PRACTICE SESSION FOR THEORY ACTIVITY

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Assignment Name: Significance of All Basic Graphs Required for Data Visualization in Python

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Introduction

Data visualization is a powerful technique in data analysis that helps in understanding, interpreting, and communicating patterns and trends within data. Python, with libraries like Matplotlib, Seaborn, and Plotly, allows us to create meaningful visualizations using different types of basic graphs. Each graph type has its unique purpose and is suitable for different kinds of data.

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1. Line Graph

Significance:

- Shows trends over time.
- Useful for time series data analysis.

Example:

```
python
CopyEdit
import matplotlib.pyplot as plt

months = ['Jan', 'Feb', 'Mar', 'Apr']
sales = [2500, 3000, 4000, 3500]

plt.plot(months, sales)
plt.title('Monthly Sales Trend')
plt.xlabel('Month')
plt.ylabel('Sales')
```

```
plt.show()
```

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2. Bar Chart

Significance:

- Compares values across categories.

Example :

```
python
CopyEdit
categories = ['A', 'B', 'C']
values = [10, 24, 36]

plt.bar(categories, values)
plt.title('Category Comparison')
plt.xlabel('Category')
plt.ylabel('Value')
plt.show()
```

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3. Histogram

Significance:

- Shows distribution of continuous data.

Example :

```
python
CopyEdit
import numpy as np

data = np.random.normal(50, 10, 100)
plt.hist(data, bins=10, color='skyblue')
plt.title('Data Distribution')
plt.xlabel('Value Range')
plt.ylabel('Frequency')
plt.show()
```

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4. Pie Chart

Significance:

- Displays proportion of categories.

Example:

```
python
CopyEdit
labels = ['Apple', 'Banana', 'Orange']
sizes = [30, 45, 25]

plt.pie(sizes, labels=labels, autopct='%1.1f%%')
plt.title('Fruit Share')
plt.show()
```

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5. Scatter Plot

Significance:

- Shows relationship between two numeric variables.

Example:

```
python
CopyEdit
x = [1, 2, 3, 4, 5]
y = [2, 4, 1, 8, 7]

plt.scatter(x, y, color='red')
plt.title('Scatter Example')
plt.xlabel('X-axis')
plt.ylabel('Y-axis')
plt.show()
```

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6. Box Plot

Significance:

- Displays data spread and outliers.

Example :

```
python
CopyEdit
import seaborn as sns

data = [7, 15, 13, 21, 22, 19, 30, 35]
sns.boxplot(data=data)
plt.title('Box Plot Example')
plt.show()
```

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7. Heatmap

Significance:

- Visualizes correlations or matrix data.

Example :

```
python
CopyEdit
import seaborn as sns
import numpy as np
import pandas as pd

data = np.random.rand(4, 4)
df = pd.DataFrame(data, columns=["A", "B", "C", "D"])

sns.heatmap(df, annot=True, cmap="YlGnBu")
plt.title('Heatmap Example')
plt.show()
```

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8. Area Chart

Significance:

- Emphasizes magnitude over time.

Example :

```
python
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x = [1, 2, 3, 4]
y = [2, 3, 4, 6]

plt.fill_between(x, y, color="skyblue", alpha=0.4)
plt.plot(x, y, color="Slateblue")
plt.title('Area Chart')
plt.xlabel('X-axis')
plt.ylabel('Y-axis')
plt.show()
```

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9. Violin Plot

Significance:

- Combines box plot and density plot.

Example :

```
python
CopyEdit
tips = sns.load_dataset("tips")
sns.violinplot(x="day", y="total_bill", data=tips)
```

```
plt.title('Violin Plot of Total Bill by Day')
plt.show()
```

Conclusion

Understanding the right graph to use for specific data types is essential in data analysis. Each type of visualization highlights different aspects of the data, from distribution and relationships to trends and comparisons. Python provides simple yet powerful tools for creating these visuals, which are critical for insightful analysis and presentation.
