# Chapter 7

# Data Visualization with Matplotlib

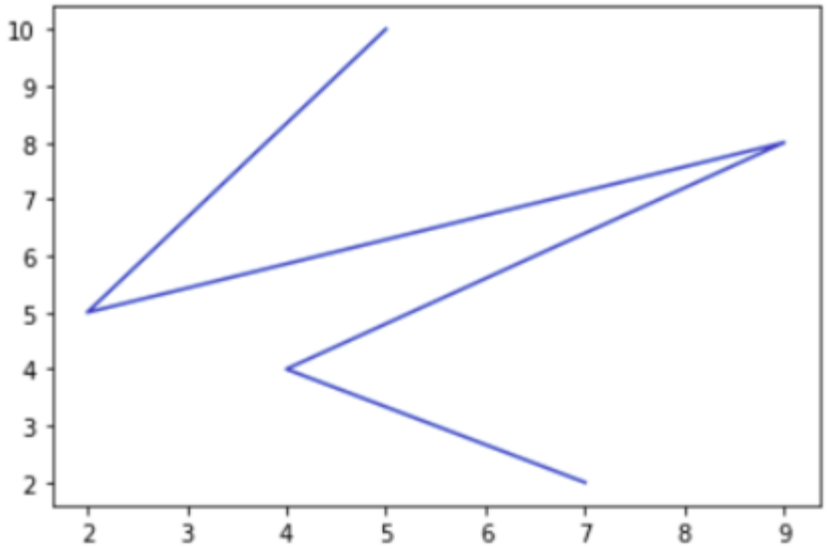
- Introduction
- Install
- Types of plot in matplotlib

- Data Visualization:
  - is the process of presenting data in the form of graphs or charts.
  - is also used in high-level data analysis for Machine Learning and Exploratory Data Analysis (EDA)
- Matplotlib
  - is a low-level library of Python which is used for data visualization.
  - is easy to use and emulates MATLAB like graphs and visualization.

- Step 1 – Make sure Python and pip is preinstalled on your system:
  - Check Python : python --version
  - Check pip : pip -V
- Step 2 – Install Matplotlib
  - Command : pip install matplotlib
- Step 3 - Check if it is installed successfully
  - Command : import matplotlib
  - Check version : Matplotlib.__version__

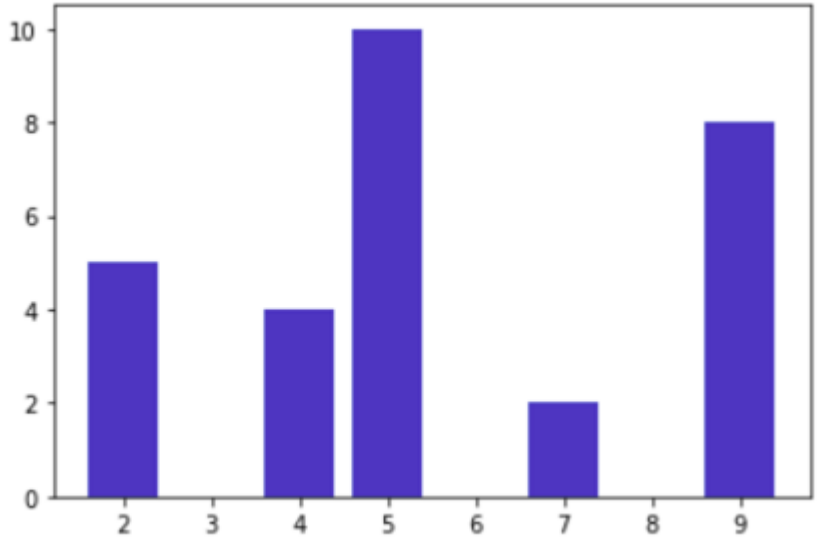
- Line Plot
- Example:

```
# importing matplotlib module
from matplotlib import pyplot as plt

# x-axis values
x = [5, 2, 9, 4, 7]

# Y-axis values
y = [10, 5, 8, 4, 2]

# Function to plot
plt.plot(x, y)

# function to show the plot
plt.show()
```



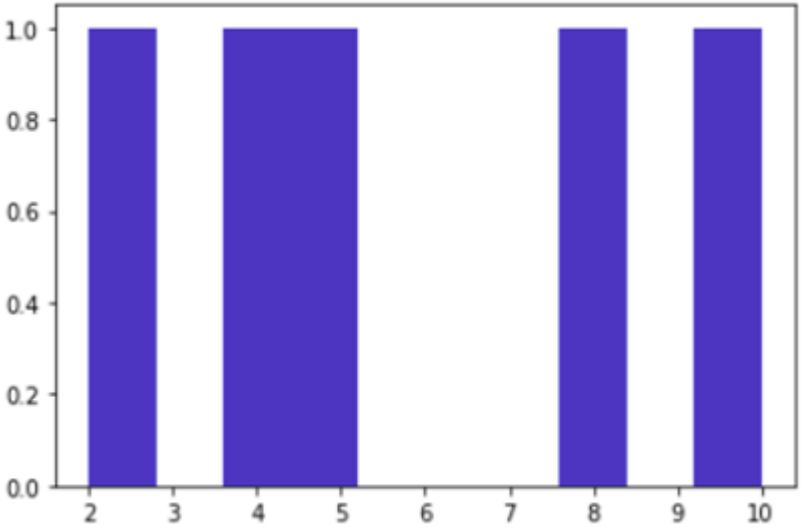
- Bar Plot
- Example:

```
# importing matplotlib module
from matplotlib import pyplot as pl

# x-axis values
x = [5, 2, 9, 4, 7]

# Y-axis values
y = [10, 5, 8, 4, 2]

# Function to plot
plt.bar(x, y)

# function to show the plot
plt.show()
```



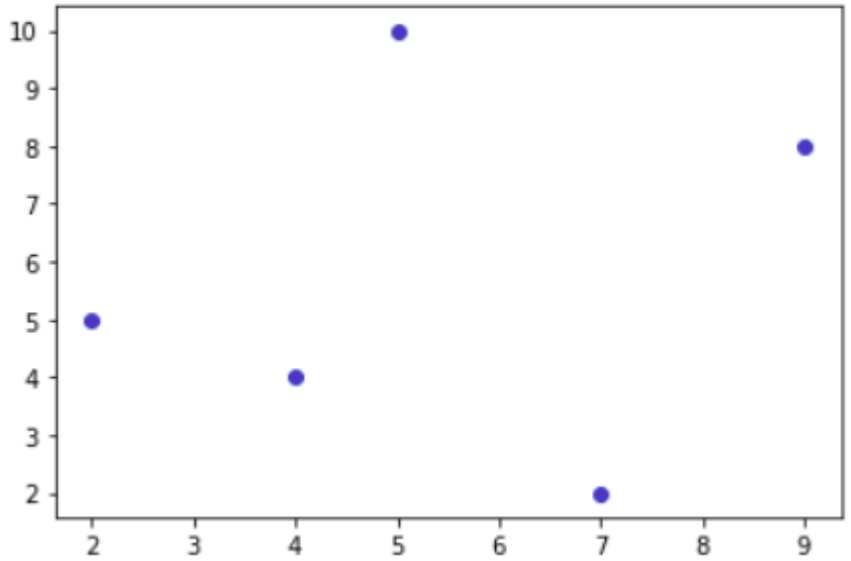
- Histogram
- Example:

```
# importing matplotlib module
from matplotlib import pyplot as plt

# Y-axis values
y = [10, 5, 8, 4, 2]

# Function to plot histogram
plt.hist(y)

# Function to show the plot
plt.show()
```



- Scatter Plot
- Example:

```
# importing matplotlib module
from matplotlib import pyplot as plt

# x-axis values
x = [5, 2, 9, 4, 7]

# Y-axis values
y = [10, 5, 8, 4, 2]

# Function to plot scatter
plt.scatter(x, y)

# function to show the plot
plt.show()
```



# Types of plot in matplotlib

- Adding title and Labeling the Axes in the graph
- Add Title:

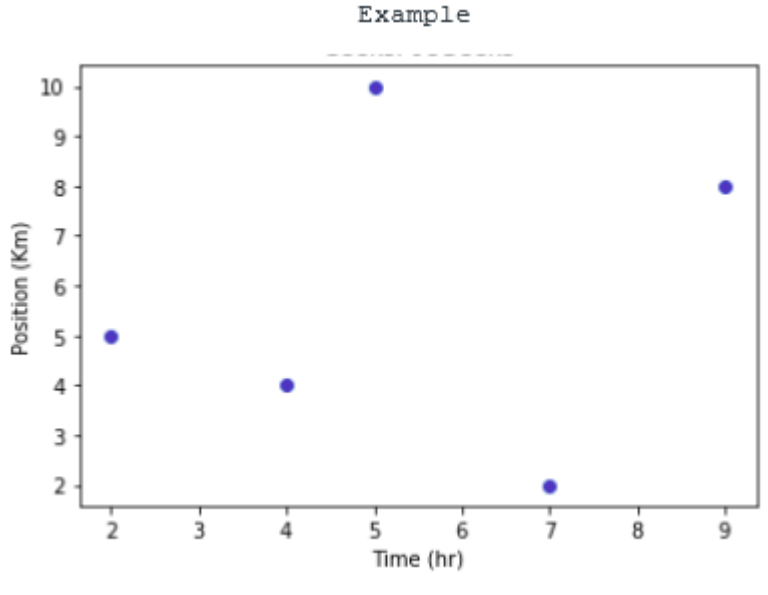
```
matplotlib.pyplot.title("My title")
```

- Label the x-axis and y-axis :

```
matplotlib.pyplot.xlabel("Time (Hr)")
matplotlib.pyplot.ylabel("Position (Km)")
```

- Adding title and Labeling the Axes in the graph
- Example:

```
# x-axis values
x = [5, 2, 9, 4, 7]

# Y-axis values
y = [10, 5, 8, 4, 2]

# Function to plot
plt.scatter(x, y)

# Adding Title
plt.title("Example")

# Labeling the axes
plt.xlabel("Time (hr)")
plt.ylabel("Position (Km)")

# function to show the plot
plt.show()
```

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- Multiple Graphs: by repeating the show() function or use a function called subplot() in order to print them horizontally as well.
- Example:

```
from matplotlib import pyplot as plt


x = [1, 2, 3, 4, 5]
y = [1, 4, 9, 16, 25]
plt.scatter(x, y)

# function to show the plot
plt.show()

plt.plot(x, y)

# function to show the plot
plt.show()
```