Department of Engineering Sciences and Technology,

Second Year Btech in Computer Science

Project Based Learning-Python

Assignment - 18

Name - Paritosh kolwadkar

SRN – 31231313

Roll no – 39

Batch – D2

Problem statement : **Write a program to create a simple line plot, scatter plot, histogram, and bar plot using Matplotlib. Customize each plot with appropriate labels, titles, colors, and markers.**

pip install matplotlib

Basic understanding of plotting using `Matplotlib`.

Code:

```
import matplotlib.pyplot as plt

import numpy as np


# Data for the plots

x = np.linspace(0, 10, 100)

y = np.sin(x)

y_scatter = np.random.rand(10)

x_scatter = np.random.rand(10)

data_hist = np.random.randn(1000)
```

```
categories = ['A', 'B', 'C', 'D']
values = [15, 30, 45, 10]

# 1. Line Plot
plt.figure(figsize=(10, 6))
plt.plot(x, y, label='sin(x)', color='blue', marker='o', linestyle='-', markersize=5)
plt.title('Simple Line Plot')
plt.xlabel('X-axis')
plt.ylabel('Y-axis')
plt.grid(True)
plt.legend()
plt.show()

# 2. Scatter Plot
plt.figure(figsize=(10, 6))
plt.scatter(x_scatter, y_scatter, color='red', marker='^', s=100)  # 's' is for size of the marker
plt.title('Simple Scatter Plot')
plt.xlabel('X-axis')
plt.ylabel('Y-axis')
plt.grid(True)
plt.show()

# 3. Histogram
plt.figure(figsize=(10, 6))
plt.hist(data_hist, bins=30, color='green', edgecolor='black')
plt.title('Simple Histogram')
plt.xlabel('Value')
plt.ylabel('Frequency')
plt.grid(True)
plt.show()

# 4. Bar Plot
plt.figure(figsize=(10, 6))
plt.bar(categories, values, color='purple', edgecolor='black')
plt.title('Simple Bar Plot')
plt.xlabel('Category')
plt.ylabel('Value')
plt.grid(True)
plt.show()
```

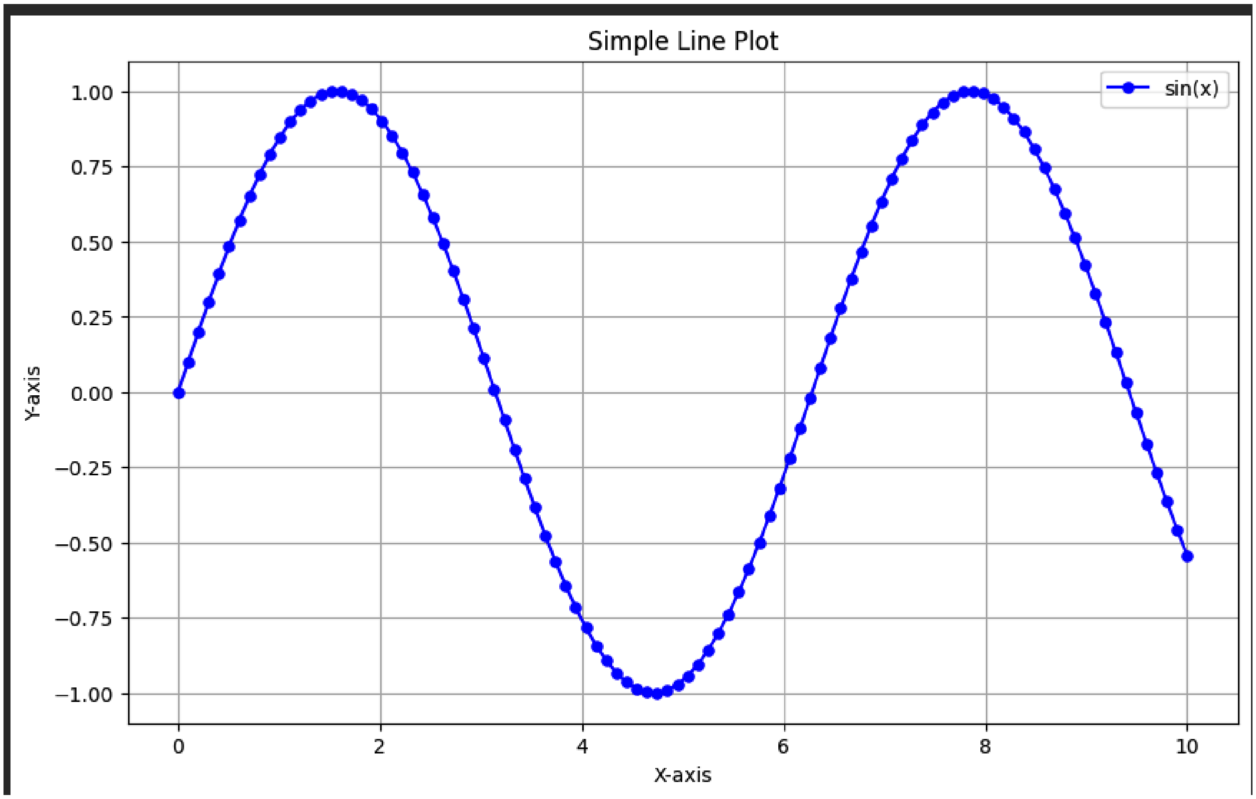
Explanation :

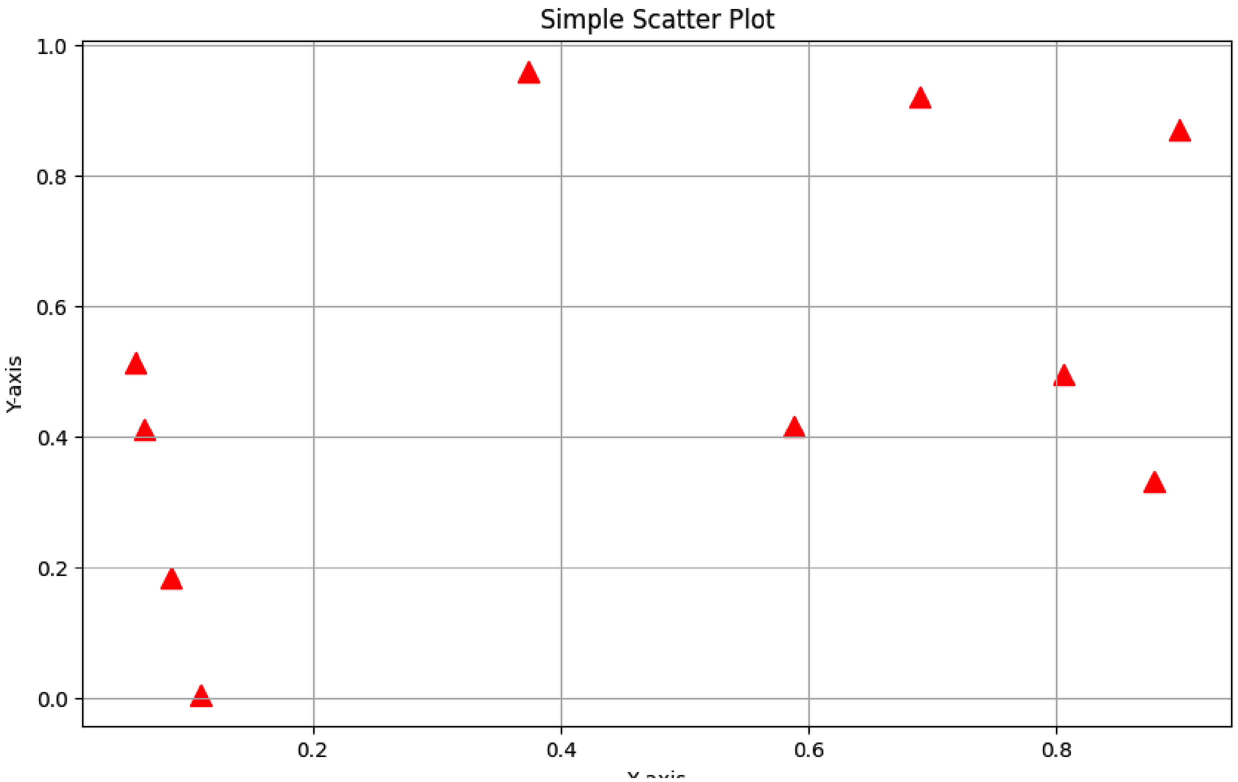
1. **Line Plot:**
   - **The line plot is created using the `plt.plot()` function, where `x` is the horizontal axis and `y` is the vertical axis.**
   - **Customizations include:**
     - **Color: Blue line.**
     - **Marker: Circle markers (`'o'`).**
     - **Linestyle: Solid line (`'-'`).**
     - **Title: "Simple Line Plot".**
     - **Labels: X and Y axes are labeled.**
     - **Grid: Enabled grid for better visualization.**
2. **Scatter Plot:**
   - **The scatter plot is created using the `plt.scatter()` function, where `x_scatter` and `y_scatter` are the data points.**
   - **Customizations include:**
     - **Color: Red points.**
     - **Marker: Triangle markers (`'^'`).**
     - **Size: Marker size is set to `100`.**
     - **Title: "Simple Scatter Plot".**
     - **Labels: X and Y axes are labeled.**
     - **Grid: Enabled grid for better visualization.**
3. **Histogram:**

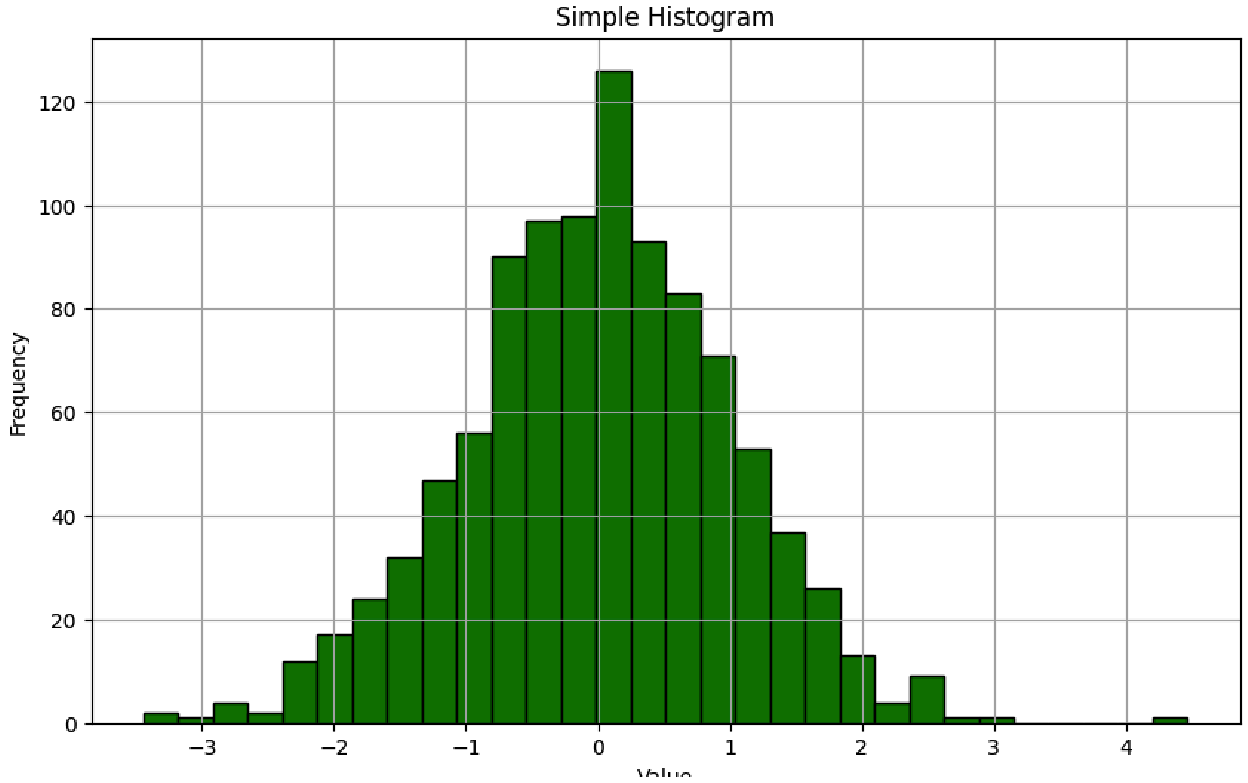
   - The histogram is created using `plt.hist()`, which visualizes the distribution of `data_hist` data.
   - Customizations include:
     - Bins: 30 bins.
     - Color: Green bars.
     - Edge Color: Black border around the bars.
     - Title: "Simple Histogram".
     - Labels: X and Y axes are labeled.
     - Grid: Enabled grid for better visualization.

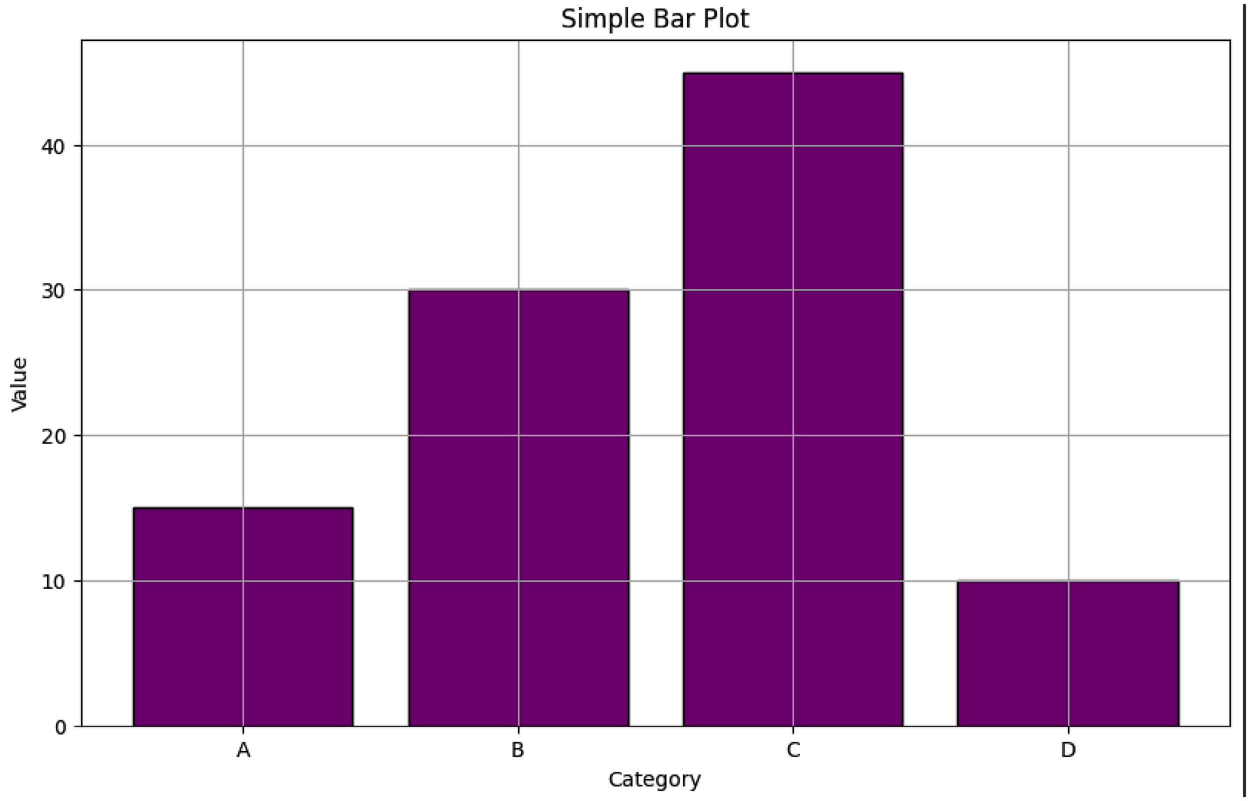
4. Bar Plot:
   - The bar plot is created using `plt.bar()` where the x-values represent categories (like 'A', 'B', 'C', 'D') and y-values represent the corresponding values.
   - Customizations include:
     - Color: Purple bars.
     - Edge Color: Black border around the bars.
     - Title: "Simple Bar Plot".
     - Labels: X and Y axes are labeled.
     - Grid: Enabled grid for better visualization.

Output:


Simple Line Plot
sin(x)
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
Y-axis
0
2
4
6
8
10
X-axis


Simple Scatter Plot
1.0
0.8
0.6
0.4
0.2
0.0
Y-axis
0.2
0.4
0.6
0.8
X-axis


Simple Histogram


Simple Bar Plot

Output Explained:

- `plt.plot()`: Used for line plots.
- `plt.scatter()`: Used for scatter plots.
- `plt.hist()`: Used for histograms.
- `plt.bar()`: Used for bar plots.
- Customizations:
    - Colors, markers, labels, and grids help improve plot readability and aesthetics.

This program demonstrates how to create different types of plots and how to customize them for better presentation and analysis.