

## Introduction to Matplotlib

**Matplotlib** is a Python library used for creating static, interactive, and animated visualizations. The most commonly used module in Matplotlib is **pyplot**, which provides a MATLAB-like interface for plotting.

### Syntax for Importing Matplotlib

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

**import:** Loads the pyplot module from the Matplotlib library.

**as plt:** Provides an alias (plt) to simplify the use of functions from pyplot. Instead of writing matplotlib.pyplot.function\_name, you can use plt.function\_name.

### Basic Example

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

```
# Data for the plot
```

```
x = [1, 2, 3, 4, 5]
```

```
y = [2, 4, 6, 8, 10]
```

```
# Create a simple line plot
```

```
plt.plot(x, y, label="y = 2x", color='blue', linestyle='--', marker='o')
```

```
# Add a title and labels
```

```
plt.title("Simple Line Plot")
```

```
plt.xlabel("X-axis")
```

```
plt.ylabel("Y-axis")
```

```
# Add a legend
```

```
plt.legend()
```

```
# Display the plot
```

```
plt.show()
```

#### 1. Data for the Plot:

- $x = [1, 2, 3, 4, 5]$  and  $y = [2, 4, 6, 8, 10]$  are the data points for the X-axis and Y-axis.

#### 2. `plt.plot(x, y, ...)`:

- Creates a line plot of y values against x.
- **label="y = 2x"**: Adds a label for the plot to use in the legend.
- **color='blue'**: Sets the line color to blue.

- **linestyle='--'**: Uses a dashed line style.
- **marker='o'**: Adds circular markers at data points.
- 3. **plt.title()**:
  - Sets the title of the plot as "Simple Line Plot".
- 4. **plt.xlabel()** and **plt.ylabel()**:
  - Label the X-axis and Y-axis.
- 5. **plt.legend()**:
  - Displays the legend for the labeled plot.
- 6. **plt.show()**:
  - Displays the plot on the screen.

### Output

The resulting graph would show:

- A dashed blue line with circular markers.
- A title: "**Simple Line Plot**".
- Labels for both axes.
- A legend indicating the line represents  $y = 2x$ .

### Use Cases of Matplotlib

- **Data Exploration**: Create visualizations like scatter plots, histograms, and bar charts to analyze datasets.
- **Presentation**: Enhance presentations with visually appealing charts.
- **Reporting**: Generate plots for inclusion in reports or publications.