Department of Computer Science and Engineering
Academic Year 2024 – 2025 (Odd Semester)

Degree, Semester & Branch: III Semester B.E. CSE
Course Code & Title : CS3352 Foundations of Data Science
Name of the Faculty member (s): Dr.M.Swarna Sudha

Innovative Practice Description

Unit / Topic: Unit V / Matplotlib

Course Outcome: CO 5

Topic Learning Outcome: TLO10

Activity Chosen: Demonstration and Practice

Justification:

The topic of **Matplotlib** was chosen for its importance in **data visualization**, a key skill in data analysis. By demonstrating the tool and allowing students to practice with real datasets in **Google Colab**, they gain hands-on experience in creating and customizing visualizations. This approach enhances learning by providing both theoretical insights and practical application, helping students develop essential skills for representing and interpreting data effectively. The use of **Google Colab** also ensures accessibility, enabling students to work on the visualizations collaboratively and independently.

Time Allotted for the Activity: 40 minutes

Details of the Implementation:

 To introduce students to Matplotlib for data visualization, the session began with **a** live demonstration using Google Colab. I first explained the basics of Matplotlib, including how to import the library and plot simple graphs like line plots and bar charts. During the demonstration, I showed how to customize the plots by adding titles, axis labels, legends, and changing line styles and colors to make the visualizations clearer and more engaging.

After the demonstration, students were provided with real-world datasets (e.g., sales data over time and weather data) and were asked to replicate the demonstrated plots in Google Colab**.** They practiced creating line plots**,** bar charts**,** and scatter plots**,** while experimenting with different customization options like gridlines, color palettes, and marker styles. This hands-on practice allowed them to apply the concepts directly.

Students were also encouraged to explore advanced features such as multiple subplots, adjusting plot dimensions, and exporting plots as images. After completing the exercises, students shared their work in small groups to discuss their approach and challenges, fostering collaborative learning. This activity not only helped them

understand the technical aspects of Matplotlib but also enhanced their ability to represent and interpret data effectively.
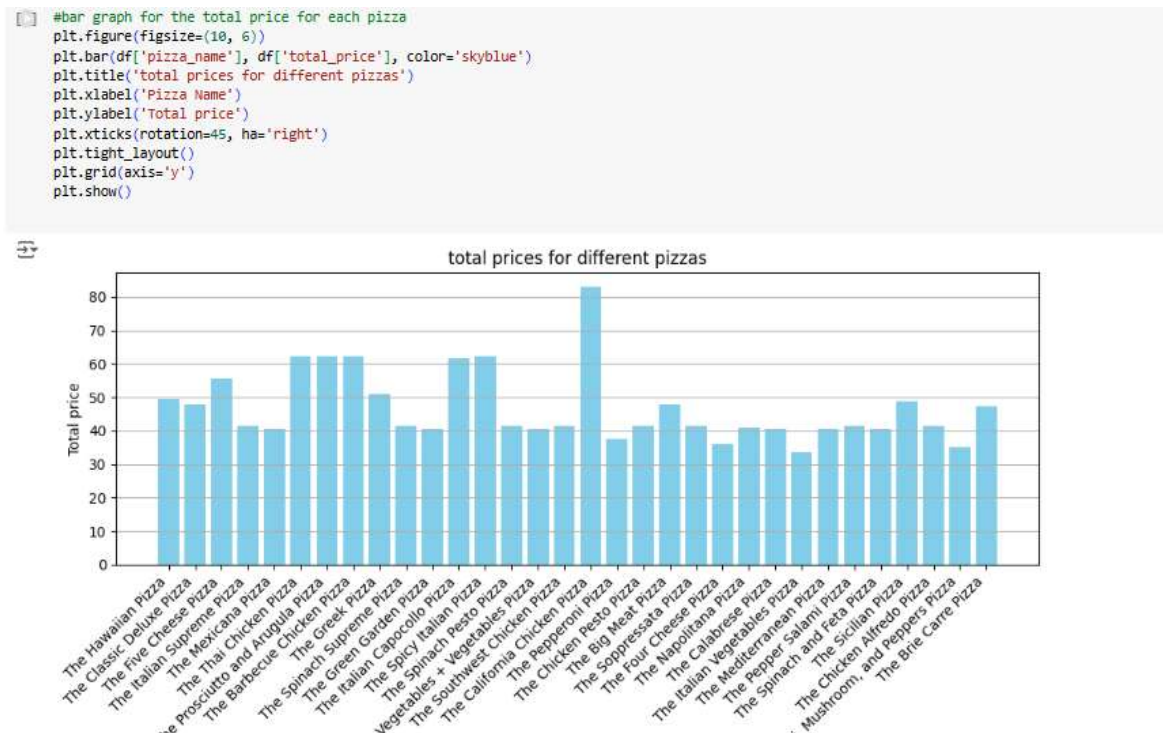
Images / Screenshot of the practice:

```python
#bar graph for the total price for each pizza
plt.figure(figsize=(10, 6))
plt.bar(df['pizza_name'], df['total_price'], color='skyblue')
plt.title('total prices for different pizzas')
plt.xlabel('Pizza Name')
plt.ylabel('Total price')
plt.xticks(rotation=45, ha='right')
plt.tight_layout()
plt.grid(axis='y')
plt.show()
```


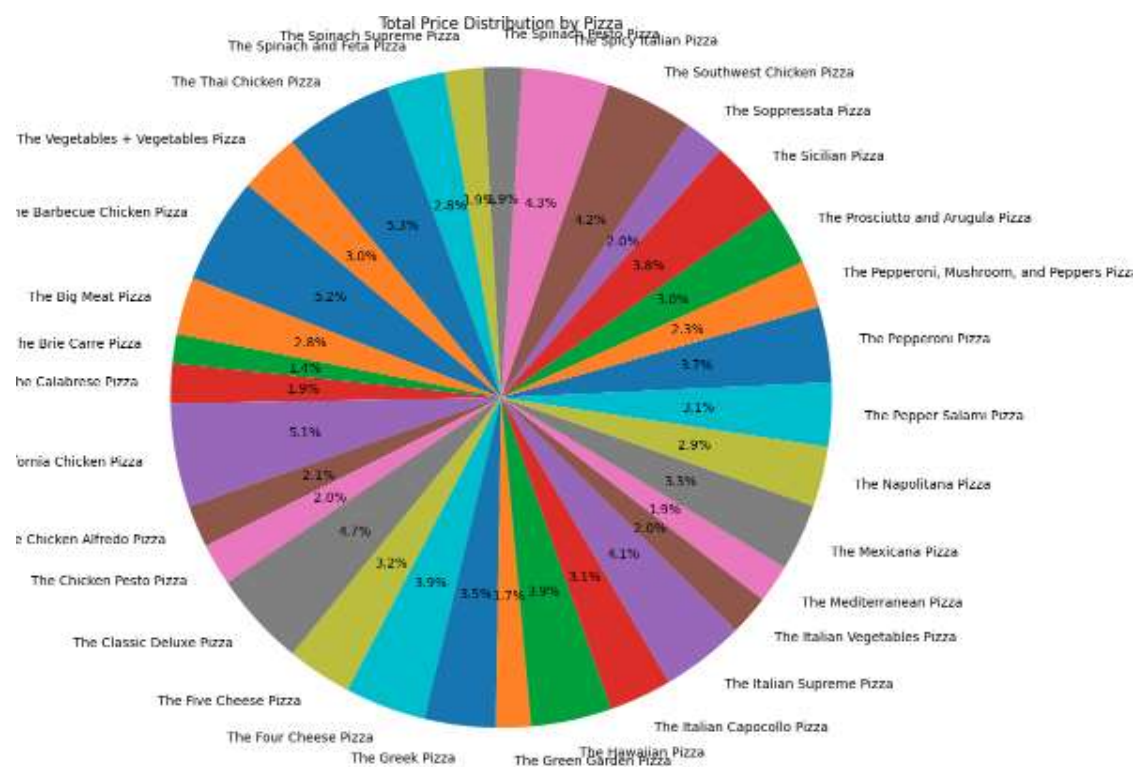*Figure 1: Bar chart for Pizza_dataset_by JECI CARMEL A*

Figure 2:. Pie Chart for Pizza dataset by JECI CARMEL A

Stacked Bar Chart for Selected Indicators

```
[ ]   df.set_index('FSI Country', inplace=True)
      df[['S1: Demographic Pressures', 'S2: Refugees and IDPs', 'C3: Group Grievance']].plot(kind='bar', stacked=True, figsize=(12, 7))
      plt.xlabel('Country')
      plt.ylabel('Scores')
      plt.title('Stacked Bar Chart for Selected Indicators')
      plt.xticks(rotation=45)
      plt.legend(loc='upper right')
      plt.grid(axis='y', linestyle='--', alpha=0.7)
      plt.show()
```
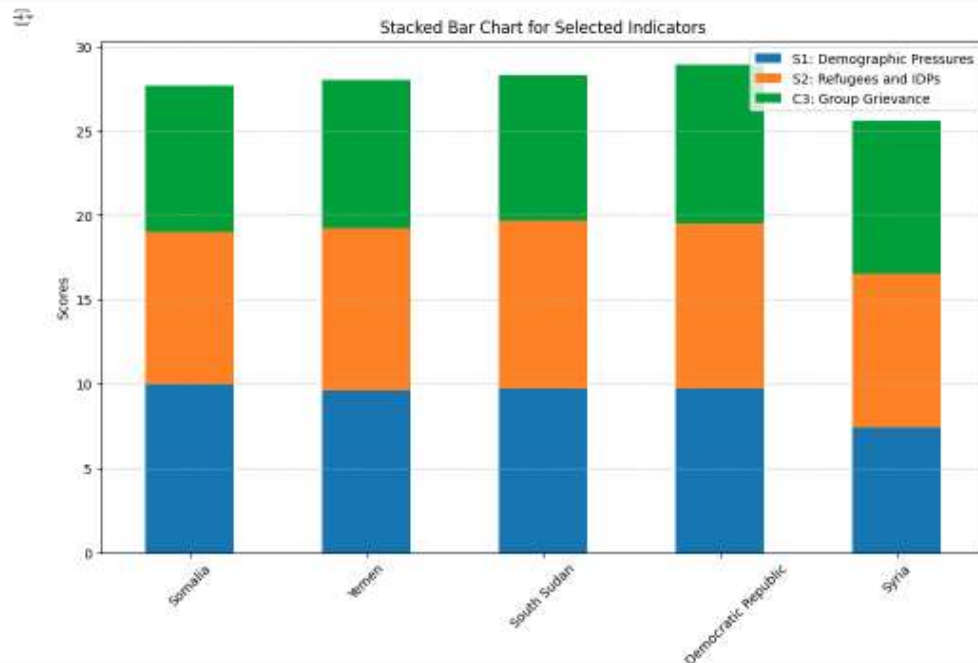

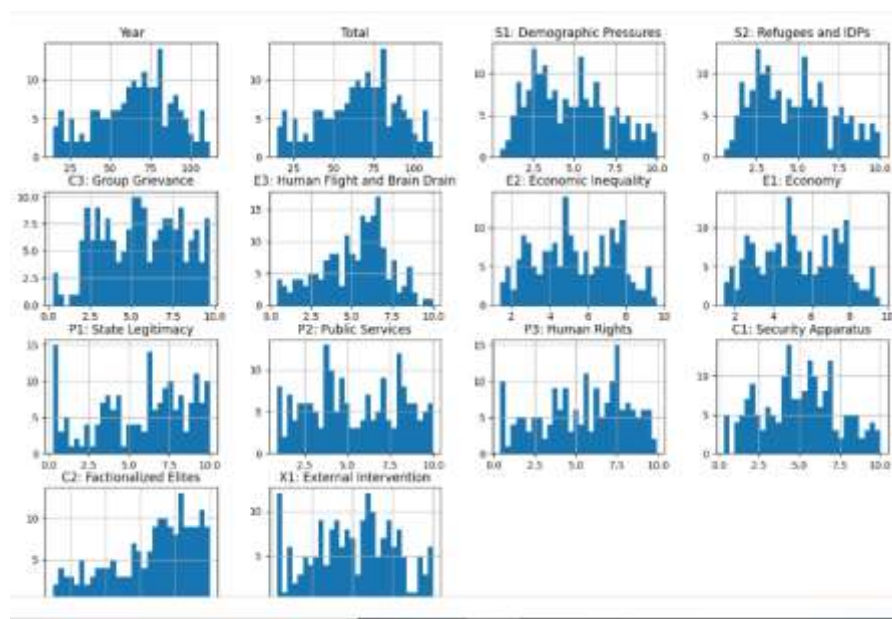**Fig 3 Line Plot for "S1: Demographic Pressures" Over Countries by ASMA**

Fig 4 Histogram for "S1: Demographic Pressures" Over Countries by ASMA

CO – PO / PSO mapping:

CO	PO1	PO2	PO3	PO4	PO5	PSO2	PSO3
CO4	2	2	2	2	3	2	2

(1 – Low 2 – Moderate 3 – High)

PO / PSO mapped:

Innovative practice	PO1	PO2	PO3	PO4	PO5	PSO2	PSO3
	2	2	2	2	3	2	2
Justification for correlation	Students understood the concept Matplotlib with Engineering Knowledge	Students analyzed use of the module Matplotlib using engineering sciences.	Students developed visualization based solutions by implementing different dataset.	Students investigated complex problems related and explore potential improvement	Students effectively used GoogleCo lab tools and platforms to implement and gain hands-on experience.	Students will be able to apply Visualizatio n concepts to develop reliable IT solutions.	Students will be able to incorporate with AI to provide solutions to real-world problems in Industry.

Reflective Critique:

- The demonstration activity enhances students' awareness of online tools relevant to the subject matter, expanding their resource base for future learning endeavors.
- Introducing students to a variety of online tools cultivates adaptability and prepares them for diverse technological environments.

Benefit of the practice:
- The students enjoyed the activity.
- Hands-on practice aids in depth about concept clearly.
- Active engagement promotes experiential learning, enabling students to adopt theoretical knowledge and apply it to practical scenarios with greater confidence.

Challenges faced in implementation:
- Implementing Google Colab in classroom settings can present challenges, particularly in monitoring student progress and managing time effectively

References:

1. https://colab.research.google.com/drive
2. https://www.geeksforgeeks.org/how-to-use-google-colab/
3. https://learning.cambridgeinternational.org/professionaldevelopment/mod/book/view.php?id=18506&chapterid=7531