



Data Science

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PLOTTINGS

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Plotting

- Plotting means creating visual representations of data to make it easier to observe patterns, trends, and insights.

Why Plotting is Important:

- Makes data easy to understand
- Helps in decision making
- Reveals **hidden patterns, trends, and outliers**
- Makes communication of results more visual and impactful

Plotting in Python: Libraries

To plot graphs in Python, we mainly use:

1. Matplotlib

- Core plotting library in Python.
- Easy for basic plots.

2. Pandas

- Easier syntax for simple plots using .plot().

3. Seaborn

- Built on Matplotlib, used for statistical and attractive visualizations.
- Includes advanced plots like heatmaps, violin plots, etc.



How to Install Plotting Libraries

pip install matplotlib seaborn pandas

How to Import

import pandas as pd

import matplotlib.pyplot as plt

import seaborn as sns

Note: Use %matplotlib inline if working in Jupyter Notebook to show plots inline.



Example :

```
import pandas as pd  
import matplotlib.pyplot as plt
```

```
data = {  
    'Month': ['Jan', 'Feb', 'Mar', 'Apr', 'May'],  
    'Sales': [250, 400, 300, 500, 450],  
    'Profit': [80, 120, 100, 160, 130]  
}
```

```
df = pd.DataFrame(data)  
print (data)  
Print (df)
```

1. Line Plot

- A graph that connects data points using a straight line.
- To **show trends over time** (like monthly sales or temperature changes).



Code 1: Line Plot

```
df.plot(x='Month', y='Sales', kind='line', marker='o')
plt.title("Monthly Sales Line Plot")
plt.xlabel("Month")
plt.ylabel("Sales")
plt.grid(True)
plt.show()
```

Note: marker='o' or marker='*' or marker='s'

The marker is used to highlight individual data points on a line plot.



2. Bar Graph

- A chart with rectangular bars representing values of different categories.
- To compare values across different groups/categories.



Code 2 : Bar Graph

```
df.plot(x='Month', y='Sales', kind='bar', color='skyblue')
plt.title("Sales Bar Chart")
plt.xlabel("Month")
plt.ylabel("Sales")
plt.show()
```



3. Pie Chart

- A circular chart divided into slices to illustrate parts of a whole.
- To show proportions or percentage share (like % of total sales by month).

Code 3 : Pie Chart

```
plt.pie(df['Sales'], labels=df['Month'], autopct='%1.1f%%')  
plt.title("Sales Share by Month")  
plt.show()
```

NOTE:

(1) **autopct = “auto percentage”**

It is used to display the percentage value on each slice of the pie chart.

(2)

Parameter	Meaning
%1.1f%%	1 decimal place floating number + percent sign
%1.2f%%	2 decimal places



4. Scatter Plot

- A graph with points plotted on X and Y axes to show relationships.
- To visualize the correlation or relationship between two numeric variables.



Code 4 : Scatter Plot

```
df.plot(kind='scatter', x='Sales', y='Profit', color='red')
plt.title("Sales vs Profit")
plt.xlabel("Sales")
plt.ylabel("Profit")
plt.show()
```

5. Histogram

- A histogram is a type of bar chart that represents the frequency distribution of numerical data by grouping values into intervals or bins.

Useful for:

To understand the distribution (normal, skewed, uniform, etc.)

To find data spread, central values, or gaps

To detect peaks or skewness



Code 5 : Histogram

```
import pandas as pd
import matplotlib.pyplot as plt

data = {'Marks': [23, 45, 55, 60, 67, 67, 70, 72, 75, 78, 80, 85, 85, 90, 95, 100]}
df = pd.DataFrame(data)

plt.figure(figsize=(8,5))
plt.hist(df['Marks'], bins=5, color='skyblue', edgecolor='black')

plt.title('Histogram of Marks')
plt.xlabel('Marks Range')
plt.ylabel('Frequency')
plt.grid(True)
plt.show()
```



6. Box Plot

Code 6.

```
import seaborn as sns  
import matplotlib.pyplot as plt  
  
data = sns.load_dataset("tips")  
sns.boxplot(x=data["total_bill"])  
plt.title("Box-and-Whisker Plot")  
plt.show()
```

Code 7: Experience of 10 teachers are 3,3,7,8,8,10,11,12,15,18

```
import matplotlib.pyplot as plt
```

```
import seaborn as sns
```

```
teaching_years = [3, 3, 7, 8, 8, 10, 11, 12, 15, 18]
```

```
sns.boxplot(data=teaching_years)
```

```
plt.title("Box Plot of Teaching Experience (Years)")
```

```
plt.xlabel("Teaching Experience")
```

```
plt.show()
```



Code 8 : Orientation

```
import matplotlib.pyplot as plt  
import seaborn as sns
```

```
teaching_years = [3, 3, 7, 8, 8, 10, 11, 12, 15, 18]
```

```
sns.boxplot(data=teaching_years, orient='h')  
plt.title("Box Plot of Teaching Experience (Years)")  
plt.xlabel("Teaching Experience")  
plt.show()
```



Code 9:

```
import seaborn as sns
import matplotlib.pyplot as plt
import pandas as pd

data = pd.DataFrame({
    'Experience': [3, 3, 7, 8, 8, 10, 11, 12, 15, 18],
    'Department': ['CS', 'Math', 'CS', 'Physics', 'CS', 'Math', 'Math', 'Physics',
                   'CS', 'Math']
})

sns.boxplot(x='Department', y='Experience', hue='Department', data=data)
plt.show()
```



Thanks!