



The Matplotlib Library



Matplotlib is a data visualization tool built upon the Numpy and SciPy framework. It was created by John Hunter in 2002

It is a plotting library used for 2D graphics in python programming language. It can be used in python scripts, shell, web application servers and other graphical user interface toolkits.

- There are several toolkits which are available that extend python matplotlib functionality. Some of them are separate downloads, others can be shipped with the matplotlib source code but have external dependencies.

Contd..

- **Basemap:** It is a map plotting toolkit with various map projections, coastlines and political boundaries.
- **Cartopy:** It is a mapping library featuring object-oriented map projection definitions, and arbitrary point, line, polygon and image transformation capabilities.
- **Excel tools:** Matplotlib provides utilities for exchanging data with Microsoft Excel.
- **Mplot3d:** It is used for 3-D plots.

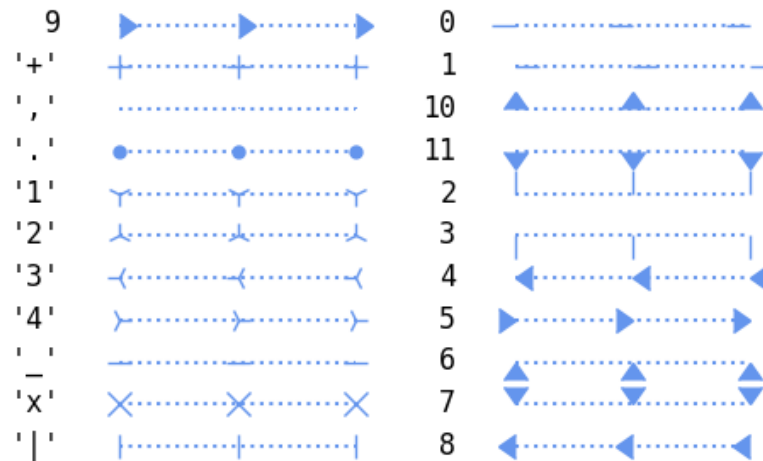
Grids, Axes, Plots

- **Grid** - The **grid()** function of **axes** object sets visibility of grid inside the figure to on or off. You can also display major / minor (or both) ticks of the grid. Additionally color, linestyle and linewidth properties can be set in the **grid()** function.
- **Axes** - Axes object is the region of the image with the data space. A given figure can contain many Axes, but a given Axes object can only be in one Figure. The Axes contains two (or three in the case of 3D) Axis objects
- **Plots** - The ability to present data in a graphical or pictorial format in an attempt to help people understand its significance is known as data visualization skills. Data visualization skills simply refer to the ability to identify or uncover patterns etc.

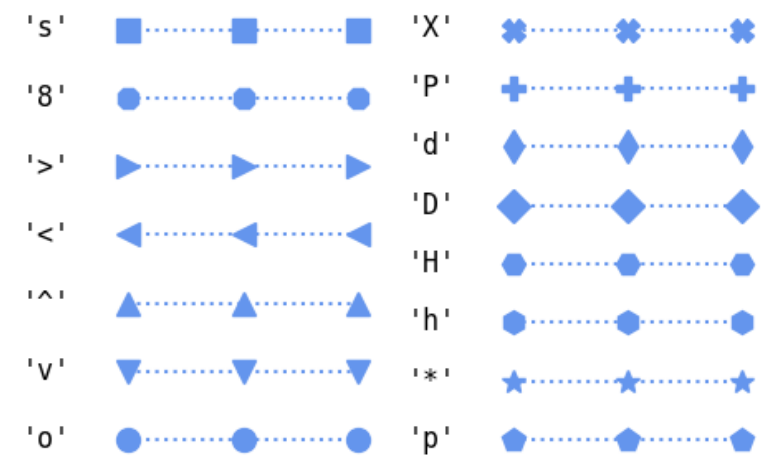
Markers and Colors

Markers: there are 2 types of makers

1. Un-filled markers



2. Filled markers



Colors: Commands which take color arguments can use several formats to specify the colors. For the basic built-in colors, you can use a single letter

- b: blue
- c: cyan
- k: black
- g: green
- m: magenta
- w: white
- r: red
- y: yellow

Types of Plots

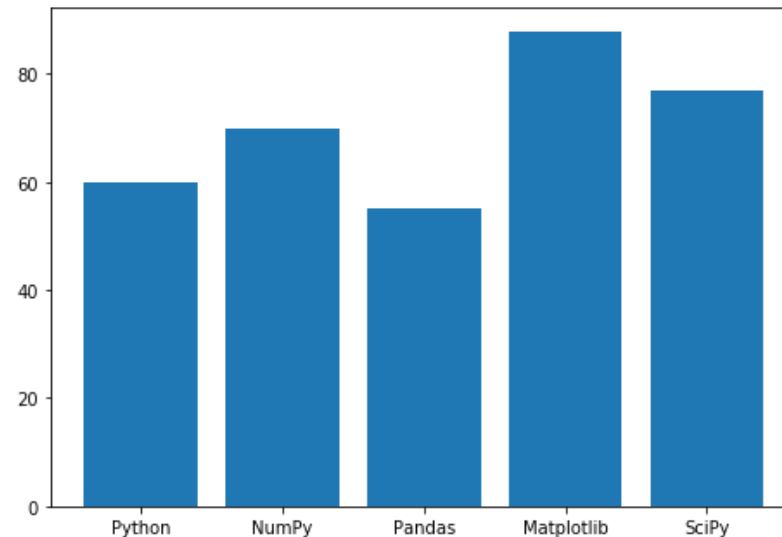
The various types of plots available in matplotlib are

1. Line plot -
2. Scatter Plot
3. Histogram
4. Bar Graph
5. Pie Chart
6. Box Plot
7. Contour plot
8. Polar Plot
9. Log Plot
10. Stream Plot

Bar Graphs in Matplotlib

```
import matplotlib.pyplot as plt  
fig = plt.figure()  
ax = fig.add_axes([0,0,1,1])  
Subjects = ['Python', 'NumPy', 'Pandas', 'Matplotlib', 'SciPy']  
Students = [60,70,55,88,77,33]  
ax.bar(Subjects, Students)  
plt.show()
```

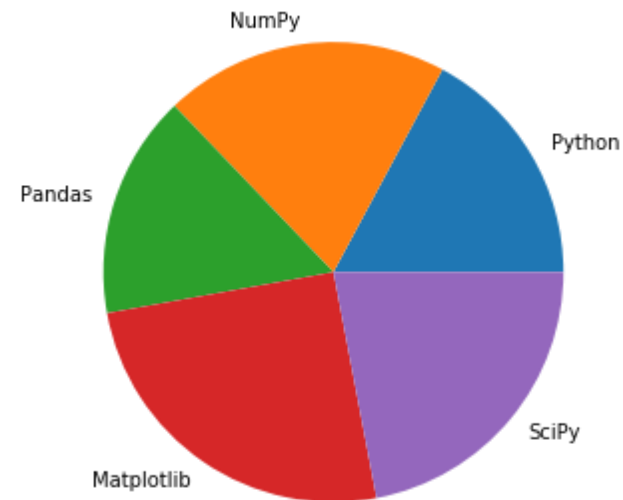
Output →



Pie Chart in Matplotlib

```
import matplotlib.pyplot as plt  
fig = plt.figure()  
ax = fig.add_axes([0,0,1,1])  
Subjects = ['Python', 'NumPy', 'Pandas', 'Matplotlib', 'SciPy']  
Students = [60,70,55,88,77,33]  
ax.bar(Students, labels = Subjects)  
plt.show()
```

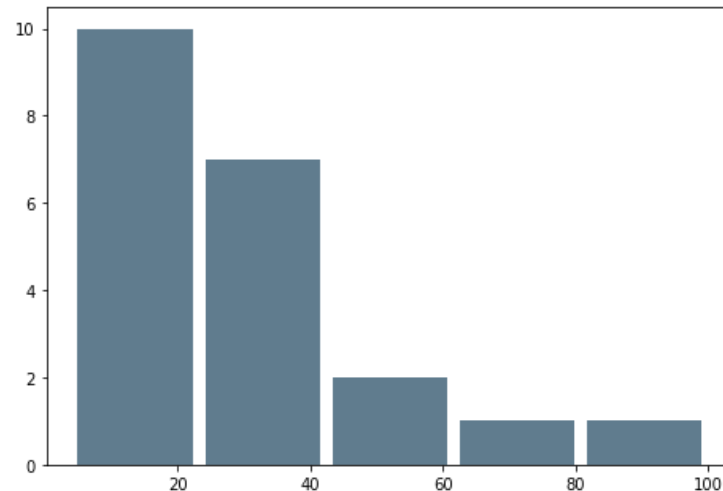
Output →



Pie Chart in Matplotlib

```
import matplotlib.pyplot as plt  
fig = plt.figure()  
ax = fig.add_axes([0,0,1,1])  
x = [21,22,23,4,5,6,77,8,9,10,31,32,33,34,35,36,37,18,49,50,100]  
plt.hist(x, bins=5, rwidth=0.9, color='#607c8e')  
plt.show()
```

Output →



Contour Plot

```
x = np.arange(-5.0, 5.0, 0.1)
y = np.arange(-5.0, 5.0, 0.1)
X, Y = np.meshgrid(x, y)
Z = np.sin(X)*np.cos(Y)
fig, ax = plt.subplots(figsize=(6, 6))
ax.contour(X, Y, Z)
plt.show()
```

Output:

