, wireless

Documents

Galety, M.G.[a] , Thiagarajan, R.[b] , Sangeetha, R.[c] , Vignesh, L.K.B.[d] , Arun, S.[e] , Krishnamoorthy, R.[e]

Personalized Music Recommendation model based on Machine Learning
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Abstract
A music recommendation system suggests songs to an individual user on his preferences. There are many different sorts of music to choose from. The world of music is so vast that it is impossible to listen to all the songs one desires. As a result, we create a model that supports a user in discovering music that he could enjoy. It collects individuals who share the user's passions and picks knowledge and resemblance associations depending on the user's past. The information gathered from user evaluations is used to make suggestions. The main focus of the study is on the context-aware recommendation process's insufficient integration of context data with the emergence of new attractions. Using libraries like NumPy and Pandas, we used a library of songs to uncover connections across individuals and music so that a hit album might be offered to individuals derived from history. In addition to Count Vectorizer (CV), we'll use Cosine similarity (CS). In addition, when a piece of given music is processed, a front end with a flask will provide us with the suggested tracks. © 2022 IEEE.

Author Keywords
Music recommendation system; NumPy; Pandas and Count Vectorizer

Index Keywords
Machine learning, Music; Context-aware recommendations, Machine-learning, Model-based OPC, Music recommendation, Music Recommendation System, Numpy, On-machines, Panda and count vectorizer, User evaluations, Vectorizer; Recommender systems

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Documents

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Super-resolution of Retinal Fundus Images Using Generative Adversarial Networks
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Abstract
It is important to have high-resolution medical images for the early diagnosis of diseases. It became more challenging once the structure is very small as in retinal fundus images. A generative adversarial network (GAN) centered retinal fundus image super resolution system is proposed for the early detection of retinal diseases. The low resolution images are fed as the input to the system and the output obtained will be a high resolution image. The method is tested on standard databases like DRIVE, STARE, etc. The PSNR SSIM values obtained in the suggested method outperform the state of art methods. © 2022 IEEE.

Author Keywords
Accuracy; Convolutional Neural Network; Machine learning techniques; Retinal fundus image; Segmentation

Index Keywords
Convolutional neural networks, Diagnosis, Image segmentation, Medical imaging, Ophthalmology, Optical resolving power; Accuracy, Convolutional neural network, Diagnoses of disease, Early diagnosis, High resolution, Image super resolutions, Machine learning techniques, Retinal fundus images, Segmentation, Superresolution; Generative adversarial networks

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Documents

Venkatesh, P.[a] , Narmadha, T.V.[b]

Miniaturized Triband Planar Monopole Antenna using Right Turned L-Shaped Stubs for Wireless Communications
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Abstract
Due to the increasing use of communication networks and wide deployment of various wireless technologies, the transmit and receive antennas are expected to be compact, provide multi service with good radiation and bandwidth characteristics. This paper deals with integrative operation of two such wireless technologies such as Worldwide Interoperability for Microwave Access (WiMAX) and Wireless Local Area Network (WLAN) which are considered to be the key technologies used in wireless communication and Networks. In addition to this, enabling Aeronautical Mobile Communication for Airport transportation is also achieved. To accomplish all the above mentioned communication requirements, the antenna design proposed in this paper is enabled with a Right turned L-shaped connection between the feedline and the lower portion of the radiator to improve the impedance and bandwidth characteristics. A 50 Ω microstrip line is used to feed the radiating element. The length of the ground plane is reduced to achieve good bandwidth and resonance. The proposed antenna configuration resonates at 3.5 GHz (WiMAX), 4.75 GHz (Aeronautical Mobile Communication) and 5.5 GHz (WLAN) with a bandwidth of 400 MHz, 160 MHz and 200 MHz respectively. The foot print of the antenna is 35X12X1.6 mm3 providing an efficiency greater than 80% in all the three desired bands. The far field pattern of the proposed antenna is also obtained as per the application requirements. The entire design is simulated using Computer Simulation Technology (CST). © 2022 IEEE.

Author Keywords
Aeronautical Mobile Communication; Computer Simulation Technology; Monopole antenna; Multi service; Triband; Wireless communication and Technologies

Index Keywords
Antenna feeders, Antenna grounds, Bandwidth, Directional patterns (antenna), Interoperability, Microwave antennas, Mobile telecommunication systems, Radiation efficiency, Receiving antennas, Wimax, Wireless local area networks (WLAN); Aeronautical mobile communication, Bandwidth characteristics, Computer simulation technology, L-shaped, Mobile communications, Multi-services, Planar monopole antenna, Tri-bands, Wireless communications, Wireless technologies; Monopole antennas

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Documents

Dhanasekaran, S.[a] , Gomathi, P.[b] , Renaldo maximus, A.[c] , Krishnan, T.[d] , Kannan, B.[e]

Solar Tree based Smart City Street Light Control System using IoT BLYNK Platform
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Abstract
Street lighting uses a lot of electricity around the world. Street lights in most cities are only managed regularly and the quality of service is very low. The worst levels will be caused by constraints on available resources, very limited equipment instrumentation, inappropriate system operation, and poor network maintenance. The goal of the current research is to build and develop a highly IoT-dependent smart city based on ESP8266. Its main goal is to create a subway IoT system that contributes to the development of smart cities and uses online cloud computing to solve real-time problems. Thanks to the Internet of Things, street lighting and water management are now two factors that are automatically managed in smart cities and rural areas. In our current work, we tend to focus more on using Internet of Things (IoT) devices to remotely control street lighting. IoT will allow access to real-time street lighting data (on/off status) anytime, anywhere. IoT is nothing more than a network that uses software, sensors, and connectivity to control and monitor data anytime, anywhere. The central office can conduct observations from anywhere. Data that is continuously stored in the cloud via BLYNK local servers and efficient client-server connections is visible to us in real time. Such automated systems will work more efficiently than manual systems, saving manpower and increasing the accuracy of the system. Electricity prices continue to rise as more and more energy is wasted. Saving energy is now absolutely necessary. To improve efficiency, a technology called street lighting monitoring to automatically control street lighting was created. The main reason for the work is to save energy. © 2022 IEEE

Author Keywords
Embedded C software; Internet of thing (IoT); Light-emitting diode (LED); Solar panel; Street light

Index Keywords
Automation, C (programming language), Light emitting diodes, Quality of service, Smart city, Street lighting, Water management; 'current, Embedded C software, Internet of thing, Light control systems, Light-emitting diode, Lightemitting diode, Real- time, Solar panels, Street light, Tree-based; Internet of things

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Mechanical and tribological properties of SS316L with comparison of SLM and casting methods

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ABSTRACT

This paper includes a thorough investigation of the effects of two distinct processing methods Selective Laser Melting (SLM) and using conventional casting. The mechanical characteristics and wear behaviour of austenitic SS316L was studied. The processing techniques, the resultant microstructure, mechanical and wear properties were all connected. When SS316L specimens made by SLM were likened to those made by traditional casting, the findings revealed that the mechanical characteristics and tribological results were enhanced. The Selective Laser Melting technique induces a finer microstructure, which is largely responsible for the superior mechanical properties of hardness and tensile strength. And also wear resistance on SS316L by wear rate and friction coefficient has been improved. By using proper material selection, fabrication method with optimum process parameter itself the potential strength of the materials has been enhanced. In this regard, SLM appears to be a potential technique for creating SS316L implants that are more mechanically and wear resistant effectively.

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1. Introduction

Because of its great strength, good corrosion resistance, and biocompatibility [1], SS316L has long been employed in biomedical applications such orthopaedic transplants and prosthesis. To achieve biocompatibility on orthopaedic implants, a high wear resistance is required in addition to appropriate mechanical strength [2]. Selective Laser Melting (SLM) is an additive manufacturing process in which powderbeds are heated layer by layer with the help of a laser beam in order to create items based on previously created CAD data. SLM, which is regarded as an amazing approach to generate functionally categorized materials& complicated works with specific local useful needs [3], results in an astonishing adaptability to geometry and materials design. SLM technology also makes it possible to produce nearly entirely dense metal components with mechanical characteristics that are equivalent to those obtained using traditional methods [4].

The adjustment of SLM settings to create 316L SS components has been the subject of several investigations. In comparison to cast 316L SS, prior results [5] on 316L SS generated by SLM (with optimum settings) indicated, on typically more strength and less ductility. A typical microstructure is produced by SLM's exceptionally rapid rate of cooling which is substantially different from the casting methods responsible for these componentstechnical features. Though, suggested that it would be able to achieve a wear resistance comparable to 316L SS castings once it reached full density by SLM. They did this by studying the stainless steel 316L components microstructure and tribological behaviour parts generated by SLM [6]. While compared to conventional techniques, SLM provides several advantages, including a reduced material waste, less ecological impact, and more freedom in terms of shape and material design.Selective Laser Melting reduces prices for tiny lot sizes and for complicated shapes (in contrast to subtractive technologies) without increasing expenses [7].The bulk of SS316L Casting is being used to create prosthetics, but it is feasible to use SLM technology to rapidly and efficiently create tailored implants that are suitable for the patient, which is not achievable when using conventional manufacturing processes.

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Mechanical and tribological performance of 18Ni(350) maraging steel

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ABSTRACT

Metal additive manufacturing has been created as a manufacturing technology for intricately functional products with highly specific mechanical performance requirements that might be used in a variety of technology sectors. As a result, it's critical to describe additive manufacturing materials under a variety of loading circumstances to comprehend probable differences in behavior from their conventional counterparts. This study examines the mechanical behaviour of 18Ni(350) maraging steel, a material frequently utilized in additive manufacturing applications. On maraging steel produced conventionally and additively, numerous physical and mechanical tests were conducted. Finally, the tribological performance of wear rate and coefficient of friction has been improved by 48.04% and 28.36% respectively in additively fabricated maraging steel when compared to conventionally manufactured (CMed) steel. Digital Image Correlation was used to help materials related strategies. The tests results revealed the complex behaviour of maraging steels, and the material produced using additive manufacturing appeared to have greater strength potential than conventional materials.

Selection and peer-review under responsibility of the scientific committee of the International Conference on "Application in Computational Engineering .

1. Introduction

The influence of metallic additive manufacturing (MAM) has been gradually growing over the past ten years [1]. The incredible potential of additive manufacturing (AM) assets, such as topological optimization mixed with highly flexible design constraints, has also sped up its development [2]. Laser powder bed fusion (LPBF) is presently the most popular MAM method in contrast to other MAM technologies since it needs fewer support structures and employs finer processing conditions (i.e., laser spot size & smaller metal particles), allowing for higher geometrical complexity [3,4]. Furthermore, it is known that, in comparison to other MAM techniques, the process can be produced parts with higher dimensional precision (albeit completing post-processing is required), as well as superior as-built surface quality [5]. Even though LPBF can process a wide range of materials, developing optimum feedstock is difficult [6], which means that very minimum number of materials are now considered viable alternatives. When enhanced yield strength is desired, standard methods are used. Because of its exceptional mix of strength and flexibility, maraging steel (18Ni (350)) is frequently used in extremely demanding structural applications. Furthermore, the absence of carbon improves corrosion resistance and increases weldability. Because of the carbide precipitation, it is suitable for AM processing [7,8]. An obvious characterization need arises when new technologies have emerged, (i.e. AMed) materials, especially given the current trend toward geometrical complexity increase (i.e. topological optimization) [9,10]. To develop a detailed physical and mechanical characterization that allows the material to account for the state of stress, metallurgical condition, and wear, a number of characterization tests were conducted. This paper is intended to provide data on material characterization, the majority of which has already been published elsewhere. Because of this, a brief summary of the information, tests, and outcomes will be provided, and readers who are interested in learning more will be pointed in that direction.

2. Materials and methods

Different geometries from the same material sample were performed for a thorough analysis of additively manufactured (AMed) 18Ni(350) maraging steel. The manufacturer chose a set of processing parameters corresponding to a 400 W power laser, 0.86 m/s scanning speed, 95 m hatch spacing, and a layer thickness of

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PREPARATION AND CHARACTERIZATION OF NANO-ENHANCED PHASE CHANGE MATERIAL FOR THERMAL MANAGEMENT

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In this study, the nanoparticles including Bismuth oxychloride and Copper oxide were dispersed with phase change material (stearic acid) in different combinations. The various characterizations such as X-ray diffraction, Fourier transform infrared spectroscopy, Scanning Electron Microscope analysis, Differential Scanning Calorimetry, Thermogravimetric analysis has been done to ensure the chemical and thermal stability for low/medium temperature applications. Results showed that the thermal conductivity is increased by dispersion of nano-particles. The latent heat of fusion decreased for all three combinations of Nano- PCM. However, it is suggested that the thermal power storing capacity has increased. The stability analysis also done for prepared samples after 100 cycles. Eventually, it is recommended that the Copper oxide dispersed Nano-PCM is an effective potential candidate due to its congruent melting and discharging comparatively other two combinations.

Keywords: Nanoparticles, Phase change material, Thermal storage, Characterization.

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DIGITIZATION OF AGRO FOREST

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The employment of a LIDAR sensor in the line follower is required for the application of gripping technology in the forest region. This will make it more facile for the user to obtain the real-time observation of trees and plants as they grow on a field. The dimensions of the trees are difficult to determine from an image or a video source. We found a solution to this problem by

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using the point cloud intersection approach to quantify the dimensions of the trees, such as height and width, using a lidar sensor. This can be achieved by utilizing the lidar sensor to take the reading of the trees and storing the data in the cloud through the use of the Arduino and Wi-Fi module. To obtain readings of the trees and plants, Lidar is mounted on the robot at a categorical height. The Robo-Line follower is used to direct the path to specific trees in the forest where the Lidar takes the readings. Using Arduino, the Lidar data is then stored in the IoT cloud (Thingspeak). To communicate the reading from the micro-controller (Arduino) to Thingspeak, a Wi-Fi module is used. The values stored in the IoT cloud will be viewed by the land owner.

Keywords: Lidar, IoT, Forest, Digitization, Robo-line follower, Arduino.

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EXPERIMENTAL PERFORMANCE ANALYSIS OF FREE AND FORCED FULLY DEVELOPED AIR FLOW GREEN HOUSE SOLAR DRYER USING CURRY LEAVES

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The world is beginning to move away from its consumption of fossil fuels. Various technologies are being developed to make use of renewable energy sources such as wind, solar, and tidal, etc. Solar energy is the best choice among these sources because of it is readily available, abundant, and capable of producing both electric energy and space heating. Solar energy can be used directly or indirectly to dry agricultural and non-agricultural products to preserve them for long a period without formation of fungi. Drying of herbal leaves is an important process in Siddha and Ayurvedic industries to produce herbal medicines in power form. However, as herbal leaves are dried in the open sun, they are susceptible to environmental factors such as rain, insects, and livestock. These disadvantages of open-air drying shall be overwhelmed by greenhouse solar dryer. Greenhouse solar dryer with natural convection, forced convection with hot air supply are the existing methods, but when supplied with hot air, the rise in temperature leads to nutrient loss in herbal leaves. In order to avoid this loss in nutrients, the current work gives a solution that the temperature of forced convection greenhouse dryer can be reduced and controlled by supplying the ambient air at inlet flow in a fully developed air region, and this method can also leads to

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reduction in colour loss with possibly same or higher drying rate compare to natural convection greenhouse dryer.

Keywords: Greenhouse dryer, Drying rate, Solar energy, Siddha and Ayurveda, Medicine powder.

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MULTI-RESPONSE OPTIMIZATION OF MACHINING PARAMETERS ALUMINIUM METAL MATRIX COMPOSITES IN TURNING PROCESS USING GREY RELATIONAL ANALYSIS

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An experimental investigation of parameter on machining of Aluminium metal matrix composites by cutting speed, feed, and depth of cut of optimize design in a turning process. The main response selected to evaluate the process are Surface roughness, removal rate of material, and Machining time, and the turning parameters are feed, speed depth of cut. Grey analysis uses grey relational grade (rank) as characteristic index method of determination of optimal condition of turning parameters. Design of Experiments used is L9 orthogonal array. The grey relational analysis method (GRA) is used to obtain the optimal condition of turning parameters. This approach method is used as a tool to improve the quality attributes in turning performance of aluminium metal matrix composites.

Keywords: *Metal matrix composites, Turning, Grey relational analysis, CNC.L9 Orthogonal Array.*

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AUTOMATIC SEED SOWING ROBOT

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Agriculture is the major sector in the world that plays a vital role in developing the economy of a nation. Agro technology is the process of implementing the recent technologies to develop the crops that are being produced. The use of agro technology not only helps in improving the efficiency of the crop that are being produced but also helps in developing devices that are suitable for doing mechanical works in the fields. This result in minimization of the total cost of production, saving of time and reduction in the effort involved in the process. The new technology should also be economically feasible and hence the behavior of the technology and its role in the society is an important consideration before developing a new product or process. In this work a seed sowing machine has been developed that help the farmers in harvesting the best crop with least efforts. A mechanical device that helps in sowing operation has been developed. . This project aims to increase the productivity and to reduce the time for seed sowing process and wastage of seeds. Automatic seed sowing machine designed and developed, which uses DC motors driven by L298N driver circuit with Aurdino UNO R3 control kit.

Key words: Agriculture, Agro-Machinery, Seed Sowing Machine, Automation, Agriculture Productivity.

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PERFORMANCE TEST OF PYRAMID SOLAR STILL UNDER SLANTING ANGLE OF 65° AND CONSTRUCTION OF EMPIRICAL FORMULA

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Pure water is very essential for human being as well as living being including trees, plants and animals. Now deforestation is the main cause for lack of rain fall. So we are in need of pure water saving beyond a certain decades water purification will be a essential one. But we are

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TRANSFORMING WASTE PET BOTTLES INTO SUSTAINABLE 3D PRINTER FILAMENT

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One of the world's most pressing issues today is the massive dumping of plastics, which results in soil contamination, global warming, and a drop in groundwater levels. Instead of trashing plastics, the best way to save our biodiversity is to repurpose the plastic. Waste plastic materials can be repurposed in a variety of ways, and have chosen to use 3-D printing technology as one of the best methods. Filament, which is mostly composed of the chemical molecule polythene, is the raw material necessary for additive manufacturing technique (FDM). The main purpose of the project is to create a bespoke 3D printing extruder that can convert waste plastic materials into filament for FDM printers.

Keywords: 3D printing, PET, Fused deposition modeling.

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INVESTIGATION AND OPTIMIZATION OF THERMOPLASTIC MATERIAL BY FUSED DEPOSITION MODELING

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Additive manufacturing is a booming technology nowadays. This helps to create some complicated shapes of the product. By using ASTM-D785-03 standard is used to create two different test specimens by fused deposition method (FDM). The parameters are layer thickness; infill density and infill pattern. After the printing is completed, the specimens are involved for the mechanical test. Hardness is the material property that enables it to resist penetration, scratching, indentation and plastic deformations. It is very important mechanical property of the

materials. In this project hardness of the different process parameters of Nylon and Polycarbonate is tested by Rockwell hardness test and the value is finding directly by the reading in the scale B. Once the tests are completed the values are taken for optimization techniques and the experimental results are optimized by using Minitab software.

Keywords: Additive Manufacturing, Rockwell Hardness Test, Taguchi & ANOVA.

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PERFORMANCE COMPARISON OF TRAY, BED AND INTEGRATED DRYING CHAMBER IN CLOSED LOOP HEAT PUMP DRYER FOR BERMUDA GRASS

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Drying is important in the field of food production, agriculture, siddha, Ayurveda and medical industries. The heat pump dryer is best method for herbal drying with controlled operating parameters such as temperature, humidity and air velocity. In this proposed work the heat pump dryer is designed and built to conduct the experiment to investigate the drying characteristics for Bermuda grass (Cynodon dactylon) at different velocities, 1.5 m/s, 2.0 m/s and 2.5 m/s in three different drying chamber like fluidized bed dryer, batch dryer, and combined dryer (combination of both bed and tray) with a transient temperature condition. R134a is used as the refrigerant in the heat pump system. The performance of heat pump dryer in three different drying chambers has been analysed by using Bermuda grass as a drying product. The Moisture Removal Rate (MRR) is calculated for the combinations of different velocity and drying chamber and it is observed that the higher MRR is attained in combined dryer at all three velocities than the tray and fluidized bed dryer.

Keywords: Heat pump dryer, Cynodon dactylon, Siddha, Ayurveda, Medicine powder, Different types of dryer.

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STUDY OF WIRE ELECTRIC DISCHARGE MACHINING (WEDM) OF TITANIUM ALLOY (TI-6AL-4V) FOR BIOMEDICAL APPLICATIONS

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Ti-6Al-4V (grade 5 titanium alloy) material is commonly used for biomedical applications especially in dental implants. Titanium alloys are some of the recently developed advanced materials having tremendous mechanical properties including high yield strength, high strength to weight ratio and excellent in biocompatibility. Titanium alloys having poor machinability and not able to machine in conventional machining process. These alloys can be machined effectively using some unconventional machining methods. Wire-Electro Discharge Machining (WEDM) is one such advanced machining technique working to machine intricate shapes like hardest metals like titanium. The objective of the study is to investigate and identify the optimal process parameters in electric discharge machining of Ti-6Al-4V. The machining parameters such as voltage, discharge current, pulse on time and pulse off time are considered as input parameters and material removal rate (MRR),tool wear rate (TWR) and surface roughness (Ra) are considered as response parameters. The design of the experiment strategy was followed by selecting the Taguchi optimization technique (L9) to optimize the process parameters. By analysis of variance, the most influential parameters will be found for wire electric discharge machining process.

Keyword: Titanium, Dental Implants, WEDM, Taguchi optimization, Material Removal rate, Tool wear rate, surface roughness.

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MATHEMATICAL MODELLING AND FINITE ELEMENT SIMULATION OF SHEAR STRENGTH AND TENSILE STRENGTH EVALUATION OF THREADED BOLT COMPONENTS

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In this current scenario 3D printing technology influences the fabrication of threaded fasteners for easy replacement of the end user applications. The failure of bolt and nut assemblies subjected to tension and shear is generally undesired because of its less ductile failure mode than fracture of the threaded shank of the bolt. Over tightening of the bolt is an another issue for failure. In this current study tension and shear testing simulations were performed on M12, M10 and M16 FDM and SLA based 3D printed bolt and nut assemblies with different length (Lt). A finite element model was developed and verified with analytical method using programming language to gain insight into the mechanism of failure. A three dimensional finite element model (FEM) was developed by using ABAQUS software tool. Conventional failure theory was used for analytical calculation and the same input is given to python programming language for conducting various dimensional tensile and shear strength calculations. The output of the simulation results indicated that when Lt was short, necking of the bolt occurred close of the bolt and nut was reduced. This paper given a sample suggestions for several practical approached for reducing the probabilities of thread failure.

Keywords: Threaded bolt and nut, FEM, ABAQUS, Python, 3D printing, FD, SLA.

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INVESTIGATION OF FRICTION STIR WELDING PROCESS PARAMETERS ON CDA 101 COPPER: MECHANICAL, FATIGUE AND MICROSTRUCTURAL PROPERTIES STUDY

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In this study, an experimental examination is conducted to examine the effects of tool traverse speed on the micro-structural characteristics and tensile strength of joints created during friction stir welding of Cu alloy CDA 101 at plates. , It was possible to traverse at rates ranging from 20 to 45 mm/min with a tool that had a geometry consisting of a cylindrical tapered pin. It was found that joints made with the CDA 101 at 20 mm/min were completely devoid of was, whereas joints made with other tool traverse speeds had multiple was. Due to a large amount of frictional heat and adequate stirring power, the grains in the middle of the stir zone of the joints formed at 20 mm/min were evenly dispersed and homogeneous. The joint reached at 20 mm/min had the maximum tensile strength of 200.65 MPa about 85.38% of base metal.

Keywords: Traverse speed, CDA 101, Friction stir welding, Micro-structural characteristics.

ICCRAME '23 – 52

TRASHBOT FILLING ALERT SYSTEM FOR SMART CITIES

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An observation system for garbage bins that continuously monitors the level of waste within for a specified period of time and sends SMS notifications from the system to the municipality is presented in this paper. We plan to use an ultrasonic device to monitor the waste level, a GSM module to send SMS messages, and an Arduino Uno to control the operation of the system. Once the waste bin is almost full, the algorithm is supposed to come up with and send the warning message via SMS to the municipality, urging it to collect the waste bin as soon as possible.

of the reinforcement of nanoparticles on the microstructural and mechanical properties of the Ti-Cu weld will be investigated. The inclusion of biochar is done at 0%, 1%, and 1.5%, the amount which gives us the best weld solution is determined.

Keywords: Friction stir welding, Non-consumable tool, Nanoparticles, biochar.

ICCRAME '23 – 63

PARAMETRIC DESIGN AND INVESTIGATION ON THE EFFECT OF MACHINING PARAMETER IN CNC TURNING MACHINE

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In recent years, machining parameter optimization has become essential for producing high-surface finished components to eliminate residual stresses during the working condition. In this research work, aluminium, steel, tungsten carbide cylindrical stock materials were chosen for the machining process. Step turning, internal boring, and reaming operations were carried out in MTAB Flexturn CNC turning machine. The process parameters are feed rate, depth of cut, cutting speed, which influence the surface roughness (μm/in) and material removal rate (mm3/min) of the selected machined work stock materials. The design of the experiment strategy was followed by selecting the Taguchi optimization technique to optimize the process parameters. The optimal surface roughness and material removal rate were found to be 38.59 (μm/in) & 0.046 (mm^3/min) for pure aluminium feedstock. By analysis of variance, the feed rate was found to be the most influential parameter in the surface roughness of the turning process.

Keyword: Surface Roughness, Material removal rate, MTAB Flexturn, ANNOVA, Taguchi method.

ICCRAME '23 – 79

EXPERIMENTAL EVALUATION OF MIXED MODE FRACTURE TOUGHNESS OF PURE ALUMINIUM METAL THROUGH A SPECIAL FIXTURE

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Aluminium is the most often used metal after steel because of its versatility.8% of the earth's crust is made up of aluminium, making it the third most frequent element and most abundant metal on the planet. Due to its superior mechanical, thermal, and electrical properties as well as its affordable price, aluminium is the preferred metal in industrial, military, and aerospace applications. Failure processes in the sense, of brittle and ductile fractures of materials, are the most frequent forms. As a result, the pure tensile mode of fracture (Mode I) and fatigue fracture is used in the majority of studies. But still, when utilizing mode-I, the actual fracture does not just happen in sophisticated applications. The novel fixture used for mixed mode fracture toughness evaluation is used here also to determine the same property for Aluminium 6082 metal.

Keywords: Mixed mode fracture, Fixture for fracture toughness, Mode I/II/III.

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ICCRAME '23 – 80

A REVIEW ON BONE FRACTURE AND ADDITIVELEY MANUFACTURED TI-6AL-4V PLATE

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In order to protect important organs and provide a hard backbone for movement, bones are the body's primary structural components. To better understand how and why bones shatter, it is important to examine the mechanics of bone. According to an engineering perspective, structural failure is the primary cause of bone fractures. This will happen if the force or moment acting on the bone exceeds its capacity to sustain weight. Metal rods were utilised in earlier technologies with the assistance of Bone grafts serve as the connecting hardware for the fractured bone. The evolution of technology has had a significant impact on additive manufacturing. Digital manufacturing technology known as additive manufacturing (AM) is quickly transforming the medical and printing industries. Additionally, the development of products like heart valves, joint replacements, and dental implants all involve AM technology. This technology creates a physical model directly from CAD models by layer-by-layer adding materials, and it has strong mechanical qualities. One of the most popular tertiary titanium alloys that can be utilised for biomedical implants is Ti-6Al-4V. In order for this review paper to become the standard-bearer for forward-thinking researchers working in this sector, it intends to bring together the contributions of diverse researchers in the field of AM, with a particular focus on the TI-6Al-4V in the medical field and their mechanical properties.

Keywords: Hard backbone, Structural failure, Bone grafts, Additive manufacturing, TI-6Al-4V.

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ICCRAME '23 – 81

DESIGN AND ANALYSIS OF HELMET LOCKING DEVICE

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This design focuses on implementing Magnetic based "Helmet Locking Device" which is gone controlled under the magnetic effect. For the safety of two-wheeler riders, wearing of helmets is mandatory. When one is going towards office or its destination, he carries the helmet, after parking the bike, person try to attach the strap of helmet lock often these frequently helmets are stolen from the parking lot. This helmet locking system is implemented to assure that the rider will have a secure and comfortability while they carrying helmet with them.

Keywords: Locker, Helmet, Magnet, Battery.

ICCRAME '23 – 83

FUTURE RESEARCH OPPORTUNITIES ON THE MATERIALS OF THE WIND TURBINE BLADES AND INNOVATIONS

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Wind turbine blades are now produced using a variety of materials and techniques to reduce costs and improve performance. To make blades more dependable and economical to produce, this page provides a quick introduction to blade materials and common manufacturing characteristics. Surface roughness, manufacturing flaws, and variable loads in flow fields all have a big impact on how much power is produced by wind turbines. But, by employing the right materials, these issues can be minimized. Due to this, it is crucial to choose the right materials for wind turbines to preserve their performance under adverse environmental circumstances. To address material flaws such as delamination, structural deformation, and icing issues in the Polar

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Documents

Venkatesh, R.[a] , Vignesh Saravanan, K.[b] , Aswin, V.R.[a] , Balaji, S.[a] , Amudhan, K.[c] , Rajakarunakaran, S.[a]

Detection of Cracks in Surfaces and Materials Using Convolutional Neural Network
(2022) *Lecture Notes in Networks and Systems*, 339, pp. 223-241. Cited 1 time.

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Abstract
Crack is the separation of an objects or surface in two or more pieces. Identification of these cracks is crucial and plays a vital role in preventing the disaster that will happen due to that crack. The effective identification of these cracks on materials or parts may help the manufacturer to neglect those parts and to find the root cause for the formation of crack. For this, we have developed an image processing model using convolutional neural network. This model will constantly take picture by using the web camera, and these images were processed by the model and that model will predict whether the part or material has a crack on its surface or not. If the crack is detected by the model, those images will be saved, and respective actions will be taken. We have trained our model with 20,000 positive datasets (images with crack) and 20,000 negative datasets (image without any cracks). Then we have tested the model with some random images obtained from the internet. Analysing the results, we found that our model has attained maximum accuracy with an average confidence level of 93–97%. After this stage, we have developed the model to access the device's webcam to capture live video feed and predict the images for cracks. If a crack is present in the image, the model will store the image. © 2022, The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

Author Keywords
Computer vision; Convolution; Crack detection; Deep learning; Image filtering

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Documents

Ramar, M.[a] , Kanagasabapathy, H.[b] , Rajakarunakaran, S.[a]

The Influence of Building Orientations on the Mechanical Characteristics of Selective Laser-Melting SS316L
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Abstract
To examine the influence of the building directions on surface micro-structure and tribological characteristics of stainless steel 316L samples generated using selective laser melting (SLM) technology, parts were produced in three distinct building orientations (0°, 45°, 90°). The impact of construction orientation on stainless steel microstructure, mechanical characteristics, and machinability was examined. Scanning electron microscopy (SEM) was used to examine the microstructure of SLM samples. In the X-ray diffraction (XRD) patterns of the SLM samples, only, the FCC austenite phase was found. The γ-Ni phase's lattice constant in the SLM 45°sample was the lowest of these SLM samples. The surface roughness of the SLM 45° specimen was the highest compared to the other sections, while the surface roughness of the SLM 0° sample was the lowest. Large dendritic grains were uniformly distributed in the SLM 0° sample, but the roughest dendritic grains were produced in the SLM 45° sample. In addition, the SLM 0° specimen had the best tribological results. © 2023, The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

Author Keywords
Building directions; Microhardness; Selective laser melting; Tribological performances

Index Keywords
Melting, Microhardness, Microstructure, Scanning electron microscopy, Surface roughness, Tribology; Building direction, Building orientation, Dendritic grains, Mechanical characteristics, Selective laser melting, Stainless steel (316L), Structure characteristic, Surface microstructures, Tribological characteristics, Tribological performance; Selective laser melting

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Documents

Venkatesh, R., Kathiravan, S., Prabhakaran, R., Ramar, M., Jerold John Britto, J., Rajakarunakaran, S.

Experimental Investigation on Machinability of Additive Manufactured PLA and PETG Polymers Under Dry Turning Process

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Abstract
Fused Deposition Modeling (FDM) is one of the most cost-effective additive manufacturing techniques for complex objects. FDM fabricates layer by layer directly from a CAD file. To meet practical requirements, the additive manufactured components typically require conventional machining such as turning, suggesting a distinct machinability from those manufactured using conventional molding procedures. Thus, it is critical to investigate the effect of machining parameters on the turning properties of additively built parts. The purpose of this work is to investigate the mechanical properties of Polylactic Acid (PLA) and Polyethylene Terephthalate Glycol (PETG) materials employed in the FDM process. The machinability of the additive factory-made Polylactic Acid and Polyethylene Terephthalate Glycol components was investigated experimentally using a typical dry turning method. Mechanical parameters such as hardness and surface roughness can be determined both prior to and following the machining process. Additionally, the weight of the material is checked while determining the Material Removal Rate. Chip morphology tests were conducted on dry turning chips at various cutting speeds, feed rates, and depths of cut. © 2023, The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

Author Keywords
Cutting force; FDM; Hardness; MRR; PETG; PLA; Surface roughness; Turning process

Index Keywords
Additives, Cost effectiveness, Fused Deposition Modeling, Hardness, Morphology, Plastic bottles, Polyethylene terephthalates, Polymer blends, Turning; Complex objects, Cost effective, Cutting forces, Dry turning, Experimental investigations, Manufacturing techniques, MRR, Polyethylene terephthalate glycols, Polylactic acid, Turning process; Surface roughness

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Documents

Venkatesh, R.[a] , Prabhakaran, R.[a] , Jerold John Britto, J.[a] , Amudhan, K.[b] , Karan Kumar, G.[a]

Evaluation of Hardness, Surface Roughness, and Impact Strength of Additive Manufactured Ultraviolet Resin-Based Polymer

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Abstract
Using additive manufacturing technology, objects can be created layer wise by a single machine rather than utilizing molds and dies. A digital-projection light source is used to cure the surface of a liquid photopolymer in digital light processing (DLP) technique. This method is best for items with complicated structures and small cross-sectional areas that demand a high level of surface finish and strength. Objects are created for variety of angles using a variety of input parameters. 3D printing technologies based on DLP printing are commonly utilized to fabricate complex items without the use of tools or machining. Numerous variables influence the design of 3D printed parts, and they differ for each design and process. The layer thickness, pattern diameter, pattern spacing, and hollow thickness are the initial factors to be considered for DLP printed test coupons. In the present paper, DLP 3D coupons are printed using ultraviolet sensitive resin (λ = 405 nm). The primary objective of the work is to study the influence of support orientation on the surface finish and toughness of the DLP 3D printed test coupons as per ASTM standards. © 2023, The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

Author Keywords
Additive manufacturing; DLP; Hardness; Impact strength ultraviolet-sensitive resin; Surface roughness

Index Keywords
3D printers, Additives, ASTM standards, Finishing, Impact strength, Light sources, Resins, Surface roughness; Additive manufacturing technology, Digital light processing, Digital projection, Impact strength ultraviolet-sensitive resin, Layer-wise, Liquid photopolymers, Molds and dies, Projection light sources, Single- machines, Surface finishes; Hardness

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Documents

Prabhakaran, R., Jerold John Britto, J., Venkatesh, R., Mukesh, G., Mohamedabrar, I.

Experimental Investigation and Identifying the Suitable Process Parameters for Additively Manufactured PETG Material by Fused Deposition Modeling

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Abstract
In today's world, 3D printing is a booming technology. The 3D design software CATIA® is used to design the component that will be printed in a 3D printer, and then, the 3D design file is translated to STL file format for using 3D printer software Cura. In this paper, studies mainly focus to identify the best process parameters in 3D printed models. In order to carry out different tests in 3D printed models, it is essential to choose the appropriate process parameters. Hardness test, impact test and tensile tests are to be done for finding the best parameter to achieve good mechanical properties. Hardness test is carried out using Rockwell hardness test with a numerical value ranges from 45 to 75 HRB. Charpy impact test is carried out and got the value of 3 to 11 J. Tensile strength is identified by Universal Testing Machine (UTM) with a maximum value of 7.85 kN. Then, the experimental results and process parameters are to be used to identify the best process parameters by using Taguchi and ANOVA optimization technique. © 2023, The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

Author Keywords
3D printing; FDM; Hardness; Impact strength; Optimization; PETG; Tensile strength

Index Keywords
Charpy impact testing, Frequency division multiplexing, Fused Deposition Modeling, Impact strength, Printing presses, Tensile strength, Tensile testing; 3-d designs, 3-D printing, 3D-printing, Design files, Design softwares, Experimental investigations, Optimisations, PETG, Process parameters, STL file format; Hardness

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Additive manufacturing of novel Ti-30Nb-2Zr biomimetic scaffolds for successful limb salvage

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ABSTRACT

Osteosarcoma is a type of bone cancer mainly observed in children and young adults affecting 3.4 million people per year. In the present study, Ti-30Nb-2Zr, a promising next-generation biomedical implant material was fabricated in the form of a porous scaffold using the selective laser melting (SLM) additive manufacturing route. Here, we quantitatively evaluated the bio-functionality, Young's modulus, and metal oxidative stress induced by the implant to delineate the tumor ablation ability of Ti-30Nb-2Zr scaffold. The results indicated that Ti-30Nb-2Zr scaffolds have superior osteointegration with L929 murine cells through activation of the AKT and β-catenin protein pathways. Results of fluorescent microscopy delineate the superior cell motility, protein binding ability, and adhesion of fibroblasts owing to the porous nature of the scaffold. Moreover, it demonstrated excellent capabilities in impeding post-surgical tumor recurrence, and more interestingly printed scaffolds almost matched Young's modulus of human bones. Therefore, this novel 3-D printed scaffold material may have high clinical translational potential for successful limb salvage in tumor-induced bone defect management.

Selection and peer-review under responsibility of the scientific committee of the Functional Materials for Energy, Environment and Biomedical Applications.

1. Introduction

Osteosarcoma is an aggressive musculoskeletal malignancy commonly observed in children and young adults, which affects the periosteum of long bones of the femur and tibia. Generally, it is characterized by recurrent chromosomal and genetic abnormalities. The first peak incidence of distant metastasis can be noticed among the age group of 10–30 yrs and the second peak incidence is observed at the elderly age. A recent survey incidence that across worldwide approximately 3.5 per million people are affected each year [1]. Current management strategies involve surgical removal of diseased bone, followed by radiology and neoadjuvant chemotherapy [2]. To replace the diseased bone, standard sized load-bearing implants are used. Although these implants have been successful, they seldom improve the self-healing tendency of the bone, possibly due to their poor osseointegration with the surrounding tissues. The resulting delay in self-healing may lead to tumor recurrence or an advanced stage of metastatic osteosarcoma. Besides, most of the existing implant materials such as SS316L, Co Cr Mo alloys, and NiTi implants are much stiffer than natural bones, which results in a stress shielding effect, also popularly referred to as bone resorption. Therefore, there is an urgent need for developing and designing novel implant materials for successfully salvaging a cancer-affected limb [3–5]. In this context, Ti and its alloys such as (Ti-6Al-4 V, Ti-Nb, Ti-Nb-Zr) have gained popularity as potential implant materials. Although Ti-6Al-4 V implants are widely used now a days, the presence of presence of Al and V leads to poor stability of passive films in load bearing implant applications. It is because Ti-6Al-4 V alloy has poor inherent wear resistance. Besides, TiO_2 is an unstable passive film and becomes fragmented once reaching critical thickness and freely mixed with the blood stream. During such occasions oxide ions of Al and V interacts with the soft tissues and cause pathophysiological problems such as metal induced cytotoxicity and elevated oxidative stress levels. The elevated oxidative stress levels activate

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2. P.Thiruramanathan, N.Karthikeyan, R.Srinivasan, S.Manjula, **Artificial Intelligence Approaches for the Preparation of ZnO Nanoparticle for Photocatalytic Application** (2023), International Conference on Sustainable Technology in Civil Engineering and Applied Sciences (ICSTCA-2023) pp 33.
3. T.Vigneswari, G.Kanthimathi and Lakshmanan Muthulakshmi, **Green synthesis and Potential antibacterial applications of silver nanoparticles using aqueous leaf extract Ocimum tenuiflorum** (2023), 7th International Conference on Nanoscience and Nanotechnology,(ICONN-2023) pp. 315.

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Photodegradation behaviour of sol–gel synthesized $Bi_4Ti_3O_{12}$ for water pollution disinfection

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ABSTRACT

Minimization of water consumption and effective recycling of water by choosing the appropriate water treatment technique in industry are the most essential in this modern era. Nowadays, the usage of sol–gel synthesized nanomaterial to study the photo degradation behavior of disinfected water pollution is a promising way. Phase purity analysis, reusability test, photoarate constant of photo-catalytic and rate constant of photolysis reaction were examined. X-ray diffraction (XRD) results confirm the formation of $Bi_4Ti_3O_{12}$ (BTO) with an orthorhombic structure. The phase purity of the catalyst is also analyzed using the Jana2006 refinement. The FESEM image revealed a hexagonally structured particle with an indistinguishable grain boundary. The degradation behaviour of Rhodamine-B (RhB) in sunlight is investigated under the influence of BTO nanoparticles. The rate constant of the photo-catalytic and photolysis reaction is found to be 0.0198 and 0.0008. Degradation efficiencies are found to be 91.3% for RhB. Overall results revealed that the sol–gel synthesized bismuth titanium oxide ($Bi_4Ti_3O_{12}$) is best choice for water pollution disinfection.

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1. Introduction

Industries are released the several organic pollutants like methylene blue, methyl orange, and RhB and so on are toxic chemicals that adversely affect productive lands and ground water resources. To prevent hazardous materials entering into the environment and also to meet the need for pollutant-free wastewater has necessitated in the current scenario. Implementing nanomaterial as a catalyst is a technology with promising prospects, a low-cost, environmentally friendly, and long-term treatment technique that aligns with the water/wastewater industry's "zero" waste strategy [1]. Bismuth based material have already been reported to exhibit visible-light induced photo-activity that has attracted significant attention due to their properties like stability, higher electron mobility, high surface area and high photocatalytic activity [2]. Since the nanocomposite photocatalysts made of bismuth are active in visible light, they have an orbital configuration of Bi, 6p and O, 2p [3]. Among the several nanocomposites connected to bismuth, bismuth titanates contain an unusual configuration of hybrid orbitals that control their band-gap and affect their behaviour, allowing them to segregate electrons from created electron-hole pairs [4]. It is feasible to readily couple dopants with bismuth titanate and adjust the rate of electron-hole recombination. As a result, a number of modified bismuth titanates have been created, changing their properties to match those of environmental contaminants. One of the simplest methods for creating high-quality nanostructures and microstructures is the Sol-Gel process. In comparison to other synthesis methods, this one offers a number of benefits, including easy implementation, low cost, excellent quality, and the ability to produce materials with substantial surface areas. It also allows for control over the texture, size, and surface features of the materials. It is widely used in the creation of nanoscale powders because of its adaptability and simplicity [5]. This paper organizes the analysis of photo-degradation behavior of BTO nanoparticles prepared by the sol–gel combustion method. We have also predicted the phase purity of the nanoparticles.

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PHY 03

STRUCTURAL CHARACTERIZATION STUDIES ON THIOUREA DOPED DIGLYCINE PICRATE : A NON LINEAR OPTICAL

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ABSTRACT

The crystal of Diglycine Picrate (Glycine Glycinum Picrate) has been obtained from an aqueous solution containing stoichiometric quantities of the components. Thiourea was doped with DGP and the crystal structure was determined with high accuracy, IR spectra were taken and compared with the results of DGP. Diglycine Picrate (DGP) and Thiourea doped DGP crystals were grown by solution growth method using slow evaporation technique. The lattice parameters are obtained through single crystal powder XRD study. The powder XRD spectrum helps to prove the crystalline nature of the crystal and also to identify planes present in the crystals. The UV-Vis-NIR study reveals the optical property of the grown crystals. The hardness behaviour of the crystals is analyzed by using Vickers micro hardness test.

Keywords: Crystal growth, Diglycine Picrate, Thiourea, XRD, FTIR, UV,Hardness, Non Linear Optical.

PHY 04

ARTIFICIAL INTELLIGENCE APPROACHES FOR THE PREPARATION OF ZNO NANOPARTICLE FOR PHOTOCATALYTIC APPLICATION

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ABSTRACT

In this study, an artificial intelligence (AI) algorithm is evaluated for its ability to forecast the experimental parameters required to produce Zinc Oxide (ZnO) nanoparticles with superior photocatalytic activity. The experimental data from the sol-gel produced ZnO nanoparticles were used to train an artificial neural network (ANN). The root mean square error and mean absolute percentage error were used to evaluate the ANN's performance in relation to the input (temperature, experimental time, and concentration) and output variables (size and photocatalytic nature). Structural, morphological and compositional analysis of ZnO particle was evaluated using the XRD, FE-SEM and EDAX respectively. The Jana2006 refinement is also used to assess the catalyst's phase purity. The photocatalytic activity of the produced nanoparticles was assessed (RhB) using the synthetic dye Rhodamine-B. The reaction's rate constant for photocatalytic, photolysis, and

degradation effectiveness. Overall results indicated that traditional approaches to artificial intelligence were the most time- and money-efficient.

Keywords: Artificial Neural Network; Sol-gel method; Jana2006; photo-catalysis

CHE 01

INVESTIGATION OF ANTIBACTERIAL ACTIVITY OF ALCOHOLIC EXTRACTS OF WOODFORDIA FRUTICOSA AND PLANT EXTRACTS MEDIATED SILVER NANOPARTICLES AGAINST CERTAIN BACTERIA

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ABSTRACT

The research work is focused on the investigation of antibacterial activity of both alcoholic extracts (ethanol and methanol) of woodfordia fruticosa flower (WF) and silver nano-particles (AgNPs) synthesized using alcoholic extract of WF against Staphylococcus aureus (S.aureus), Klebsiella pneumonia (K.pneumonia), Escherichia coli (E.coli) and Bacillus cereus (B.cereus) bacteria. The functional groups present in the bioactive compounds that present in the extracts were identified using Fourier Infrared spectroscopy (FT-IR), the morphological features of silver nanoparticles were analyzed by scanning electron microscopy (SEM) and Ultra-Violet spectroscopy. The elemental composition of the synthesized AgNPs was confirmed using energy dispersive X-ray spectroscopy (EDX). The antibacterial activity of alcoholic extracts of WF were analyzed and compared against green synthesized silver nano particles. The results revealed that AgNPs possessed enhanced bacterial inhibition activity compared to virgin ethanol extract of woodfordia fruticosa.

Keywords: Woodfordia Fruticosa, Green synthesis, Antibacterial Activity, Dispersive X-ray Spectroscopy

CHE 02

MESOPOROUS DOPED TITANIA PREPARATION FOR THE PHOTOCATALYTIC DEGRADATION

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ABSTRACT

Photodegradation of organic pollutants has generated broad interest for both scientific understanding and potential applications due to greater environmental pollution in recent years. Particularly, phenols are considered as hazardous pollutants because of their potential to harm human

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Room Temperature Ammonia Sensing Properties of Al-doped ZnO Sensor

Vishwanath Mote

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Abstract

In this study, we report pure and Al-doped ZnO thin films were synthesized using a spray pyrolysis method with optimized deposition parameters. Microstructural properties of the films were performed using X-ray diffraction (XRD). XRD results showed that the deposited thin films were polycrystalline with a Wurtzite structure, and average crystallite size was found to decrease with an increase in Al-dopants. FE-SEM images revealed that the incorporation of Al transformed ZnO nanorods into particles. Photoluminescence study provides the presence of various defects in the films. Compared to undoped ZnO thin film-based sensors, the Al-doping device shows superior gas sensing properties with faster response. The Al-doped ZnO-based sensor showed excellent sensitivity at an ammonia concentration up to 10 ppm, with a response and recovery times 19 and 13 s, respectively.

Keyword: Al-doped ZnO, Microstructural properties, Ammonia gas sensors.

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Green synthesis and Potential antibacterial applications of silver nanoparticles using aqueous leaf extract *Ocimum tenuiflorum*

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Abstract

When compared to other metal nanoparticles, silver nanoparticles have excellent uses in both medical and non-medical fields. Due to their simplicity, eco-friendliness, and non-toxic properties, silver nanoparticles are produced using the green synthesis process. X-Ray Diffraction (XRD) and Scanning Electron Microscopy (SEM) are used to investigate the crystal structure, grain size and morphology. The produced nanoparticles have a cubic spinel structure with a high degree of purity, according to the XRD peaks. The particle size is calculated using the Debye-Scherrer formula. Particle agglomeration is visible in the SEM image. By using Energy Dispersive X-ray (EDX) analysis, the constituents of the produced silver nanoparticles are examined. The purity of the produced nanoparticle is confirmed by the EDX peak, which exclusively detects the presence of Ag and O components. The aqueous *Ocimum tenuiflorum* leaf extract contains a variety of biomolecules, including flavonoids, glycosides, terpenoids, phenol and reducing sugars. Using the well diffusion method, the antibacterial activity of silver nanoparticles was examined against the bacterium bacillus sp. With 10 mg/mL, the largest zone of clearing (2 mm) was seen. The highest zone of clearance will be seen as silver nanoparticle concentration is increased, according to these reported data.

Keywords: AgNPs, Plant extract, XRD, spinel structure, Antibacterial activity.

Electrocatalytic behavior of Alumina-Copolymer nanocomposite

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Abstract

Next-generation renewable energy technologies including fuel cells and metal-air batteries have been focused on the development of catalysts for the oxygen reduction process (ORR) [1,2]. Electrocatalysts treated with aromatic polymers, such as PANI, have great promise for ORR. To understand that nitrogen-containing polymers could have a high catalytic activity in ORR [3,4]. In-situ methods [5] were used to synthesis PMMA/PANI Copolymer and PMMA/PANI-Al_2O_3 nanocomposite and characterised by UV, XRD, FESEM and Cyclic Voltammetry. The optical properties of copolymer and nanocomposite have optical band gaps (Eg) of 3.7 and 1.4 eV, respectively. Such values are revealed by the Tauc technique. XRD shows the amorphous nature of copolymer and the crystalline nature of nanocomposite. The average crystalline size is 29 nm using Scherer's formula. Field emission Scanning electron microscope image shows the copolymer of PANI star is seated in the sky of PMMA and PMMA/PANI-Al_2O_3 has a Cubic structure of Alumina deposited in the copolymer matrix. Cyclic voltammetry was used in electrochemical characterisation studies to compare the enhanced performance of PMMA/PANI copolymer and PMMA/PANI-Al_2O_3 nanocomposite-modified GCE in optimum pH1.0 under oxygen and nitrogen atmospheric conditions. PMMA/PANI/Al_2O_3 modified GCE show greater electrocatalytic activity toward N-phenol reduction under nitrogen atmospheric condition by Linear

Department of Chemistry - International Conference Publications

1. Revathi, C., Senthilkumar, O., Soundeswaran, S. **Growth of pyridinecarbothioamides and single crystal XRD studies** (2023) *Materials Today: Proceedings*, 80, pp. 695-699. (Scopus)
2. C. Revathi, S. Soundeswaran, **O. Senthilkumar**, "Synthesis and Characterization of Dibromobis (dimethyl glyoxime)cobalt(II) Complexes" AIP Conference Proceedings, Accepted (Oct 2022) (Scopus)

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Growth of pyridinecarbothioamides and single crystal XRD studies

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ABSTRACT

A series of pyridinecarbothioamides (PCT) are synthesized to produce parrot green crystals. The crystal structure of the compounds was resolved using single crystal XRD technique. It confirmed the formation of monoclinic system with different space groups depending on the position of side chains in the carbothioamide. The 3D structural arrangements show that molecules in the crystal structure are interlinked by N—H . . . N or S—H . . . S hydrogen bonding. The conversion of pyridinecarbonitrles to their corresponding pyridinecarbothioamides by the treatment of ammonia and H_2S was confirmed by their mass spectra. Major peak was observed at m/z of 138. Thermogram of PCTs, shows a single step decomposition thereby confirming the melting points of corresponding PCT's as 137 °C, 190 °C, 209 °C respectively. Nuclear Magnetic Resonance (NMR) spectroscopic techniques showed the signals corresponding to pyridine ring protons and amino group.

Selection and peer-review under responsibility of the scientific committee of the Second Global Conference on Recent Advances in Sustainable Materials 2022.

1. Introduction

Leprosy and multi-drug resistant tuberculosis (MDRTB) are the oldest diseases known to man. Multi drug resistance tuberculosis (MDRTB) has emerged as a major public health threat [1], because the treatment of infected individuals with medication that is appropriate to their resistance pattern and the supply of second line drugs are limited. In addition, the second line drugs needed in the treatment of MDRTB are often considerably toxic. After the discovery of isoniazid (INH) as a potent antitubercular agent and the subsequent search for structural analogs for isoniazid led to the discovery of ethionamide (ETA; 2-Ethyl- 4-pyridinecarbothioamide), an important second line therapy for MDRTB [2]. ETA has almost identical inhibitory effects on mycolic acid biosynthesis as INH. So, there has been a renewed interest in carbothioamide drugs as new analogs [3]. It has been reported that the pyridine carbothioamide group at the pyridine ring, as well as the type of *N*-alkyl substitution at the thioamide, play a crucial role in their biological activities and therapeutic action [4]. 2-pyridine carbothioamide (2-PCT) coordinated complexes synthesized for radiotherapy with Rhenium as central metal ion and anti-cancer activity with Ru or Os as central metal ions [5]. Ruthenium based 2-PCT complexes also act as catalysts in the transfer-hydrogenation reactions of aryl ketones. Pyridine carbothioamide ligands act as pincer ligands [6]. Pyridine-4-carbothioamide was found to produce isoflavonoid in Genista tinctoria culture in vitro [7]. The synthesis of such carbothioamides, in general, has been carried out by two methods; (1) Thionation of amide functional groups by Lawesson's reagent or phosphorous pentasulfide. (2) The reaction between nitriles and hydrogen sulfide. Other sulfur sources have also been used in some synthesis procedures [8].

Different carbothioamides have been synthesized in the present work and the crystals have been characterized for analyzing their properties.

2. Experimental procedure

The pyridine carbothioamides (PCT) have been synthesized using one pot method according to the procedures reported earlier [9]. To synthesize the compounds of 2-PCT, 3-PCT and 4-PCT, the corresponding pyridine nitriles were taken. Ammonia gas (dried through CaO) was passed into 10–15 ml of dry ethanol in a conical flask for a stipulated period of time until saturation. A measured quantity of the pyridinecarbonitrile was added to dry ethanol for each of the experiment. Hydrogen sulfide gas was added for about

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Synthesis and Characterization of Dibromobis (dimethyl glyoxime)cobalt(II) Complexes

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Abstract. The Dibromobis(dimethylgloxime)cobalt(II) complex $[Co(C_4H_8N_2O_2)_2Br_2]H_2O$ was prepared by precipitation and microwave assisted synthesis technique. The Cobaloxime complex was characterized by using UV-Vis, FTIR, NMR, and single crystal XRD. The peak corresponding to the $\pi \rightarrow \pi^*$ transition of the complex was observed at 245 nm in the UV-Vis spectrum. FTIR spectrum confirmed the presence of N-O, C=N and methyl group by showing their respective vibrational peaks. It also confirms the presence of hydrogen bonded O-H of the dimethylglyoxime moiety. The peaks in the NMR spectrum confirms the number and the chemical equivance of methyl protons of dimethylglyoxime. The structure of the complex was confirmed by single crystal XRD analysis. The nature of the hydrogen bonding between different moieties of the complexes was observed through Oak Ridge Thermal Ellipsoid Plot (ORTEP). The structural elucidation confirmed that both the glyoxime moieties of the dibromo complex are protonated. The complexes were inter-linked through water molecules by means of hydrogen bonding. The hydrogen bonding was observed between methyl hydrogen of equatorial dimethyl glyoxime and water molecule.

1. Introduction

Vitamin B12 is important for the synthesis of DNA which influences the formation of red blood cells. It enhances the health of nerve tissues and the brain function. The compound is water soluble and is called cyano cobalamin. It is found in many sources like fish, meat, milk and other dairy products. The deficiency of this vitamin causes anemia and neurological problems. However, the structure of this complex is a bit complicated. The central metal ion is Cobalt which is octahedrally coordinated with five Nitrogen (four Nitrogen from pyrrole sub units and one Nitrogen from 5,6-dimethhylbenzimidazole) and a Carbon from either methyl to form methylcobalamin or CN to form cyanocobalamin or 5'-deoxy adenosyl group to form an adenosylcobalamin. Hence, the model complexes are useful to explore the reactivity and functionalities of vitamin B12. Several simple and model coordination complexes are being synthesized for a variety of medicinal applications. Chemists have found that the properties of Cobalamines can be simulated using model compounds such as cobaloximes, where the ligands are made up of two dimethylglyoximate substituents [1]. Cobaloximes have been synthesized [2,3] and investigated elaborately as model complexes for the coenzyme vitamin B12. These compounds have become classic examples of organometallic chemistry and related areas.

Department of Mathematics - International Conference Publications

1. Selvaraj, G., Banu, L.J. **Solving Fuzzy Quadratic Programming Problems by Fuzzy Neural Network** (2023) *Lecture Notes in Networks and Systems*, 428, pp. 611-621.
2. Manimaran T, Subramanian K, Selvaganesh T, **Mean Irregularity Strength of Graphs**, (2023), International conference on Sustainable Technology in Civil Engineering and Applied Sciences (ICSTCA 23), pp 30
3. K.BasariKodi, M.Gomathy Nayagam, S.Eswari, R.Jaganathan, L.Sathikala, K.Vijayalakahsmi, **An Efficient Task-VM Assignment Model in Cloud Computing using Hungarian Algorithm with priority**(2023), International conference on Sustainable Technology in Civil Engineering and Applied Sciences (ICSTCA 23), pp 30
4. R. Saravanakumar and G. Selvaraj, **A Semi-Analytical Approach for the Reversible Schnakenberg Reaction Diffusion System**(2023), International conference on Sustainable Technology in Civil Engineering and Applied Sciences (ICSTCA 23), pp 31
5. Subasree R, Vigneshwaran A.E, **On Nβ*-Irresolute mappings in Neutrosophic Topological spaces**(2023), International conference on Sustainable Technology in Civil Engineering and Applied Sciences (ICSTCA 23), pp 31

Solving Fuzzy Quadratic Programming Problems by Fuzzy Neural Network

G. Selvaraj and L. Jarina Banu

Abstract A new fuzzy energy function for fuzzy quadratic programming problems is constructed using fuzzy norm. Based on the fuzzy energy function, a new fuzzy neural network is developed for solving fuzzy quadratic programming problems numerically in which all or some parameters are fuzzy. The stability of the proposed fuzzy neural network is established, and numerical examples are demonstrated to substantiate the significance of the proposed fuzzy neural network.

Keywords Fuzzy quadratic programming problem · Fuzzy neural network · Approximate optimum solution.

1 Introduction

An optimization problem is a mathematical programming problem in which a function of several variables, called objective function is to be optimized subject to constraints of these variables. It has many applications in the fields of engineering, technology, applied sciences and management sciences. Most of the optimization problems [1] are solved numerically by classical iterative methods. The iterative procedure of a classical method is required more long computation time for solving optimization problems. Alternatively, an artificial neural network or a neural network (NN) can be used to acquire a solution of the optimization problem swiftly since it is a computational mathematical structure that is stimulated by observed processes in the natural network of biological neurons which consists of simple computational highly interconnected units, called neurons. In the past few years, many researchers have applied various types of NNs for solving several classes of constrained opti-

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MAT 08

ɲ - CLOSED SETS IN TOPOLOGICAL SPACES

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ABSTRACT

In this study, we acquaint a new class of closed sets labelled ɲ- closed (ra-closed) sets on topologicalspace X. Also, we scrutinize the relation of this set with some of the other existing closed and generalized closed sets. Hereafter, we are having the motive to explore more about ɲ- closed (ra-closed) sets on tri- topological spaces.

Keywords: ɲ*-Closed sets*

MAT 09

MEAN IRREGULARITY STRENGTH OF GRAPHS

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ABSTRACT

Let $G = (V, E)$ be a connected graph of order $n > 1$. Let $f: V \to \{1,2,\dots,k\}$ be a function and let the weight of an edge $e = uv$ be defined by $\omega(e) = \left\lceil \frac{f(u)+f(v)}{2} \right\rceil$. Then, f is called an edge irregular mean labeling, if all the edge weights are distinct. The mean irregularity strength $s_m(G)$ is the smallest positive integer k such that there is an edge irregular mean labeling $f: V \to \{1,2,\dots,k\}$. In this paper, we determine the exact value of mean irregularity strength of some classes of graphs.

Keywords: Irregularity Strength, Mean Labeling

MAT 10

AN EFFICIENT TASK-VM ASSIGNMENT MODEL IN CLOUD COMPUTING USING HUNGARIAN ALGORITHM WITH PRIORITY

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ABSTRACT

Cloud computing is a popular computing paradigm that provides reliable, available, on-demand resources to customers over the Internet. Multi-tenancy is a feature of cloud computing that allows customers of multiple cloud service providers to use the same computing resources. Cloud computing is a Pay as you go model, so, customers must therefore pay according to the amount of

resources used each hour. The work assigned to a Cloud VM will take longer, resulting in the consumer paying the service providers extra money. Therefore, it is the service provider's duty to optimize VM –task allocation based on the user quality of services. Resource or task scheduling in multi tenancy environment is complicated. Furthermore, the main goal in cloud environments is to optimally allocate available resources to complete work in the shortest or optimal execution time. There is lot of traditional VM-task assignment methods are exists. However, these methods are time -consuming and add complexity. In this study, we present an improved mathematical modeling of the Hungarian method that enables allocation of VM tasks with optimal execution in cloud computing. This new model proves to be more efficient than the previous model in terms of overall execution time and overall latency.

Keywords: Cloud Computing, Resource Allocation, Execution time, Priority, Hungarian Method.

MAT 11

A SEMI-ANALYTICAL APPROACH FOR THE REVERSIBLE SCHNAKENBERG REACTION DIFFUSION SYSTEM

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ABSTRACT

Using the homotopy perturbation method, the mathematical problem corresponding to a Schnakenberg model in a reaction-diffusion cell is solved. One dimension of the reaction-diffusion model is considered to also include analytical solutions for the reversible Schnakenberg model. The simulation result is compared with the analytical results. An excellent agreement is observed between the series of solutions obtained by simulation. The approximately analytical expression obtained here is helpful for predicting the system's dynamical behavior.

Keywords: Mathematical modeling, Nonlinear reaction-diffusion model, Homotopy perturbation method, Numerical simulation.

MAT 12

ON Nβ*-IRRESOLUTE MAPPINGS IN NEUTROSOPHIC TOPOLOGICAL SPACES

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ABSTRACT

The aim of this paper is to introduce the concept of Neutrosophic β*-continuous functions and Neutrosophic β*-irresolute mappings in neutrosophic topological spaces. We also study some of the properties and characterizations of Nβ*-continuous functions and Nβ*-irresolute mappings in neutrosophic topological spaces.

Keywords: neutrosophic topology; neutrosophic β-closed set, Nβ*-continuous function, Nβ*-irresolute mappings.*

Achievements of Faculty Members

Academic Year 2022-2023

Patents granted

S. No.	Name of the Faculty Member & Students	Dept.	Name of the Patent	Patent No. & Date	Current Status
1.	S.Ravikumar, Usha Batra, Jaskiran Kaur, Ravi PratapSingh, **G.Kanthimathi**, LakshmiThangavelu, Monica Apte, Tapan Kumar Sahu	Chemistry	Infant Warmer	367143-001 3.8. 2022	Granted on 18.01.2023
2.	Mr. G. Prabu Ram, Mr. A. Muhamed Ismail Buhari, Mr. D. Ajay Prakash Mr. R. Kathirvel Saravanan Dr.S.Rajakarunakaran Mr. R. Arun Kumar	Mechanical	Oil Spill Segregating Rover	432504 04.10.2019	Granted on 22.05.2023

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पेटेंट सं. / Patent No.	:	432504
आवेदन सं. / Application No.	:	201941040308
फाइल करने की तारीख / Date of Filing	:	04/10/2019
पेटेंटी / Patentee	:	1.Mr. G. PRABU RAM 2.MR.A MUHAMED ISMAIL BUHARI 3.MR.D AJAYPRAKASH 4.MR.R KATHIRVEL SARAVANAN et al.

प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में यथाप्रकटित OIL SPILL SEGREGATING ROVER नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख अक्टूबर 2019 के चौथे दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled OIL SPILL SEGREGATING ROVER as disclosed in the above mentioned application for the term of 20 years from the 4th day of October 2019 in accordance with the provisions of the Patents Act,1970.

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टिप्पणी - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, अक्टूबर 2021 के चौथे दिन को और उसके पश्चात प्रत्येक वर्ष मे उसी दिन देय होगी।

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Academic Year 2022-2023

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S.No.	Name of the Department	No. of Book Publications
1.	Artificial Intelligence and Data Science	1
2.	Physics	2
3.	Chemistry	1
4.	Mathematics	1
	Total publications	**5**

Book Publications

Department of Artificial Intelligence and Data Science

1. Suresh, A., Vimal, S., Harold Robinson, Y., Dhinesh Kumar R., Udendhran, R. **Bioinformatics and Medical Applications: Big Data Using Deep Learning Algorithms** (2022), Wiley.

Department of Physics

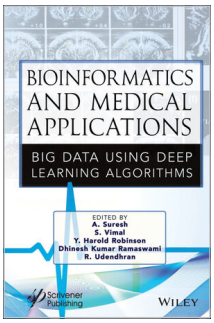
2. P.Thiruramanathan, N.Karthikeyan, T.Vigneswari, R.Srinivasan, K.Jeyapappa, "**Physics for Information Science"** Tata Mcgraw Hill Publishers, India (2023) (Book). ISBN Number: 9781307912029.
3. N.Karthikeyan, T.Vigneswari, P.Thiruramanathan, R.Srinivasan and K.Jeyapappa, **Engineering Physics**, Sunmathi Publisher, Chennai (Book) ISBN Number: 9789357773256.

Department of Chemistry

4. Dr.Chatia Naga Babu, Dr.G.Kanthimathi, Dr.Shobha Thakur Dr.Ashima Sharma, **A Text Book of Engineering Chemistry**, AGPH Publication (2023).

Department of Mathematics

5. Dr. K. Basarikodi, Dr. L. Sathikala, Dr. T. Manimaran, Mr. K. Subramanian, Dr. R. Subasree and Dr. G. Selvaraj, **Statistics and Numerical Methods**, VRB Publisher (2023)



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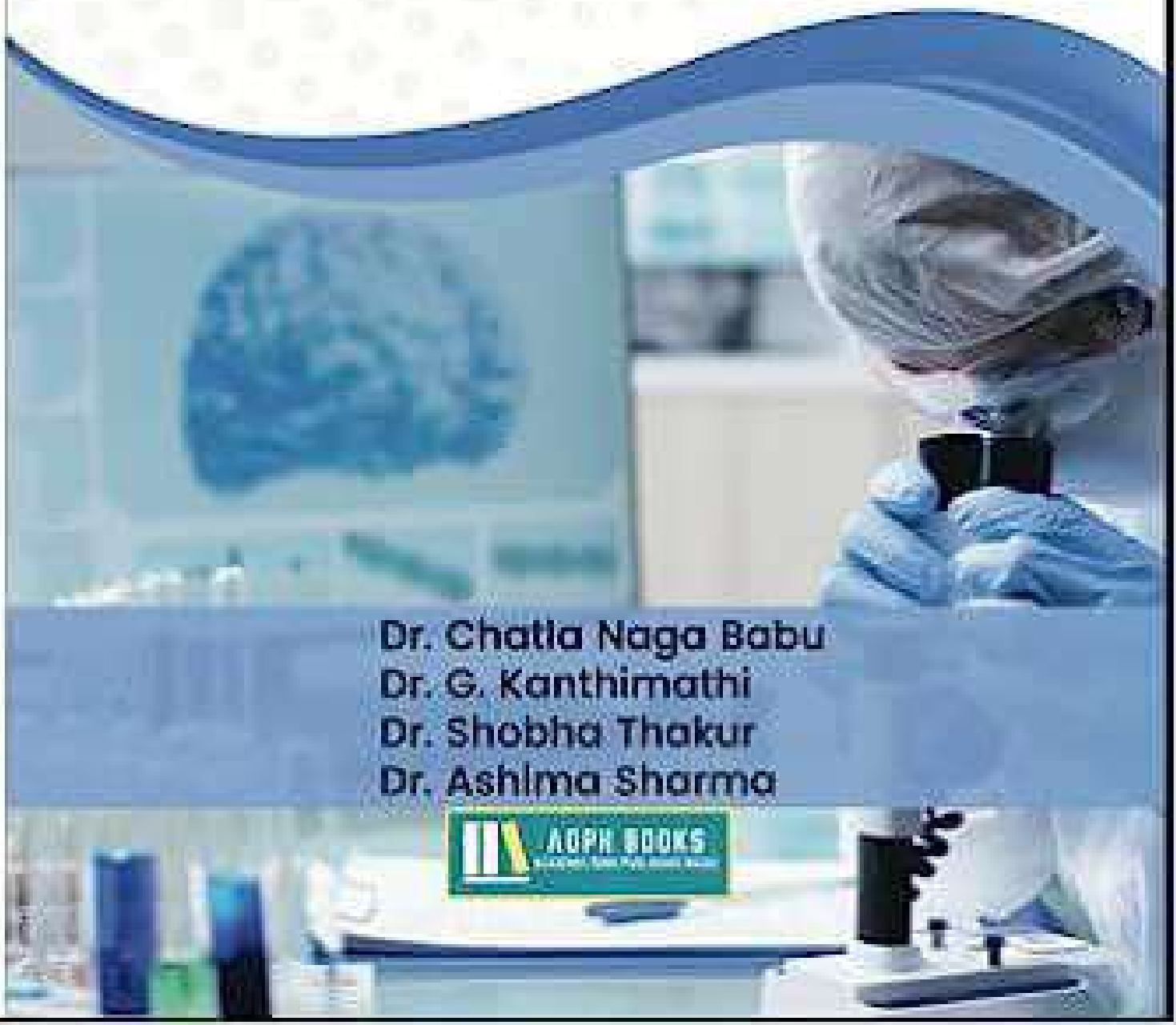

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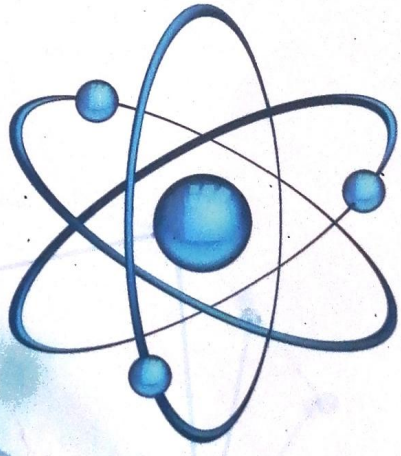

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2.	Computer Science and Engineering	01
3.	Electrical and Electronics Engineering	03
4.	Electronics and Communication Engineering	02
5.	Mechanical Engineering	01
6.	Artificial Intelligence and Data Science	02
7.	Chemistry	03
	Total publications	**14**

Book Chapter Publications

Civil Engineering

1. Bharathi Murugan, R., Murali, G., Sunita, Haridharan, M.K., Karthikeyan, S. **Numerical Analysis of One Way – Prestressed Concrete Slab Subjected to Fire** (2022) *Structural Integrity*, 19, pp. 287-305.
2. Karthikeyan, S., Poornima, V., Ananth Kumar, M., Haridharan, M.K., Bharathi Murugan, R., Murali, G. **Numerical Study on Effect of Blast Loading on Vertical Walls** (2022) *Structural Integrity*, 19, pp. 261-286.

Computer Science and Engineering

3. Kavi Priya, S., Vignesh Saravanan, K., Vijayalakshmi, K.**Machine learning techniques to mitigate security attacks in IoT**(2022) *Research Anthology on Machine Learning Techniques, Methods, and Applications*, pp. 642-663.

Electrical and Electronics Engineering

4. Bhavani, N.P.G., Deepalakshmi, B., Sujatha, K., Tamilselvi, C.**Smart Monitoring and Quality Control in Leather Processing Industry**(2023) *Cognitive Science and Technology*, pp. 631-638.
5. Vigneshwar, A.S., Meenakshi Sundaravel, S., Arunkumar, A. **Challenges of Municipal Solid Waste Management: An Empirical Study** (2022) *Changing Face of Agriculture, Agri- Business, Agriculture, Marketing and Organic, Farming- Innovation and Strategie*s, Iterative International Publishers, pp 90-97.
6. Karthick Prabhu, D**.A State of Art Review on Advancements in Vehicular Embedded System Technologies** (2022), *Handbook of Trends in Engineering Technology and Research*, Academic Guru Publication House, pp 136-146

Electronics and Communication Engineering

7. Vairaprakash, S., Rajagopal, S.**Brain–Computer Interface-Based Real-Time Movement of Upper Limb Prostheses Topic: Improving the Quality of the Elderly with Brain-Computer Interface**(2023) *Brain-Computer Interface: Using Deep Learning Applications*, pp. 179-204.
8. Leelavathy K.R., Nageshwaran V, Venkatalakshmi K, Ragavan K, **Intelligent Transport of E-Waste: A Case Study in Indian Context** (2022), *Current Advances in Civil Engineering Research*, Integrated Publications, pp 99-117

Mechanical Engineering

9. Lakshmanan, M., Ramar, M. **Role of Raw Materials in Agro Products- An Empirical Study** (2022) *Changing Face of Agriculture, Agri- Business, Agriculture, Marketing and Organic, Farming- Innovation and Strategie*s, Iterative International Publishers, pp 53-60.

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10. Aladdin, A.M., Abdullah, J.M., Salih, K.O.M., Rashid, T.A., Sagban, R., Alsaddon, A., Bacanin, N., Chhabra, A., Vimal, S., Banerjee, I. **Fitness-Dependent Optimizer for IoT Healthcare Using Adapted Parameters: A Case Study Implementation** (2023) *Practical Artificial Intelligence for Internet of Medical Things: Emerging Trends, Issues, and Challenges*, pp. 45-61.
11. Kumar, P.S., Dash, P.B., Rao, B.K., Vimal, S., Muhammad, K. **Early Detection of Chronic Obstructive Pulmonary Disease Using LSTM-Firefly Based Deep Learning Model** (2023) *Intelligent Systems Reference Library*, 233, pp. 247-267.

Chemistry

12. Revathi N., Sankarganesh M., Dhaveethu Raja J., **Natural Products and Their Bioactive Compounds as Chemotherapeutics: Natural Products to Prevent Drug Resistance in Cancer Chemotherapy** (2022) *Handbook of Research on Natural Products and Their Bioactive Compounds as Cancer Therapeutics,* pp. 187-213.
13. Revathi, C., Senthilkumar, O., Soundeswaran, S. **Biomedical Waste and Their Disposal Techniques** (2022) *Modern Trends in Chemical Sciences: Biomedical Waste and Their Disposal Techniques*, 2 pp. 73-86.
14. Kanthimathi, G., Venkatesh Perumal, M., Senthilkumar, O. **Drinking Water Contaminants and Health Implications** (2022) *Science of Environment,* pp. 173-181.

Numerical Analysis of One Way – Prestressed Concrete Slab Subjected to Fire

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Abstract. Over years, the world has experienced many disasters due to fire resulting in death and loss of property. The construction industry started using modern construction ideas due to the need for speedy and economical construction. This paper focuses on the effect of high temperatures generated during a fire on pre-stressed concrete slab. It is very important to identify the changes in temperature in pre-stressed concrete under fire to study fire resistance and deformation performance in high rise buildings. It is essential to identify stresses induced by temperature distribution for adequate structural design. The aim of the research is to show a linear transient assessment of a pre-stressed concrete slab through its cross sections. The reaction of concrete to fire is dependent on its mechanical, temperature and deformation characteristics. The traditional method of assessing fire resistance through fire testing is costly, time-consuming, and restricted to study parameters. Numerical modelling is an option to fire testing to analyze the resistance of pre-stressed concrete slabs to fire. Numerical methodology enables the effective and cost-effective integration of multiple parameters. Stress distribution along the length of prestressed slab when subjected to fire for various times is investigated and studied. It was found that stresses in the pre-stressing forces in the tendons reduced with an increase in temperature. Loss in stresses was about 28.2%, 45.2% and 49.8% for external fire curve, ISO 834 fire curve and hydrocarbon fire curve respectively. Also the deflection pattern of the prestressed concrete slab at various time intervals of fire exposure were investigated.

Keywords: Fire curves · Pre-stressed slab · Thermal response

1 Introduction

Production of prestressed concrete structures started many years ago but it became popular only recently. Pre-stressed concrete slabs have more advantages than normal reinforced concrete slabs in aspects such as construction speed, readily achievable clear

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Numerical Study on Effect of Blast Loading on Vertical Walls

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Abstract. The civilian structures, bunkers and nuclear plants have the risk of being subjected to blast and projectile impact loads as they are major hotspots for terrorist activities. Global Terrorism Index (GTI) 2020 estimates US$ 0.66 billion as the global economic impact of terrorism due to property damage alone. In addition unexpected accidental explosions also devastate the vicinity buildings as happened in Beirut 2020. Due to high vulnerability of structural elements under such intense loadings, efforts have been taken to analyze their behavior. This work numerically scrutinizes the damage behavior of reinforced concrete wall (RCW) under blast loading. The analysis was executed with Abaqus/Explicit solver using concrete damage plasticity (CDP) and elastic-plastic model based on stress strain history as constitutive material models for concrete and steel bars, respectively. Parametric study was carried out to comprehend the influence of charge weight, standoff distance, boundary conditions, percentage steel, bar spacing and reinforcement layers on damage modes of panels. Results shows that damage behavior is greatly influenced by charge weight and standoff distance. Central displacement of walls increased to 38% for every 50% increase in charge weight and decreased to 84% when standoff distance is doubled.

Keywords: Reinforced Concrete Wall (RCW) · Charge weight · Standoff distance · Damage behavior

1 Introduction

Nearly, ninety countries experienced at least one terrorist incident a year. Detonating explosives is the tactic being followed by terrorists, starting from the Oklahoma City bombing in 1995 to the Israel embassy blast in Delhi, recently. Terrorist attacks on infrastructure account for 55.2%. Hotspot targets for terrorists include bunkers, dams, embassies, hospitals, stadia, and nuclear containment zones. There are also chances

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Chapter 3
Machine Learning Techniques to Mitigate Security Attacks in IoT

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ABSTRACT

Evolving technologies involve numerous IoT-enabled smart devices that are connected 24-7 to the internet. Existing surveys propose there are 6 billion devices on the internet and it will increase to 20 billion devices within a few years. Energy conservation, capacity, and computational speed plays an essential part in these smart devices, and they are vulnerable to a wide range of security attack challenges. Major concerns still lurk around the IoT ecosystem due to security threats. Major IoT security concerns are Denial of service(DoS), Sensitive Data Exposure, Unauthorized Device Access, etc. The main motivation of this chapter is to brief all the security issues existing in the internet of things (IoT) along with an analysis of the privacy issues. The chapter mainly focuses on the security loopholes arising from the information exchange technologies used in internet of things and discusses IoT security solutions based on machine learning techniques including supervised learning, unsupervised learning, and reinforcement learning.

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Proceedings of the International Conference on Cognitive and Intelligent Computing pp 631–638

Smart Monitoring and Quality Control in Leather Processing Industry

N. P. G. Bhavani, B. Deepalakshmi, K. Sujatha & C. Tamilselvi

Conference paper | First Online: 01 January 2023

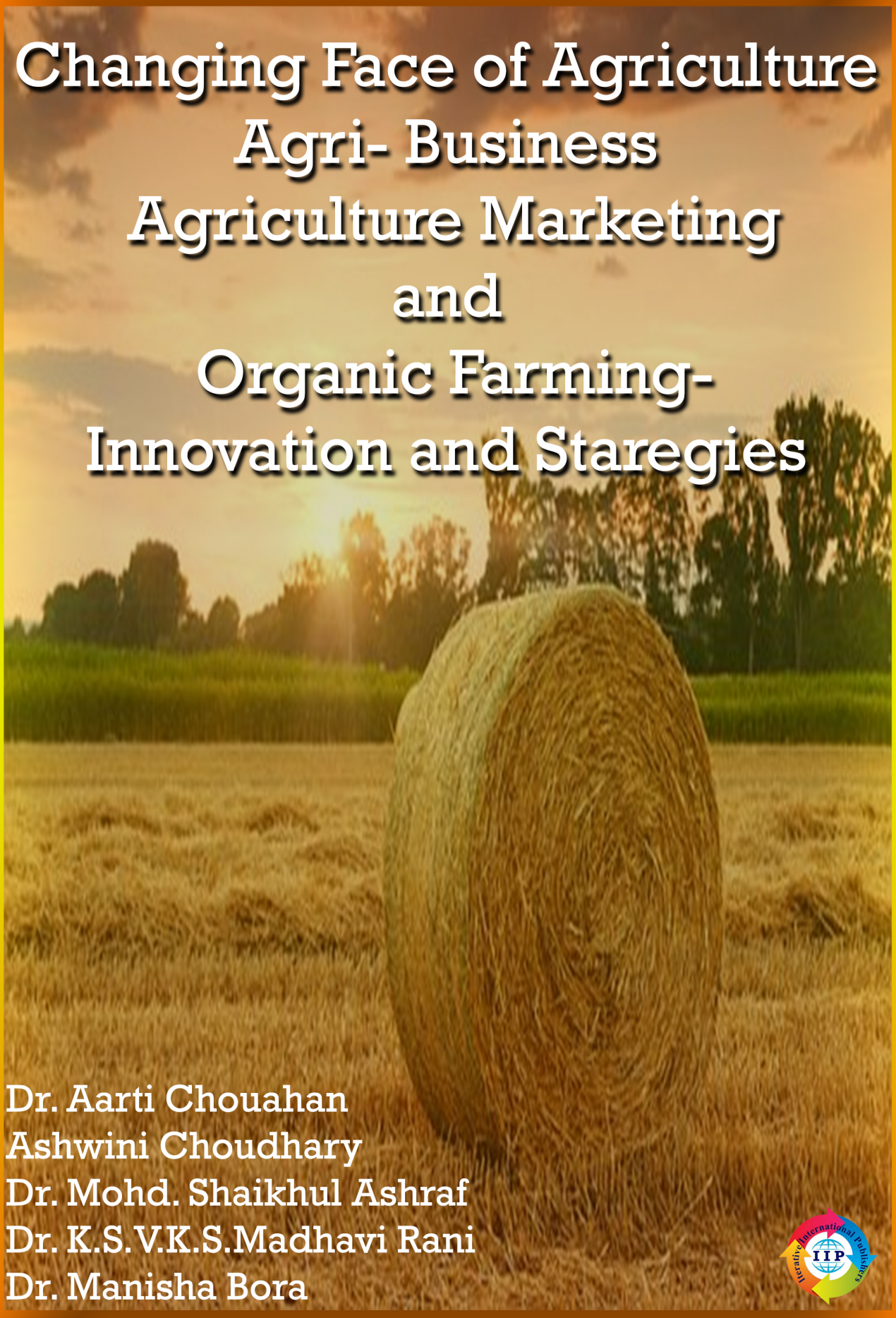
Part of the Cognitive Science and Technology book series (CSAT)

Abstract

There is currently no trustworthy method in place to provide continuous monitoring of all process conditions and leather qualities inside closed reactors during leather production, implying that there is no genuine control. Only by pausing the reactor and sampling the solution and leather can conditions inside the reactors be checked. The leather industry's automation systems are based on a dated centralised architecture, which creates a critical point of failure and an operational bottleneck. To increase the efficiency of the leather manufacturing process, the paper offers a fault-tolerant multi-agent system (MAS) architecture that delivers the high flexibility and agility required by the leather industry's turbulent environment. The quality of leather can be determined by image structure, and the quality can be estimated using image processing.

Keywords

Changing Face of Agriculture Agri- Business Agriculture Marketing and Organic Farming- Innovation and Staregies



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Changing Face of Agriculture, Agri- Business, Agriculture Marketing and Organic Farming- Innovation and Strategies

First Volume

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Ashwini Choudary
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Editors' Note

Agriculture in India is changing. There have been many technical and non-technical developments in the ways and means of production, storage and distribution. Considering these volatile aspects, we decided to come together and conceptualized an edited book which comprises the contemporary research and novel areas in the field of agriculture. Based upon the various contributions, this book has been titled as "***Changing Face of Agriculture, Agri- Business, Agriculture Marketing and Organic Farming- Innovation and Strategies***". As the editors of this book, we had a huge responsibility of collecting, checking, and editing the papers. The process of editing requires a thorough work of giving timely feedback to authors about the changes they need to make to improve the quality of papers. The whole work was a teamwork and not possible without the support of our associates, publisher, and team managers.

We whole heartedly thank all our contributors who have come up with the new ideas and thoughts and not only sent their best piece of work but also edited it as per the requirements of the book and our recommendations.

We are deeply obliged to the Editorial Executive of this book and Senior Advisor of Research Education Solutions **Dr. Aruna Kumari Nakkella** for her tireless efforts towards the publication of this book. She took all the responsibility of coordinating among all team members – editors, authors, and publisher. Without her constant and active support, it was not possible for us to shape up this book. We also thank **Ms. Megha Mittal,** Managing Director, Research Education Solutions (www.researchedu.in) providing all of us such a wonderful platform, which provides academicians to nurture their research competencies.

We extend our sincere thanks to **Iterative International Publishers** for the timely Printing and Publishing of this book. The entire publication team deserves credit to make this project successful by putting in their best possible efforts.

Editors
Dr. Aarti Chouahan
Ashwini Choudhary
Dr. Mohd. Shaikhul Ashraf
Dr. K.S.V.K.S.Madhavi Rani
Dr. Manisha Bora

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Role of Raw Materials in Agro Products- An Empirical Study

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Abstract

Agro products have been sufficing the economy for a long-long time now. The industry of agricultural products has gone through a drastic change over the last couple of decades with the help of science and technology. With new innovations the agro products have come to a full circle where both raw materials which become output is again an input for other industries. The waste generated by Agriculture is now been utilized in a much meaningful manner as a raw material. With the help of the study, an attempt is made to understand the role of raw materials in form both ends in agro-product sector. The study concludes that raw material plays a significant role in agro products.

Keywords: Raw, Materials, Agro, Products, Technology

I. Introduction

Commodities used in agricultural, predominantly the input materials, are more and more now present in areas outside than the nourishment and fiber productions. The list includes biodiesel and ethanol as a form of energy, manufacturing items such as bio-based synthetic chemicals, and therapeutic products such as meals in functional form, hormones of growth, and transplants of organs. Furthermore, advances in biotechnology have stimulated the possible use of agricultural raw materials, resulting in broader societal and public use and issues. The many uses of agricultural resources show the significance of the sector as an input provider for at least four distinct industries, including energy, industrial chemicals, health and pharmaceuticals, and food and nutrition goods. Agriculture now biologically creates particular raw materials for a wider range of end purposes rather than being a business that produces and processes commodity goods (Iacono, et. al, 2019).

The expanding multifunctional role of agriculture has generated anxiety and conundrum. Disruptive developments have been produced as a consequence of traditional biological, chemical, and technical advancements mixed with genetic

Challenges of Municipal Solid Waste Management: An Empirical Study

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Abstract

The reason behind the latest research is the appalling status of and difficulties with municipal solid waste management (MSWM) in metropolitan India. Municipal solid waste (MSW) creation is increased as a result of urbanisation, and MSW is handled in an unscientific manner, which harms the urban environment and poses health risks. In addition to a thorough analysis of MSW generation, its categorization, collections, and treatment alternatives as applied in India, this research aims to analyse the key MSWM factors. It also reports on the current state of MSWM in significant Indian towns and states. The crucial prerequisites for maximising the potential of public-private partnerships, their difficulties, and the invisible roles of rag-pickers are also explored. According to the study's findings, emerging nations like India urgently require the installation of decentralised solid waste processing facilities in major cities and towns and the growth of a professional recycling manufacturing sectors.

Keywords: Waste management, Municipal Solid Waste (MSW), sustainable development, composting, garbage, waste, separation.

I. Introduction

Over the past ten years, there has been a rise in the production of municipal solid waste (MSW) due to population and economic expansion. As a result, there is more demand on public bodies to create effective municipal solid waste management (MSWM) laws and procedures to address the effects of Waste management systems on ecological systems. Considering the limited funding opportunities for MSWM systems today and the requirement for social acceptance matching the motivations of

(Volume-1)

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Edited By:
DR. CHITARANJAN DALAI
PROF.(DR).CHANDRA KUMAR DIXIT
DR. SURYABHAN PRATAP SINGH

2022
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Handbook of Trends in Engineering Technology and Research

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A State of Art Review on Advancements in Vehicular Embedded System Technologies

Mr. D. Karthik Prabhu[1*]

[1]*Assistant Professor, Department of Electrical and Electronics Engineering, Ramco Institute of Technology, Rajapalayam*

Abstract

In the last two decades, the no. of the computer-based features incorporated in automobiles has increased significantly. Even though vehicle manufacturing is expected to rise modestly in the next years, the embedded electronics, and specifically embedded software, is rising. In addition, hardware components' quality and performance are improving whereas their price is declining. Many novel functionalities that would be prohibitively expensive or impossible to implement using the mechanical as well as hydraulic technology may now be implemented using the software technology, thus addressing the end user's needs in the terms of safety as well as comfort. Customers can now purchase a secure, effective, and customised vehicle owing to such technologies, whereas carmakers seem to be able to the master product differentiation as well as the innovation. Several studies have indeed been undertaken to improve embedded system design and the newest technologies to create smart automobiles, which are reviewed in this article. DSPs, ASICs, FPGAs, as well as other microprocessor-based embedded systems are only a few of the many options out now (field-programmable gate arrays). There has been a lot of recent discussion on the use of AI (artificial intelligence) as well as fuzzy logic controllers in automobiles.

Keywords: Vehicular Embedded System, DSPs, ASICs, FPGAs

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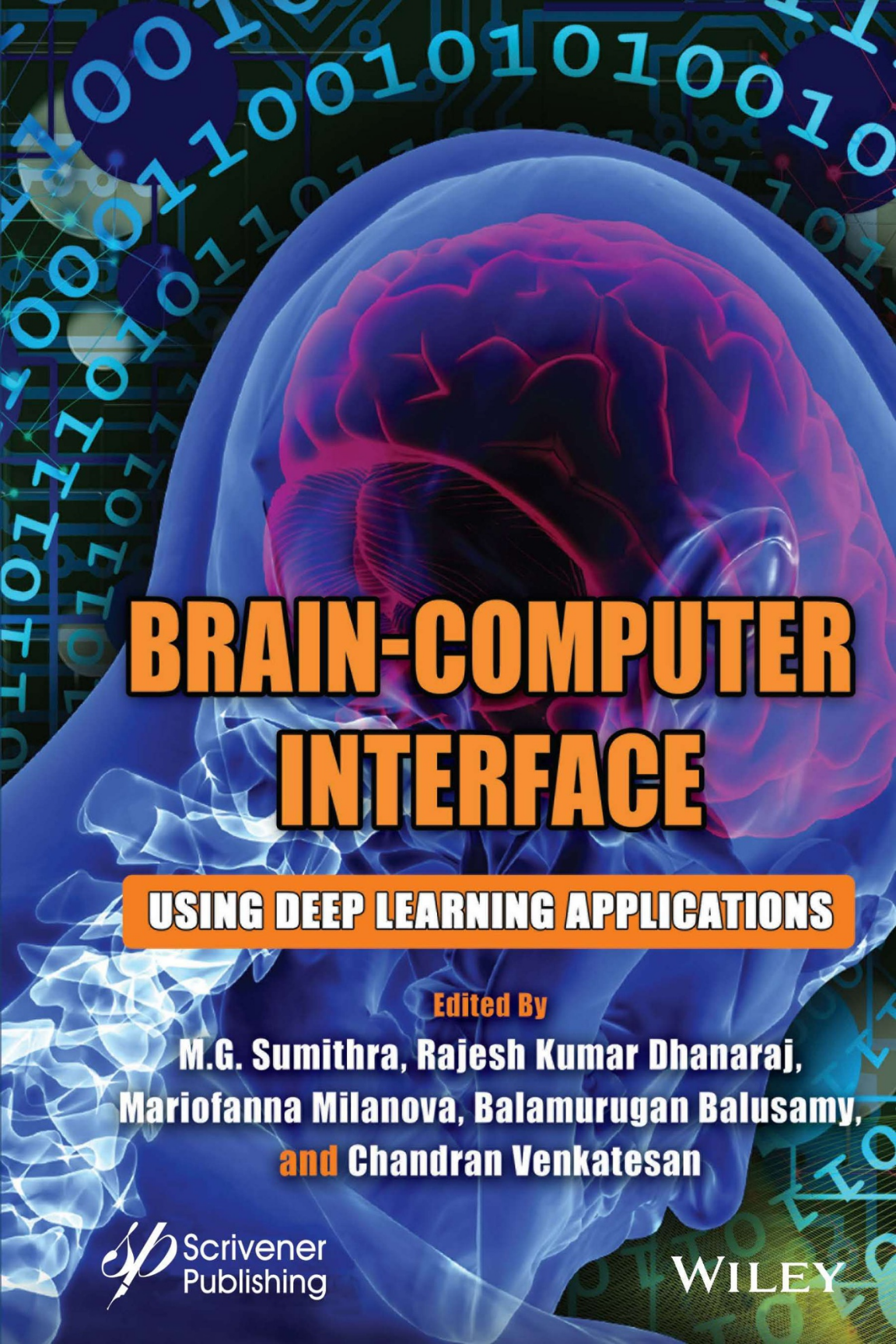
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USING DEEP LEARNING APPLICATIONS
Edited By
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and Chandran Venkatesan
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Brain-Computer Interface

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8

Brain–Computer Interface-Based Real-Time Movement of Upper Limb Prostheses Topic: Improving the Quality of the Elderly with Brain-Computer Interface

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Abstract

The early development of Human-Computer Interaction (HCI) was limited to a couple of external computer interfaces, like the keyboard, mouse, or graphical user interface, to enable users to communicate easily with the computer. Modern HCI includes input interfaces, including a joystick, bio-sensors, and power-input devices, for example, steering wheel, and electromechanical actuators, biomechanical, and optical/optoelectronic equipment. The BCI interfaces usually bypass the natural neuro-muscular controls and aim to serve as an alternative means of communication/control in the event of a neuronal/motor failure. The chapter covers BCI on cognition, sensors, machine learning, neurophysiology, psychology, signal detection and processing, source localization, pattern recognition, clustering, and classification of the signals. The components of an EEG-BCI are (i) preprocessing, (ii) extraction of the feature, (iii) selection of features, and (iv) classification. In the pre-processing stage, preliminary processing like the filtering of EEG signals takes place. The EEG signals are subsequently processed using one or more extraction methods after pre-processing. This step is designed to extract relevant special signals that match the various mental state of the user. The selection of functionality in a BCI system is an optional step, which mainly seeks to

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Intelligent Transport of E-Waste: A Case Study in Indian Context

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Chapter - 6

Intelligent Transport of E-Waste: A Case Study in Indian Context

Dr. K.R. Leelavathy, V. Nageshwaran, Dr. K. Venkatalakshmi and Dr. K. Ragavan

Abstract

India as a developing economy and being second most populous with third largest purchasing power makes it a centre for marketing all sorts of global electrical, electronic and white goods. This leads to generation of e-waste in tremendous amounts that poses a number of issues to human, environmental components and imparts a threat to the natural resources on exploitation. The generated e-waste is of non-point source in nature that challenges the collection or buyback of e-waste to aid recycling or recovery of resources. As well as, the collection, treatment and disposal are not done at the place of origin of waste itself, which mandates the transit of e-waste from one location to another. The transit of such e-waste in the case of a city or town is handled by the informal sector as of now using the road as the mode of transportation. Transportation via road is a most challenging task due to the exploding traffic congestion that exists at important junctures. In developing countries like India, road transport is still controlled using manual or other automated signals. Hence, an Intelligent Transportation System is the need of the hour. In this study, we propose a hybrid optimization algorithm that incorporates Support Vector Machine and Ant Colony Optimization with Internet of Vehicles to arrive at an effective traffic management solution. The results of the study are promising over other existing optimization techniques such as Particle Swarm Optimization, Artificial Bee Colony Optimization and Support Vector Machine.

Keywords: Support Vector Machine (SVM), Internet of Vehicles (IoV), Ant Colony Optimization Algorithm (ACO), E-Waste, Transport of E-waste, Intelligent Transportation System, Traffic Congestion

1. Introduction

India is the world's seventh-largest country by area, the second-most populated, the sixth-largest economy by nominal Gross Domestic Product

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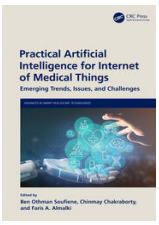

Practical Artificial Intelligence for Internet of Medical Things

Emerging Trends, Issues, and Challenges

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ABSTRACT

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Early Detection of Chronic Obstructive Pulmonary Disease Using LSTM-Firefly Based Deep Learning Model

P. Suresh Kumar, Pandit Byomakesha Dash, B. Kameswara Rao, S. Vimal & Khan Muhammad

Chapter | First Online: 15 November 2022

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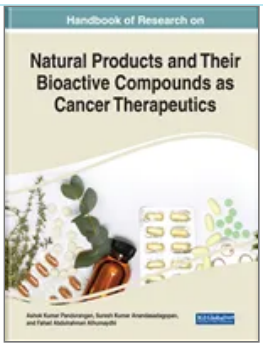
Abstract

Identifying Chronic Obstructive Pulmonary Disease (COPD) is essential for reducing mortality and cost burden. However, the population suffers from an underdiagnosis of chronic obstructive pulmonary disease. This chapter aims to create COPD detection models and assess the relative effectiveness of several modeling paradigms to discover the optimal model for the task on the dataset of 563 hospital or emergency ward visits in China-Japan Friendship Hospital performed between February 2011 and March 2017. We investigated the use of a Long Short Term Memory Network (LSTM), a kind of deep learning, for the automated identification of COPD, with the model hyperparameters modified using the firefly algorithm. Three optimization variations have been used to optimize the hyperparameters of the proposed LSTM



Natural Products and Their Bioactive Compounds as Chemotherapeutics: Natural Products to Prevent Drug Resistance in Cancer Chemotherapy

Revathi Nagaraj, Sankarganesh Murugesan, Dhaveethu Raja Jeyaraj

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Abstract

Cancer is the second world's deadliest disease. Despite substantial advancements in medical technology for cancer therapies, cancer mortality remains greater than projected, and cancer treatment requires additional study. The research carried out in natural products is due to the presence of bioactive compounds, unique structures, and mechanistic actions. Prevention of drug resistance in chemotherapy is predominant in the usage of anticancer drugs. Clinical chemotherapeutic medicines work by causing cancer cells to die, the majority of which is apoptotic. Another way to combat drug resistance in cancer therapy is circumventing apoptosis by targeting non-apoptotic cell death. The authors discussed in this chapter both apoptotic and non-apoptotic cell death.

Chapter Preview

Top

Introduction

Cancer is a common fatal disease. The people who are affected by cancer have felt as short life period and not a good quality of life. It affected more than 10 million people in the world per year. World Health Organisation (WHO) reported that it affects one in five men and one in six women in their life and kills one in eight men and one in eleven women. It is a huge burden on society. Cancer is a multifaceted and refractory illness produced by a complex interplay of local tissue microenvironmental and hereditary variables (Klemm and Joyce, 2015). Cancer is a collection of disorders characterized by uncontrolled and aberrant cell division, as well as malignant characteristics such as invasion and metastasis. Cancer is a global issue with significant morbidity and fatality rates.

Surgery, chemotherapy, and radiotherapy are the most common cancer treatments today. While surgery may not always be able to eliminate all cancer cells from the human body, both chemotherapy and radiotherapy kill the normal cells in the body. This is the biggest side effect in cancer treatment. For more than half an epoch, natural products have been broadly scrutinized to prevent drug resistance in cancer chemotherapy due to their astonishing diversity in the chemical field. Mostly natural products derived from plants and animals have been the source for all pharmaceutical companies. Natural products have recently continued to serve as exemplars for biologically active molecules, especially for cancer treatment (Cragg and Pezzuto, 2016).

The purpose of cancer treatments is that:

- It recovers health of the human beings.
- The disease is conveyed under control due to the improvement in the immune system.
- Prevention of reoccurrence of cancer is carried out.
- The symptoms are reduced.

Depending on the type of cancer, there are many types of cancer treatment. Some cancer patients will just require one treatment. Most people, on the other hand, receive a mix of therapies, such as surgery combined with chemotherapy and/or radiation therapy. They are frequently used in tandem. Surgical treatment, chemotherapy, irradiation, and hormone therapy are the most common types of cancer treatment. For clinical treatment, chemotherapy

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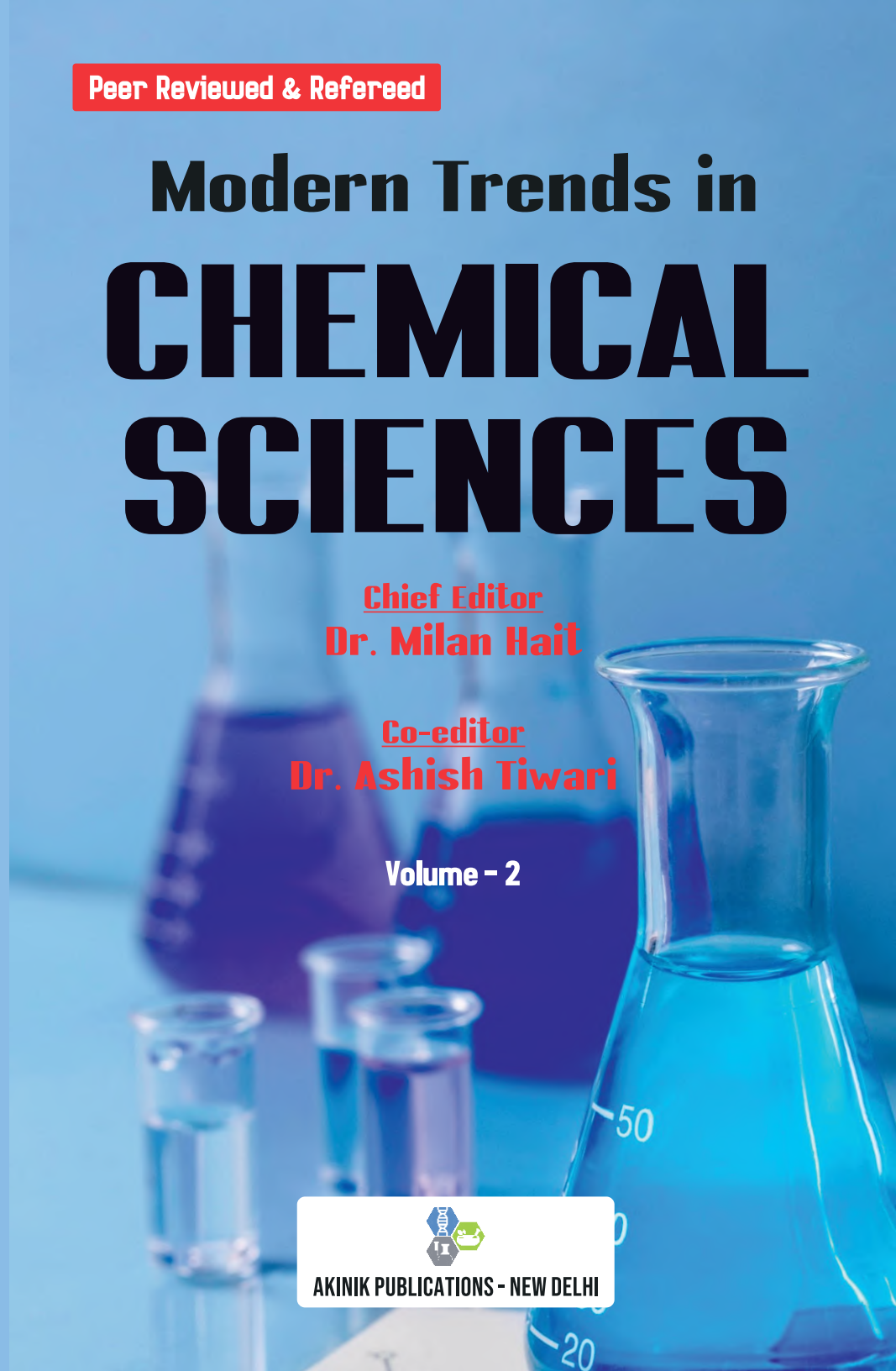

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Chapter - 3
Biomedical Waste and Their Disposal Techniques

Authors

C. Revathi
Department of Chemistry, Chellammal Women's College, Chennai, Tamil Nadu, India

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Department of Chemistry, Ramco Institute of Technology, Rajapalayam, Tamil Nadu, India

Chapter - 3

Biomedical Waste and Their Disposal Techniques

C. Revathi, S. Soundeswaran and O. Senthilkumar

Abstract

Biomedical wastes are infectious and harmful. Management of biomedical waste requires special processing and treatment procedures. Trained professionals are needed in some of the processing steps or medical/health care professional should be trained specifically to manage biomedical waste. The management of biomedical waste in India is defined by the regulations defined by Central Pollution Control Board which is working under Ministry of Environment, Forest and Climate Change. This chapter highlights the current scenario and challenges involved, sources, various stages of processing and handling and degradation steps of biomedical wastes.

Keywords: Bio Medical Waste (BMW), management, sterilization techniques

1. Introduction

Bio medical waste (BMW) is entirely different from other types of waste. It is a challenging task to manage biomedical waste. Hospitals, nursing homes, health care centres, biological testing laboratories, pharmaceuticals, scan centres are the main places where biomedical wastes are generated in large quantities. Furthermore, individuals from all walks of life visit such locations on a regular basis, producing waste, spreading diseases, or getting infected as a result of inadequately handled waste. BMW cannot be handled like municipal waste. The apex body for monitoring BMW in India is Central Pollution Control Board (CPCB). It is directly functioning under Ministry of Environment, Forest and Climate Change. State Pollution Control Boards also function separately and report their findings to CPCB. The country has a strict policy of onsite segregation of created BMW, as well as storing, transporting, and disposing of them in accordance with the guidelines from the Ministry. The first BMW rules were notified by the Government of India in 1998. The rules were periodically

Chapter
19

DRINKING WATER CONTAMINANTS AND HEALTH IMPLICATIONS

G. KANTHIMATHI[1*], M. VENKATESH PERUMAL[2], O. SENTHILKUMAR[3]

[1, 2, 3] Department of Chemistry,
Ramco Institute of Technology, Rajapalayam, Tamilnadu, India - 626117
*Corresponding Author: G. Kanthimathi, Email: kanthimathi@ritrjpm.ac.in.

ABSTRACT

Water is an essential component for the survival of all living organisms. We know that, rainwater is one of the purest forms of water. But, when it reaches the earth surface, it get polluted easily due to the discharge of effluents from industries, commercial activities, mining activities and domestic sewages. The addition of wastages makes the water unsuitable for drinking, domestic and industrial purposes due to the adding up of physical, chemical and biological impurities. Each year 1.2 million deaths were reported because of using unsafe water. In low-income countries, 6% of deaths are the results of unsafe water sources. One-in-four people do not have access to safe drinking water for day today life. Unsafe water is responsible for 1.2 million deaths each year. 6% of deaths in low-income countries are the result of unsafe water sources. One-in-four people do not have access to safe drinking water. Whether water is utilized for drinking, home use, food production, or recreation, safe and readily available water is critical for public health. Improved water supply and sanitation, as well as better management of water resources can help countries thrive economically, reduce poverty and supports sustainability.

KEYWORDS: Wastages, Sustainability, Public health.

INTRODUCTION

Water is the most important element that allows life to exist on this planet. The ocean contains nearly all of the accessible water on the planet, and it is too salty to drink or use for irrigation. (Bharucha 2006).only 3 percent is available as fresh water. Of this, 2.997 percent is locked in ice cabs and glaciers. Thus, only 0.003 percent of the earth's total volume of water is easily available as soil moisture, groundwater, water vapor and the water in lakes, streams, rivers and wet lands. Pure form of water present in the earth is a gift from Mother Nature to all living beings. Any alteration of the environment by external forces or contamination by pollutants leads to water pollution. Water pollution is defined as the addition of any

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Achievements of Faculty Members

Academic Year 2022-2023

Number of new externally funded research projects received & Fund received during this academic Year: **8**

S. No	Name of the Project/ Endowments, Chairs	Name of the Principal Investigator/Co - investigator	Department of Principal Investigator	Year of Award	Amount Sanctioned	Duration of the project	Name of the Funding Agency	Type (Government/ Non-Government)
1.	IoT Based Smart Food Waste Monitoring System	Dr. S. Kannan and Mr. A.S. Vigneshwar	EEE	2022-23	20,000	1 Year	The Institution of Engineers (India) under IEI R&D Grant in - Aid scheme	Government
2.	Eco friendly light weight bricks	Mrs.R.Kalaimani	CIVIL	2022-23	7500	6 Months	Tamilnadu State Council for Science and Technology	Government

3.	Detection of speed breakers in real time for indian roads	Mrs.S.Manjula	CSE	2022-23	7500	6 Months	Tamilnadu State Council for Science and Technology	Government
4.	Uninterrupted power supply phase selector for rural hospital medical ventilator	Mr.E.Thangam	EEE	2022-23	7500	6 Months	Tamilnadu State Council for Science and Technology	Government
5.	Trashbot filling alert system for smart cities	Mr.T.Selvasundar	MECH	2022-23	6500	6 Months	Tamilnadu State Council for Science and Technology	Government
6.	Tree Measurement using LIDAR with Built-in Navigation System	Mr. S. Valai Ganesh	MECH	2022-23	7500	6 Months	Tamilnadu State Council for Science and Technology	Government
7.	Smart Stick for Blind-Deaf People	Mr. M. Ramar	MECH	2022-23	7500	6 Months	Tamilnadu State Council for Science and Technology	Government

8.	Onion grand Challenge-Development of cost effective automated machine for	Dr.A.Lakshmi	ECE	2022-2023	100000	3 months	Ministry of Consumer Affairs, Food and Public	Government
Total Fund					**1,64,000**			

The Institution of Engineers (India)

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8 Gokhale Road, Kolkata-700 020

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Ref: R.4/2/UG/2022-23/UG2023013

Date: 11 October 2022

The Principal
Ramco Institute of Technology
North Venganallur Village
Rajapalayam 626117, Tamil Nadu

Dear Sir/Madam,

Sub: Intimation of Approval for R&D Project entitled: *"IoT Based Smart Food Waste Monitoring System"*

This has reference to your subject project proposal submitted to The Institution of Engineers (India) for funding under IEI R&D Grant-in-Aid Scheme.

We are pleased to inform that the same has been approved by the competent authority as per the details mentioned below:

Project ID:	UG2023013	**Category:**	UG	**Financial Year:**	2022-23
Guide(s):	1. Dr S Kannan 2. A S Vigneshwar	**Applicant(s):**	S Gurumoorthy		
College / Institute / University:	Ramco Institute of Technology	**Total Grant Sanctioned:**	₹20,000/-	**Number of Instalment(s):**	1

Kindly quote your project ID all your future correspondence.

Please note that the Terms & Conditions of the Grant (Copy enclosed) should be strictly followed. On successful completion of the project, the following documents are to be furnished: (1) hard and soft copy of the Project Report, (2) hard/soft copy of the Project Completion Report, (3) two hardcopies of the Utilization Certificates in original, (4) soft copy of the filled-in R&D Compendium pro-forma (in .doc/.docx format) and (5) an Audio/Visual Demonstration of the Prototype/Model/Process in CD or Google Drive File Link. The submission will be treated as successful and complete only on receipt of the above documents.

Kindly acknowledge receipt through email id **research@ieindia.org**.

Thanking you.

Yours faithfully,

Director (Technical) – I/C
For Secretary & Director General

Encl: as stated.

cc: Guide(s) – 1. Dr S Kannan
2. A S Vigneshwar

தமிழ்நாடு அறிவியல் தொழில்நுட்ப மாநில மன்றம்
TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY
(Established by Government of Tamilnadu)
Directorate of Technical Education Campus, Chennai – 600 025.
Ph : 044-22301428, www.tanscst.nic.in

Dr.R.SRINIVASAN, M.Sc., Ph.D.,F.I.C.S., M.A.C.S.(USA).,
Member Secretary

Lr.No.TNSCST/SPS/BS/2022-2023 03.03.2023

To
The Principal
Ramco Institute of Technology, Rajapalayam,
Virudhunagar- 626 117

Sir/Madam,

Sub: TNSCST – Student Project Scheme – 2022-2023 – approval intimation–grant release- reg.

With respect to the above scheme, the list of projects approved by the State Council is enclosed along with terms and conditions. You are requested to adhere to terms and conditions such as submission of UC and Seminar Paper on Time.

Herewith enclosed the cheque for the approved grant and disburse the grant to the concerned students through the guides at the earliest

Kindly send the utilisation certificate (format enclosed) and seminar paper (Ref.T&C) on completion of the project.

Thanking you,

Yours faithfully,

3/3/23
Member Secretary.

Encl: a) Terms & Conditions (T&C)
b) Format of Utilisation Certificate (UC)
c) Cheque for Rs. 44000/- Cheque No:574969 dt. 03.03.2023
d) List of Approved Projects

Copy to: Individual Guides

RAMCO INSTITUTE OF TECHNOLOGY, RAJAPALAYAM, VIRUDHUNAGAR – 626 117

1.	Mr.S.Valai Ganesh, Assistant Professor, Department of Mech. Engg. Ramco Institute of Technology, Rajapalayam, Virudhunagar- 626 117	Tree Measurement using LIDAR with Built-in Navigation System	Dinesh R, Shyamsundar R,	AS-574	The Principal	Rs 7500/-
2.	Mr. M .Ramar, Assistant Professor, Department of Mechanical Engineering, Ramco Institute of Technology, Rajapalayam, Virudhunagar- 626 117	Smart Stick for Blind - Deaf People	S. Saravanakumar, T. Arun Prasath,	PS-346	The Principal	Rs 7500/-
3.	Mrs.S.Manjula, Assistant Professor, Department of CSE, Ramco Institute of Technology, Rajapalayam, Virudhunagar- 626 117	Detection of speed breakers in real time for indian roads	Muthuraman.C, Malini.M,	CSE-1256	The Principal	Rs 7500/-
4.	Mrs.R.Kalaimani, Professor, Department of Civil Engineering, Ramco Institute of Technology, Rajapalayam, Virudhunagar- 626 117	Eco Friendly Light Weight Bricks	S. Muthu Sanjay,	ECV-325	The Principal	Rs 7500/-
5.	Mr.T.Selvasundar, Assistant Professor, Department of Mechanical Engineering, Ramco Institute of Technology, Rajapalayam Virudhunagar- 626 117	Trashbot filling alert system for smart cities	Soumya souvik khuntia, S. Jehaveerapandiyan,	EME-0610	The Principal	Rs 6500/-
6.	Mr.E.Thangam, Assistant Professor, Department of EEE, Ramco Institute of Technology, Rajapalayam Virudhunagar - 626 117	Uninterrupted power supply phase selector for rural hospital medical ventilator	Abimanyu J, Kabilan K, Ponmadasamy A,	EEE-1469	The Principal	Rs 7500/-
					Total	**Rs 44000/-**

ONION GRAND CHALLENGE

REPORT

TEAM NAME : THE BRAINIACS

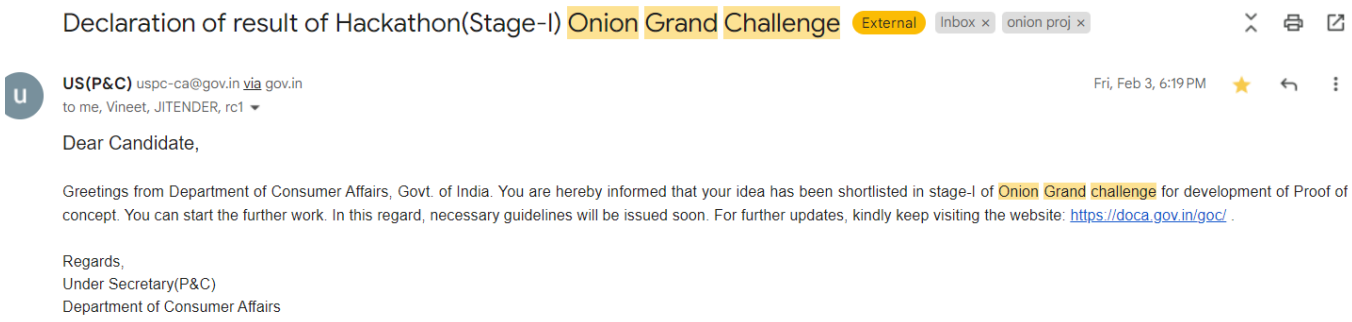
Submission ID: 456

TL name : SHRINITHI R
Team Members:
1.MONICA S
2.ROSHAN RAM B
3.SAKTHI C R
4.SARAN KUMAR R
5.SURUTHI S

Mentors name : Dr. A. LAKSHMI

Stage 1: Ideation Phase

- 06/01/2023- First meeting on idea presentation was conducted through online meeting.
- 03/02/2023-Results for selection of stage 1 was declared. Selection in ideation phase



Declaration of result of Hackathon(Stage-I) Onion Grand Challenge External Inbox × onion proj ×

u **US(P&C)** uspc-ca@gov.in via gov.in Fri, Feb 3, 6:19 PM
to me, Vineet, JITENDER, rc1

Dear Candidate,

Greetings from Department of Consumer Affairs, Govt. of India. You are hereby informed that your idea has been shortlisted in stage-I of Onion Grand challenge for development of Proof of concept. You can start the further work. In this regard, necessary guidelines will be issued soon. For further updates, kindly keep visiting the website: https://doca.gov.in/goc/ .

Regards,
Under Secretary(P&C)
Department of Consumer Affairs

Stage2:Ideation to PoC

Re: Onion Grand challenge 2022 |

gc.onion MIC <gc.onion@aicte-india.org>
to bcc: me

Please find the submission ID.

submission_id	Team Name
502	Yashwanth Nandi
216	Godaam Innovations
89	V.Arun Prasath
606	ON-I-ON
106	Isomeq
128	KritiLabs Technologies Private Limited
129	KritiLabs Technologies Private Limited
188	Sivabharathi
530	MicroGO
[illegible]	Feromatech
456	THE BRAINIACS
601	[illegible]
519	Research view
163	Gurumurthy Hegde
608	SpectralEye
331	Aakkam VIT
463	Acronions
254	Navaya
547	Chill Onion
609	Shini Unicorns
76	Dehydrator
466	Food Technology RGU (FT RGU)

Onion Grand Challenge 2022_STAGE 1 EVALUATION || 10 May 2023 || Vertical 3 External Inbox x

gc.onion MIC <gc.onion@aicte-india.org> Tue, May 2, 4:17 PM
to bcc: me

Dear Team Leader,

It is to inform you that the Stage 1 evaluation of Onion Grand Challenge (OGC 2022) has been scheduled from 9th-11th May 2023. A team is directed to kindly prepare the presentation as per the template provided (attached to this mail) and the ppt will be presented in front of the experts and OGC committee members. On the basis of your presentation which will include your work progress, evaluation will be done. Kindly note that the team leader along with the members must join the meeting prior 10 minutes to the time slot (schedule attached).

It is also requested that the team (specially team leader) should be active on the telegram group while waiting in the Webex lobby as any information during the meeting will be provided through the same mode instead of any calls.

Please find the schedule of your presentation along with the meeting link below:

Date	Vertical	Team Name	Presentation Slot
10th May 2023	3	Processing and Food Engineering	10:10 AM to 10:20 AM
		KritiLabs Technologies Private Limited	10:30 AM to 10:40 AM
		Sivabharathi	10:50 AM to 11:00 AM
		MicroGO	11:10 AM to 11:20 AM
		Feromatech	11:30 AM to 11:40 AM
		THE BRAINIACS	11:50 AM to 12:00 PM

Meeting Link : https://aicteindia.webex.com/aicteindia/j.php?MTID=m0beedba666be986240c081502acef023

Meeting number (access code): 2510 272 6029

Stage 3: PoC to Product Development

- 26/05/2023-Result for selection of stage 2 was declared.

In the first stage (Ideation to PoC), 23 ideas were shortlisted to work on the prototype development. Further, on 7, 8 and 9 May 2023, the prototype of these shortlisted teams was

evaluated by a panel of domain experts in the overall supervision of DoCA. In this regard, 11 ideas have been shortlisted for the product development stage.

A list of the 11 shortlisted ideas in the four verticals is as below.

Sr. No	Vertical	Submission Id	Team Name	Category
1	1	502	Yashwanth Nandi	Student
2	1	216	Godaam Innovations	Start Up
3	2	106	Isomeq	Start Up
4	3	530	MicroGO	Start Up
5	3	487	Feromatech	Faculty
6	3	456	THE BRAINIACS	Student
7	4	163	Gurumurthy Hegde	Faculty
8	4	608	SpectralEye	Start Up
9	4	463	Acronions	Faculty
10	4	254	Navaya	Professional
11	4	609	Shini Unicorns	Faculty

Department of Consumer Affairs

Dated 24th May, 2023
Krishi Bhawan, New Delhi-01

Result announcement (Stage - I)

Hackathon: Onion Grand Challenge

***

This Department had launched a Hackathon for the Grand Challenge for development of "Technologies for Primary Processing, Storage and Valorization of Onions". Students (UG/PG/Diploma), Research Scholars, Faculty and other individuals were eligible to participate in the challenge. There were four verticals of the challenge viz.

(a) Improvements in the designs of storage structures
(b) Pre-harvesting stage
(c) Primary Processing
(d) Valorization: Value addition and utilisation of onion waste

2. In the first stage (Ideation to PoC), 23 ideas were shortlisted to work on the prototype development. Further, on 7, 8 and 9 May 2023, the prototype of these shortlisted teams were evaluated by a panel of domain experts in the overall supervision of DoCA. In this regard, 11 ideas have been shortlisted for the product development stage.

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6	3	456	THE BRAINIACS	Student
7	4	163	Gurumurthy Hegde	Faculty
8	4	608	SpectralEye	Start Up
9	4	463	Acronions	Faculty
10	4	254	Navaya	Professional
11	4	609	Shini Unicorns	Faculty

Achievements of Faculty Members

Other achievements :**115**

Award received from any agencies

S. No	Name of the Faculty	Award Name	Agency Name
1.	Dr.S.Vimal,ASOP/AI&DS	International Young Researcher (2020-21)	I2OR-MSME
2.	Dr.M.Kaliappan ,Prof& Head/AI&DS	International Engineer Educator (2020)	IUCEE
3.		Best SPOC NPTEL(2019)	NPTEL
4.	Dr. G. Karthikeyan, AP(SG)CIVIL	International Engineer Educator (2020)	IUCEE
5.	Mr.T.Chockalingam,AP/CIVIL	NPTEL Believer (Jan - Apr 2022)	NPTEL
6.	Dr.K.Vijayalakshmi, Prof/CSE	ICT innovator-Best CoOrdinator	ICT
7.	Mrs.B.Vijayalakshmi, AP/CSE	NPTEL online course Programming in Java with a score of 94% (Elite+Gold) and securing top 1% among the certified nationwide	NPTEL
8.		NPTEL online course Problem-Solving Programming in C with a score of 91% (Elite+Gold) and securing top 1% among the certified nationwide	NPTEL
9.	Dr.K.Vivekrabison, AP/CSE	NPTEL online course Programming in Java with a score of 92% (Elite+Gold) and securing top 2% among the certified nationwide	NPTEL

S. No	Name of the Faculty	Award Name	Agency Name
10.	Dr.V.Anusuya, AP(SG)/CSE	IUCEE - completed with distinction in online course on Online Teaching	IUCEE
11.	Mr.K.VigneshSaravanan, AP/CSE		
12.	Mrs.N.Nithya, AP/CSE	Winners in the Essay competition on Talent Acquisition organized by IEEE CS, ACM & CSI in association with MrRaghunathRamaswamy, Founder and CEO, Spectrum Consulting & Author of the book "FAIL - SAFE HIRING: Assuring Talent Acquisition"	IEEE CS, ACM & CSI
13.	Dr.M.GomathyNayagam, ASP/CSE	Secured 3rd Rank inAll India Level in AI/ML course organized by BNY Mellon and ISTE with Proficiency Level	BNY Mellon and ISTE
14.	Dr.V.Anusuya, AP(SG)/CSE	Rewarded for their outstanding contributions as "Primary Evaluators in Toycathon-2021," which was co-hosted by AICTE and the Ministry of Education's Innovation Cell	AICTE and the Ministry of Education's Innovation Cell
15.	Dr.R.Venkatesh, ASP/CSE		
16.	Mrs.M.SwarnaSudha, AP/CSE		
17.	Mrs.S.Manjula, AP/CSE		
18.	Mrs.N.Nithya, AP/CSE		
19.	Dr.M.GomathyNayagam, ASP/CSE	Red Hat Certified System Administrator	Red Hat
20.	Dr.R.Venkatesh, AP(SG)/CSE		
21.	Dr.I.GethziAhilaPoornima, AP/CSE	IUCEE International Engineering Educator Certification Program Spring 22	IUCEE
22.	Mrs.B.Vijayalakshmi, AP(SG)/CSE	Zoho Certified Trainer	Zoho
23.	Mr.K.VigneshSaravanan,AP/CSE		
24.	Mr.C.A.Yogaraja, AP/CSE	Educator for leading Android Educator program offered by Google Developers	Google Developers
25.	Mr.K.VigneshSaravanan, AP/CSE		
26.	Mr.K.VigneshSaravanan, AP/CSE	Microsoft Certified Educator	Microsoft
27.	Dr.R.Venkatesh, ASP/CSE	Python Programmer Certification- Infosys Spring Board	- Infosys Spring Board
28.	Mrs.M.SwarnaSudha, AP/CSE		
29.	Ms.G.SakthiPriya, AP/CSE		

S. No	Name of the Faculty	Award Name	Agency Name
30.	Dr.M.GomathyNayagam, ASP/CSE	Completed the Robotic Process automation-UiPath	UiPath
31.	Mr.K.VigneshSaravanan, AP/CSE		
32.	Mr.C.A.Yogaraja, AP/CSE	Innovation Ambassador training in “Advanced Level” conducted in online mode by MoE’s innovation cell & AICTE	MoE’s innovation cell & AICTE
33.	Dr.R.Venkatesh, AP(SG)/CSE	Innovation Ambassador training in “Foundation Level” conducted in online mode by MoE’s innovation cell & AICTE	MoE’s innovation cell & AICTE
34.	Dr.R.Rajalakshmi ,AP/ECE	April-2022: Tamilnadu Association of Intellectuals and Faculty (TAIF) in Best Young Faculty Award	TNSCST
35.	Mr.D.Gopinath-AP/ECE	Secured I Rank in ECE Domain of ALTAIR National Level Design Contest	ALTAIR
36.	Mrs.G.GnanaPriya,AP(SG)/ECE	NPTEL Online course Certification "Discrete Time Signal Processing" with Elite score	NPTEL
37.	Mrs.S.Jeeva, AP/ECE		
38.	Mrs.S.Jeeva ,AP/ECE	IUCEE - completed with distinction in online course on Online Teaching	IUCEE
39.	Mrs.S.Jeeva ,AP/ECE	Exceptional contributions as "Primary Evaluators in Toycathon-2021," which was co-hosted by AICTE and the Ministry of Education's Innovation Cell	AICTE and the Ministry of Education's Innovation Cell
40.		Completed the Robotic Process automation-UiPath	UiPath
41.	Mr.R.DeivaNayagam, AP/ECE	NPTEL Certification Course on Python with Data Science under Elite Category	NPTEL

S. No	Name of the Faculty	Award Name	Agency Name
42.	Mrs.G.GnanaPriya,AP(SG)/ECE	IUCEE International Engineering Educator Certification Program with Distinction	IUCEE
43.	Dr.S.Vairaprakash, ASP/ECE		
44.	Mrs.V.SrirengaNachiyar, AP(SG)/ECE		
45.	Dr.K.Ragavan,AP(SG)/ECE		
46.	Mrs.G.GnanaPriya,AP(SG)/ECE	The Basics of PBL" IUCEE certification conducted by Australian Catholic University with Distinction	Australian Catholic University
47.	Mrs.R.Ramalakshmi, AP(SG)/ECE	Completed 8 online courses and received “Google Data Analytics Professional Certificate” offered by Google-Coursera Scholarship scheme	Google-Coursera Scholarship scheme
48.	Mrs.V.SrirengaNachiyar, AP(SG)/ECE		
49.	Mrs.R.Ramalakshmi, AP(SG)/ECE	Certificate of Completion with Distinction for the course “Online Teaching” offered by IUCEE	IUCEE
50.	Mrs.R.Ramalakshmi, AP(SG)/ECE	Best Paper Award in the IEEE International Conference “Emerging Technologies and Applications for a Smart and Sustainable World” Organized by National Engineering College.	National Engineering College
51.	Dr. S. Rajakarunakaran, Prof&Head/Mech	uLektz Wall of Fame Award – Top 20 Revolutionary Education Leaders – 2020	uLektz
52.	Mr.R.Arun Kumar, AP(SG)/Mech	Completed IUCEE International Engineering Educator Certification Program (IIEECP) with Distinction - 2020	IUCEE
53.		Certified Patent Agent (IN/PA-4439)	Govt. of India
54.		Master Trainer	Entrepreneurship Development and Innovation Institute, Govt. of Tamil Nadu
55.		Mentor	Annamalai Innovation & Incubation Research Foundation

S. No	Name of the Faculty	Award Name	Agency Name
56.	Mr.R.Arun Kumar, AP(SG)/Mech	External Member	Institution's Innovation Council, Vivekananda Institute of Management Studies, Coimbatore
57.		Innovation Ambassador	Ministry of Education's Innovation Cell (MIC), Govt. of India
58.		1. NPTEL Domain Scholar - Patents and IPR Domain 2. NPTEL Domain Scholar - Faculty Domain (Advanced) 3. NPTEL Motivated Learner	NPTEL
59.	Dr.K.Basarikodi, Prof/Maths	special appreciation award for her effort as coordinator to conduct ISTE-SRMC for the school students of Virudhunagar District.	ISTE-SRMC
60.	Mr.Anish Alfred Vaz, AP/English	Best Paper Award for "The Means of Escaping Hierarchical Supermacy as Depicted in select Black Vernacular Folktale" from Trans Stellar Journal Publications on 31.08.2017	Trans Stellar Journal
61.	T.Vigneswari, AP(SG)/Physics	Best Paper Award for "Superparamagnetic properties of iron oxide nanoparticles using vitexnegundo leaf extract by green synthesis method and its antimicrobial activity against wound pathogen", from International Conference on Advanced Technologies in Chemical, Construction and Mechanical Sciences (ICATCHCOME 2023), Organized by KPR Institute of Engineering and Technology, Coimbatore, 09 February, 2023 & 10 February, 2023	KPR Institute of Engineering and Technology, Coimbatore
62.	G.Kanthimathi, ASP/Chemistry		

Professional society executive member

S. No	Name of the Faculty	Name of the Professional Society
1.	Dr.M.Kaliappan, Prof&Head/AI&DS	ISTE
2.		IE(I)-Life member
3.		CSI- Life member
4.	Dr.S.Vimal, ASP/AI&DS	IEEE
5.		ACM
6.		ISTE
7.	Mrs.B.Revathi, AP/AI & DS	ISTE
8.	Dr. S. Rajakarunakaran, Prof&Head/MECH	ISTE National Executive Member
9.		SAE Management Committee Member, Tirunelveli Division
10.	Dr.S.Dharmar, ASP/Civil	Life Time Member-ISTE
11.	Mrs.D.Darling Helen Lydia, AP/Civil	
12.	Mrs.A.Leema Margret, AP/Civil	
13.	Mrs.R.Kalaimani AP/Civil	
14.	Mr.V.Ragavan, AP/Civil	
15.	Dr.M.Indhumathi,ASP/Civil	
16.	Mr.T.Chockalingam, AP(SG)/Civil	
17.	Dr.M.Indhumathi,ASP/Civil	MIE
18.	Ms. R.Ramalakshmi, AP(SG)/ECE	Life Time Member-ISTE
19.	Ms. G.GnanaPriya, AP(SG)/ECE	
20.	Mr.R.Arun Kumar, AP(SG)/Mech	Life Member - Indian Society for Technical Education
21.		Associate Member - The Institution of Engineers (India)

Syllabus committee member:

1. Dr. S. Rajakarunakaran acted as Syllabus Committee member M.E. Industrial Engineering & M.E. Industrial Safety Engineering
2. Dr.K.Vijayalakshmi, Prof/CSE,acted as Syllabus Committee member for Anna University PG Regulation R-2017,2021.
3. Dr.T.Vigneshwari ,AP(SG)/Physics-acted as a Sylalbus committee review member for Engineering Physics -I & II (Theory & Practical) I PACR amasamy Raja Polytechnic College,Rajapalayam in 2021
4. Dr. M.Anand, ASP/English acted as PACR Polytechnic Sylalbus Committee members for English(Since 2019)
5. Dr. G.Kanthimathi,ASP/Chemistry,Syllabus committee member for the subject Engineering Chemistry I & II and Engineering Chemistry Practical I &II for the Institution P.A.C Ramasamy Raja Polytechnic College (Autonomous), Rajapalayam on 25.05.2021

Margdarshak

1. Dr. S. Rajakarunakaran, Prof.& Head/Mechanical AICTE-Margdarshak Member from 23/06/2021

NBA Mock Audit expert member

1. Dr. S. Rajakarunakaran, Prof. & Head/Mech acted as an "Expert in the NBA documentation processes- NBA Mock Audit" organised by PSR Engineering College, Sivakasi, NSR Institute of Technology, Sontyam, Visakhapatnam, SSM Institute of Engineering and Technology, Dindigul, Anna University, Chennai, Shadan College of Engineering and Technology, Hyderabad.
2. Dr. P.Suresh Kumar, ASOP/Mech acted as an "NBA Mock Audit" organised by AnjalaiAmmalMahalingam Engineering College, Thanjavur and Shadan College of Engineering and Technology, Hyderabad
3. Dr.M.Kaliappan, Prof&Head AI&DS acted as NBA Mock Audit Committee member in Sadhaan College of Engneering ,Hyderabad and Anjalaiammal Engineering College, Thanjavar.

Others

1. Dr. S. Rajakarunakaran Prof.& Head/Mechanical acted as Academic Board Nominee in Sankar Polytechnic College, Sankar Nagar
2. Mr.R.Muruganatham AP/Civil, Mr.A.ManickaMammallan AP/Civil &Mr.V.Ragavan AP/Civil certified that trainer for Vayumitra Training offered by NIWE (a unit of MNRE)
3. Dr.M.Indhumathi ASP/Civil,certified that Approved Valuer from IOVRVF
4. Mr.T.Chockalingam, AP(SG)/Civil Engineering has completed the innovation Ambassador TraningInnovation Ambassador - Advanced Level organized by Ministry of Education.
5. MrD.KarthikPrabhu AP(SG)/EEE acting as a certified trainer for Vayumitra Training offered by NIWE (a unit of MNRE)
6. Mr. S. MeenakshiSundaravel, AP(SG)/EEE acting as a certified trainer for Vayumitra Training offered by NIWE (a unit of MNRE)
7. Mr.E. Thangam, AP(SG)/EEE acting as a certified trainer for Vayumitra Training offered by NIWE (a unit of MNRE)
8. Ms.B. Vijayalakshmi, AP(SG)/ CSE participated as programme committee member and reviewer in the International Conference on Computer Vision and Robotics (CVR 2023) held during Feb 24-25, 2023, India
9. Dr.M.GomathyNayagam, Assoc. Prof/CSE, received recognition certificate of review the journal paper in Measurement: Sensor (Elsevier)

10. Dr. B. Deepa Lakshmi, ASP/EEE acted as reviewer in the International Conference on Distributed Computing and Electrical Circuits and Electronics ICDCECE-2023 which was organized by Ballari Institute of Technology and Management, Ballari, Karnataka in association IEEE Bangalore Section.
11. Dr. A. Lakshmi, ASP/ECE, received recognition certificate of review of the Journal papers in Biomedical Signal Processing and Control, Elsevier and Computers in Biology and Medicine, Elsevier
12. Dr. R. Rajalakshmi, AP/ECE acted as a reviewer in Journal of Intelligent & Fuzzy Systems
13. Ms.R.Chandralekha, AP/ECE acted a reviewer in IEEE International Conference on Integrated Circuits and Communication Systems (ICICACS-2023) which was organized by S.L.N. College of Engineering, Raichur, Karnataka
14. Dr.B.Deepa Lakshmi, ASP/ECE acted as a reviewer in IEEE Sponsored Conference on International Conference On Distributed Computing And Electrical Circuits And Electronics (ICDCECE-2023) which was organized by Ballari Institute of Technology and Management, Ballari, Karnataka
15. Dr. S. Vimal, Associate Professor/AI & DS received the International Young Researcher Award 2022 instituted by the International Institute of organized Research (I2OR) which is a registered MSME with the Ministry of Micro, Small and Medium Enterprises, Government of India and is advocating Academic and Research Programs for API and Career Advancement Scheme.
16. Dr.S.Vimal, ASP/AD for the completion of the "Postdoctoral Fellowship Program" at the Telecommunications Engineering Graduate Programme, Federal Institute of Science, Education and Technology of Ceará, Fortaleza-CE, Brasil, from February, 1st 2022 To January, 31st 2023 the project entitled "Artificial Intelligence and Block chain based sentiment analysis of clinical data investigation for healthcare sector " A presentation was held with Zoom meeting on 02.03.2022 and he is cordially invited to visit the Federal Institute of Science, Education and Technology of Ceará, Fortaleza-CE, Brasilting during June - July 2023.
17. SCIVAL- ELSEVIER released TOP 500 authors in all universities list, In Anna university affiliated institutions,

CSE background Ranking :

- Dr.S.Vimal, Asso/AD have ranked 4th place out of top 513 authors
- Dr M.Kaliappan, prof & head/AD have ranked 145th place

Overall Ranking in top 500 authors:

- DrRajakarunakaran sir, VP,Prof and Head/MECh have ranked 369th Place
- Dr .M. Kaliappan, prof & Head/ AD have ranked 470th place
- Dr.S.Vimal, Asso/AD have ranked 20th place out of top 513 authors

18. Dr. S. Vimal ASP/AI & DS to Chair the technical session in the 5th International Conference on Computational Intelligence in Pattern Recognition(CIPR-2023) to be held at Techno Main, Salt Lake, Kolkata, W.B. during MAY 27-28, 2023
19. Dr. T.Vigneswari, AP(SG)/Phy received the Best paper award in the International Conference on Advanced Technologies in Chemical, Construction and Mechanical Sciences (ICATCHCOME 2023), Organized by KPR Institute of Engineering and Technology, Coimbatore during 09 -10 February, 2023.
20. Dr. K. Jeyapappa, AP/Phy received the Best paper award in the International Conference on Advanced Technologies in Chemical, Construction and Mechanical Sciences (ICATCHCOME 2023), Organized by KPR Institute of Engineering and Technology, Coimbatore during 09-10 February, 2023.
21. Dr.M.VenkateshPerumal, AP/Chemistry received the Best paper award in the International Conference on Advanced Technologies in Chemical, Construction and Mechanical Sciences (ICATCHCOME 2023), Organized by KPR Institute of Engineering and Technology, Coimbatore during 09-10 February, 2023.
22. Dr.M.VenkateshPerumal, AP(Sr.G)/Chemistry acted as a reviewer in Letters in Drug Design & Discovery (Bentham Science Publishers).
23. Dr. S. Vimal/ASP AI &DS have been invited as Jurie for the Hackathon Contest to be held on April 29, 2023 Organized in association with Bevy Networks(Bangalore and Tirunelveli) Smack Coders(Tirunelveli)