Python Certification Course

IntelliPaat

Data Visualization Basics

Things you will learn after this Session

Data Visualization Basics:

- What is Data Visualization?
- Why visualize the data?
- What are various Data Visualization library in python?

Basics of Data Visualization

What is Data Visualization?

- Data visualization is the representation of data in a pictorial or graphical format

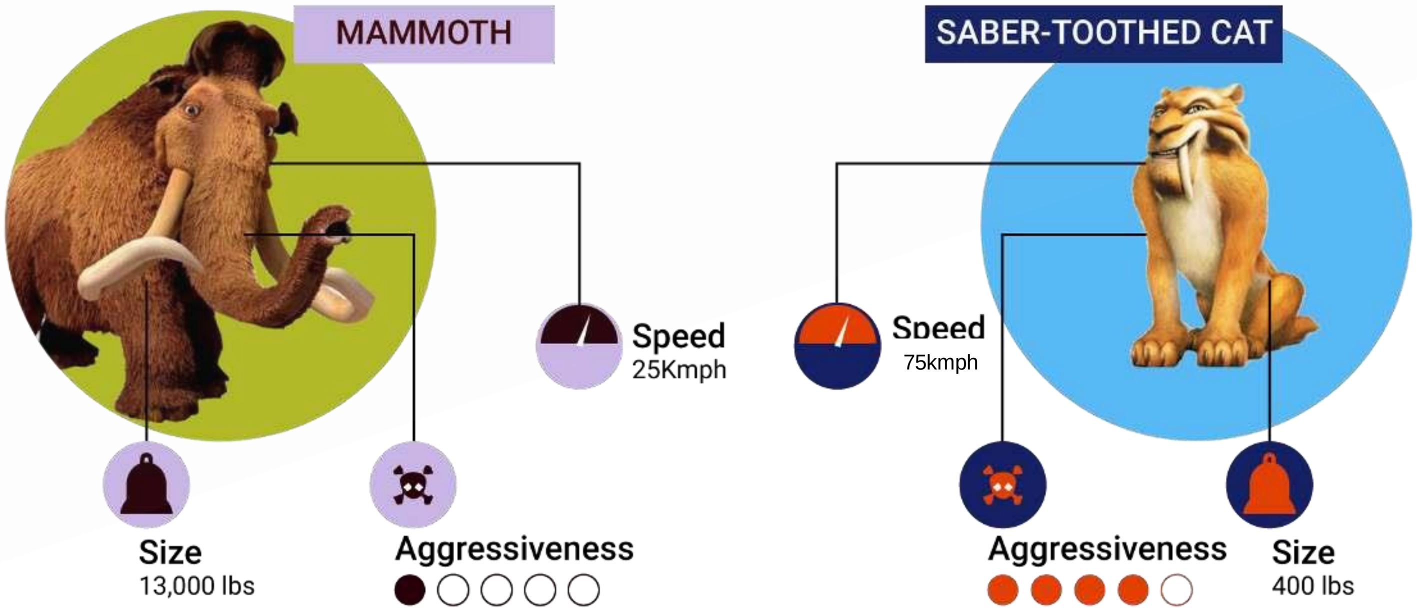
- Allows the decision makers to see analytics, grasp difficult concepts and identify new patterns at ease

Basics of Data Visualization

Data Visualization Example:

Mammoth	25	low	13000lbs
Saber-Tooth Cat	75	High	400lbs

Data

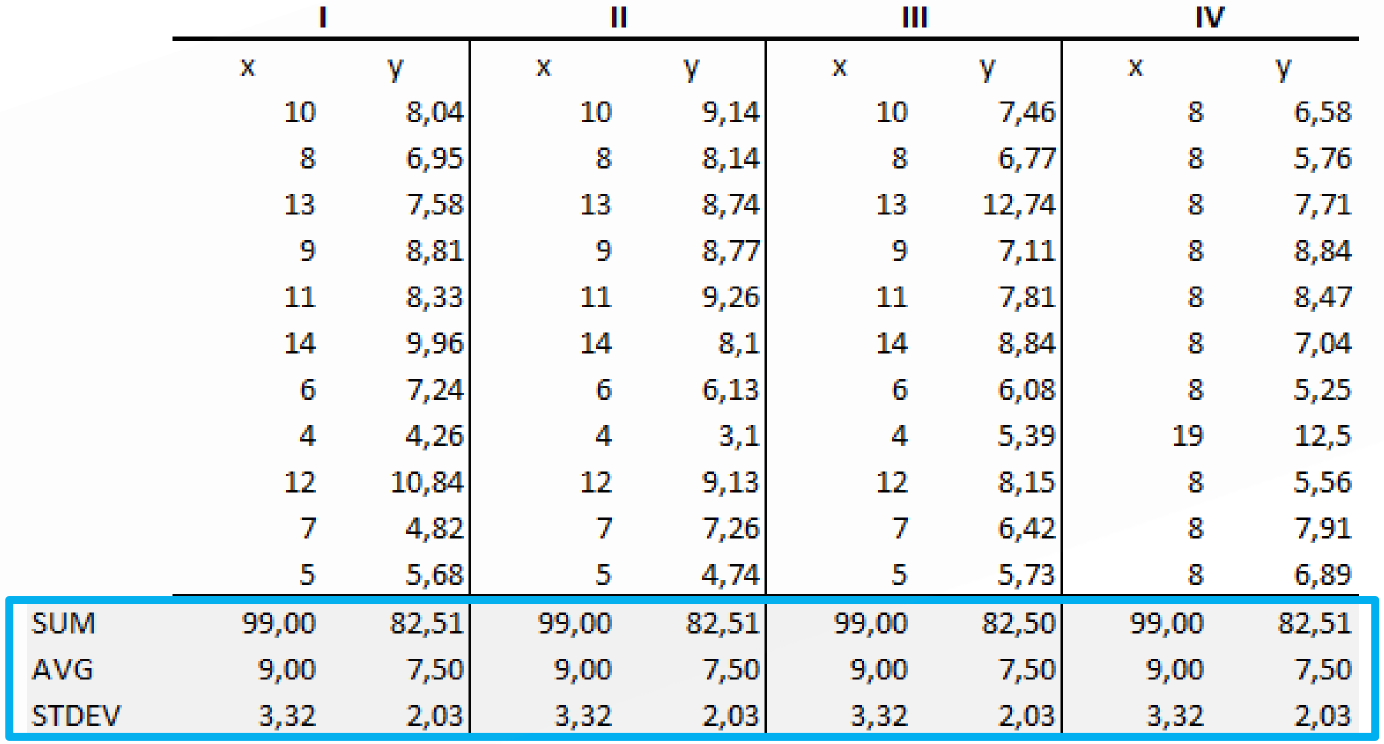


Data Visualization

Basics of Data Visualization

Why do we need Data Visualization?

Anscombe’s Quartet



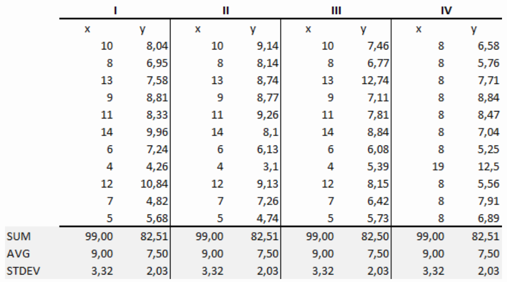
	I		II		III		IV	
	x	y	x	y	x	y	x	y
	10	8,04	10	9,14	10	7,46	8	6,58
	8	6,95	8	8,14	8	6,77	8	5,76
	13	7,58	13	8,74	13	12,74	8	7,71
	9	8,81	9	8,77	9	7,11	8	8,84
	11	8,33	11	9,26	11	7,81	8	8,47
	14	9,96	14	8,1	14	8,84	8	7,04
	6	7,24	6	6,13	6	6,08	8	5,25
	4	4,26	4	3,1	4	5,39	19	12,5
	12	10,84	12	9,13	12	8,15	8	5,56
	7	4,82	7	7,26	7	6,42	8	7,91
	5	5,68	5	4,74	5	5,73	8	6,89
SUM	99,00	82,51	99,00	82,51	99,00	82,50	99,00	82,51
AVG	9,00	7,50	9,00	7,50	9,00	7,50	9,00	7,50
STDEV	3,32	2,03	3,32	2,03	3,32	2,03	3,32	2,03

Anscombe's quartet comprises four datasets that have nearly identical simple descriptive statistics, yet appear very different when graphed.

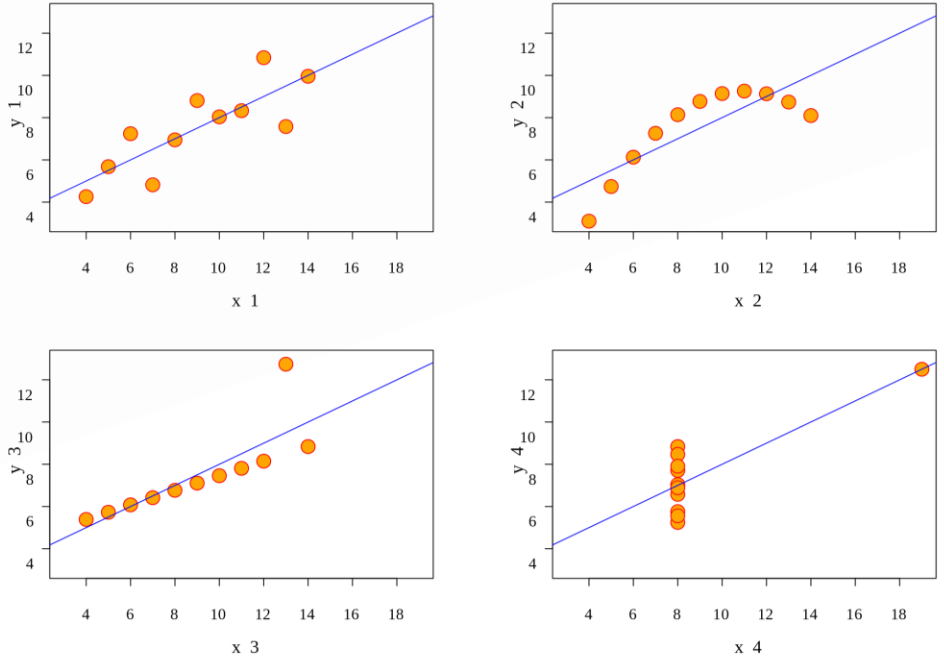
Basics of Data Visualization

Why do we need Data Visualization?

Anscombe’s Quartet



	I		II		III		IV	
	x	y	x	y	x	y	x	y
	10	8,04	10	9,14	10	7,46	8	6,58
	8	6,95	8	8,14	8	6,77	8	5,76
	13	7,58	13	8,74	13	12,74	8	7,71
	9	8,81	9	8,77	9	7,11	8	8,84
	11	8,33	11	9,26	11	7,81	8	8,47
	14	9,96	14	8,1	14	8,84	8	7,04
	6	7,24	6	6,13	6	6,08	8	5,25
	4	4,26	4	3,1	4	5,39	19	12,5
	12	10,84	12	9,13	12	8,15	8	5,56
	7	4,82	7	7,26	7	6,42	8	7,91
	5	5,68	5	4,74	5	5,73	8	6,89
SUM	99,00	82,51	99,00	82,51	99,00	82,50	99,00	82,51
AVG	9,00	7,50	9,00	7,50	9,00	7,50	9,00	7,50
STDEV	3,32	2,03	3,32	2,03	3,32	2,03	3,32	2,03



Basics of Data Visualization

Data Visualization Libraries

matplotlib

ggplot

seaborn

plotly

geoplotlib

www.intellipaat.com

CALL US NOW

India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

Python Certification Course

Introduction to Matplotlib

Things you will learn after this Session

Introduction to Matplotlib:

- What is Matplotlib?
- Why choose matplotlib for visualizing the data?
- What are different types of plot created using Matplotlib?

Introduction to Matplotlib

What is Matplotlib?

- Python library for Data Visualization
- Create 2D graphs and plots by using python scripts.
- Produces output in a variety of hardcopy formats

Introduction to Matplotlib

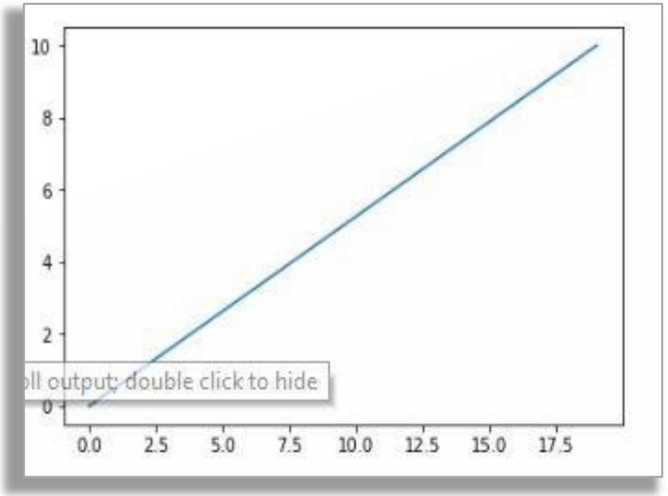
matplotlib

Why choose Matplotlib?

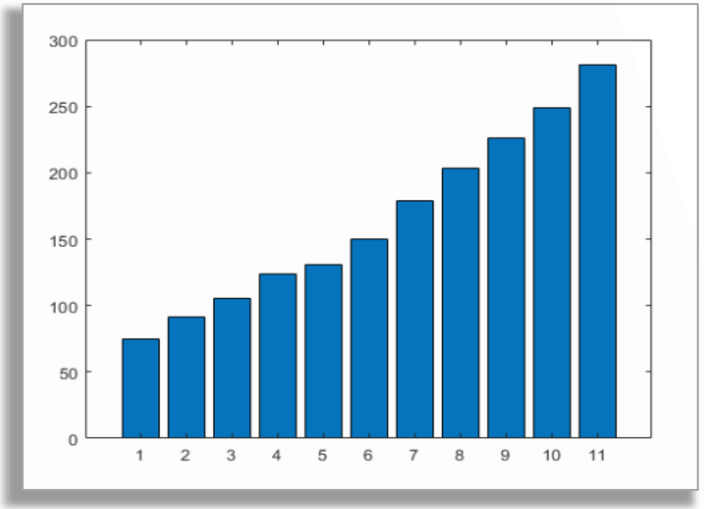
- Provides a module called Pyplot.
- Simple functions used for visualization
- Supports a very wide variety of graphs
- Easy integration with Pandas and Numpy.
- Provides an Object-Oriented API

What are the types of Plots?

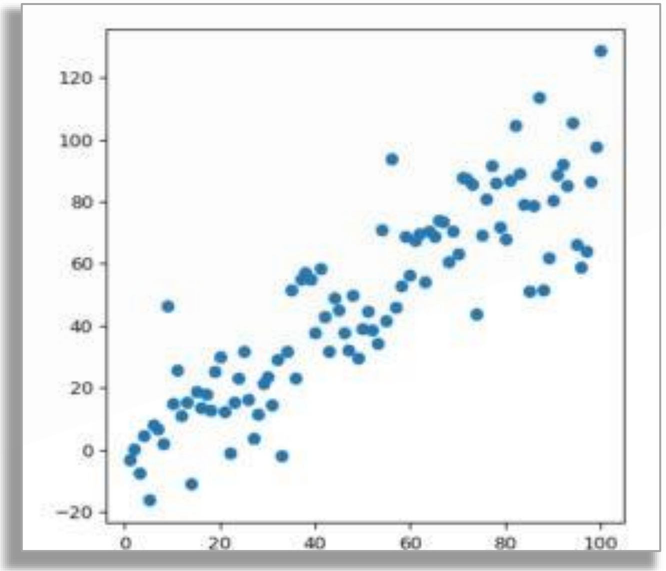
Types of Plots



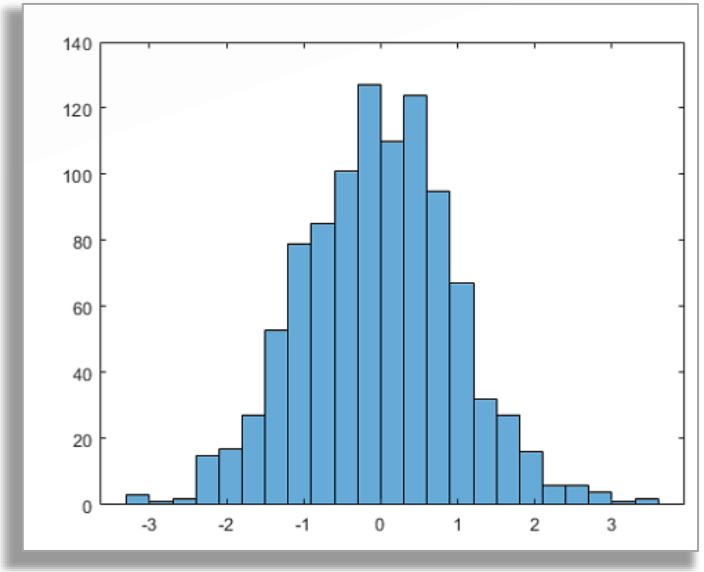
Line Plot



Bar Plot



Scatter Plot



Histogram

www.intellipaat.com

Types of Plots

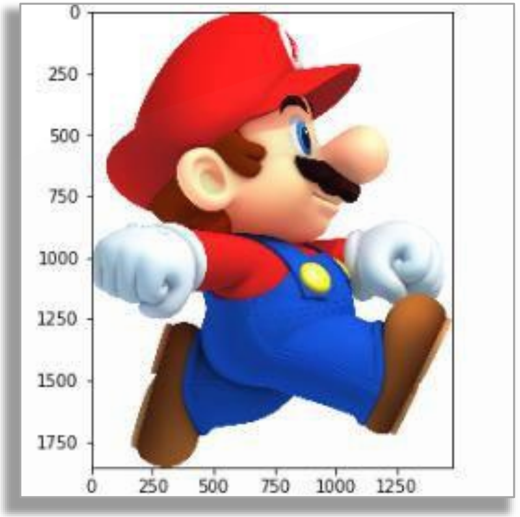
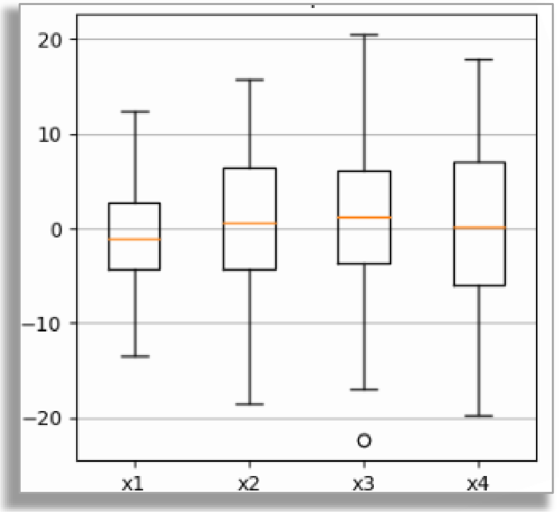
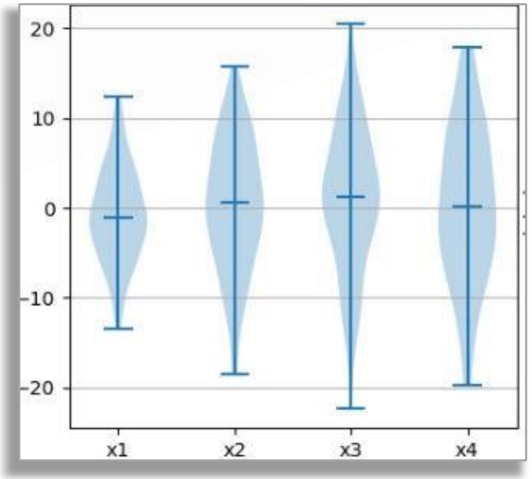


Image Plot

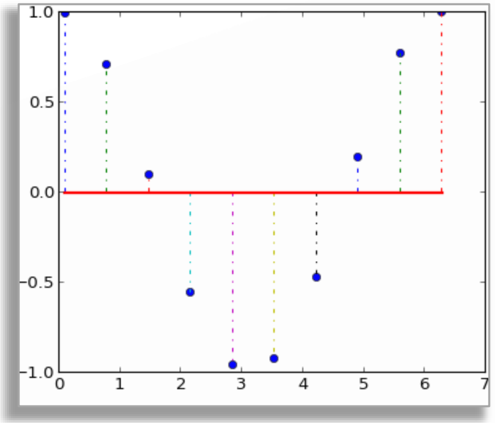


Box Plot

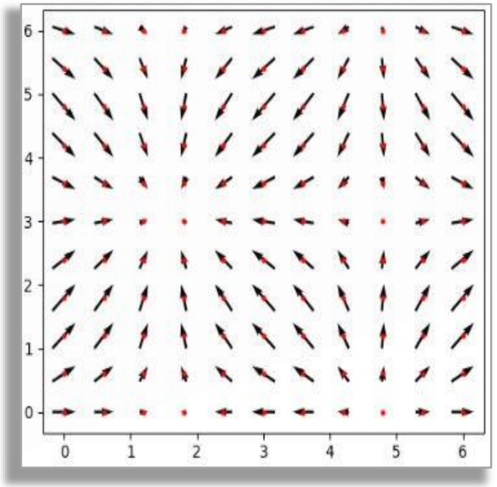


Violin Plot

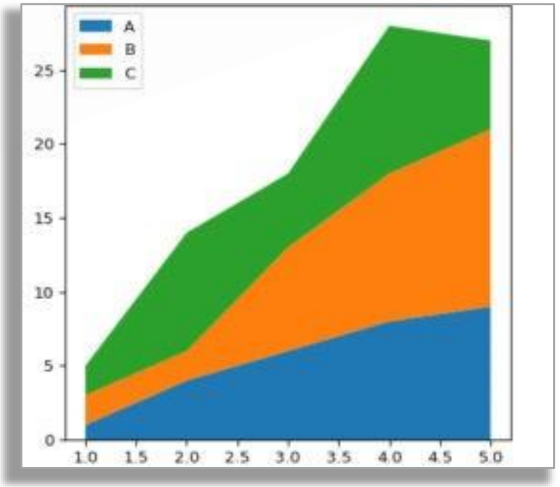
Types of Plots



Stream Plot

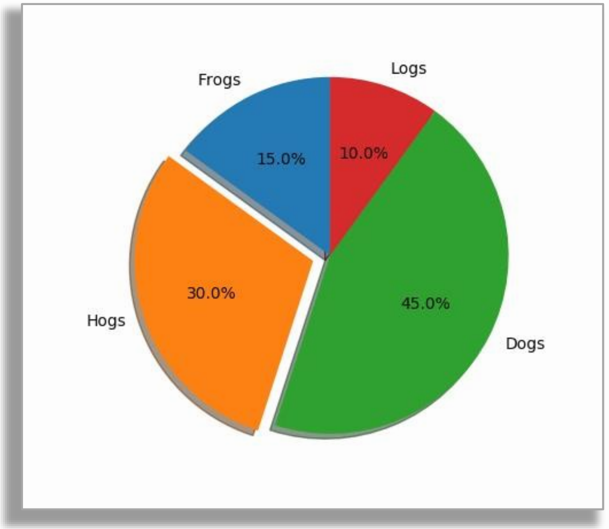


Quiver Plot

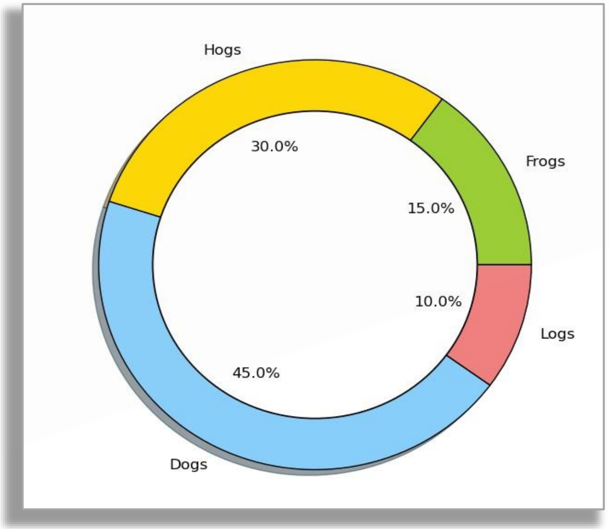


Area Plot

Types of Plots

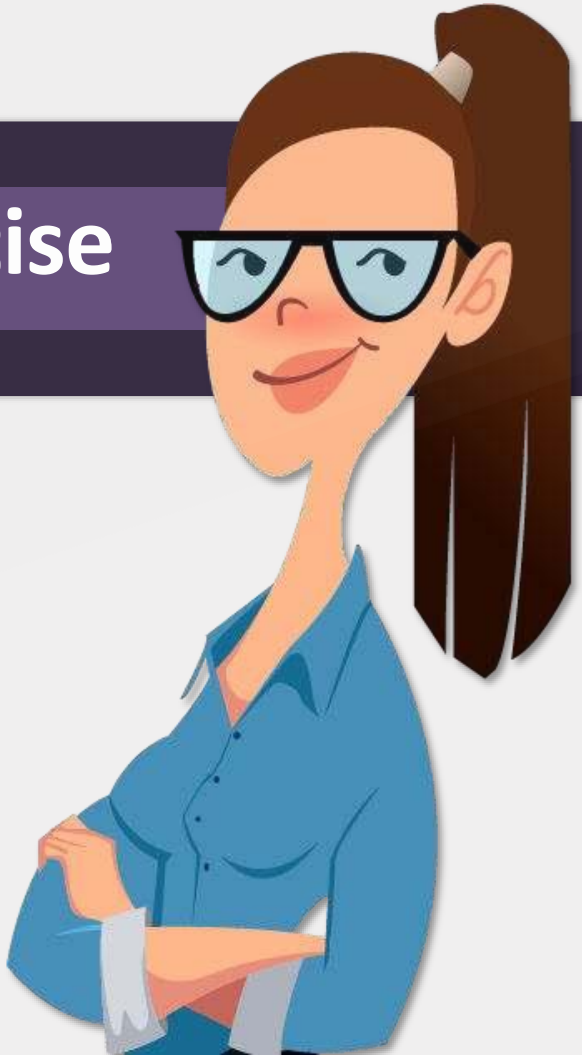


Pie Plot



Donut Plot

Let’s try some hands-on exercise



Python Certification Course

How to create a Line Plot?

Things you will learn after this Session

Hands On: How to create a Line Plot

- How to create a Line Plot?
- How to customize a Line Plot?
- How to create two or more plots in one figure?

Hands-on: Line Plot

www.intellipaat.com

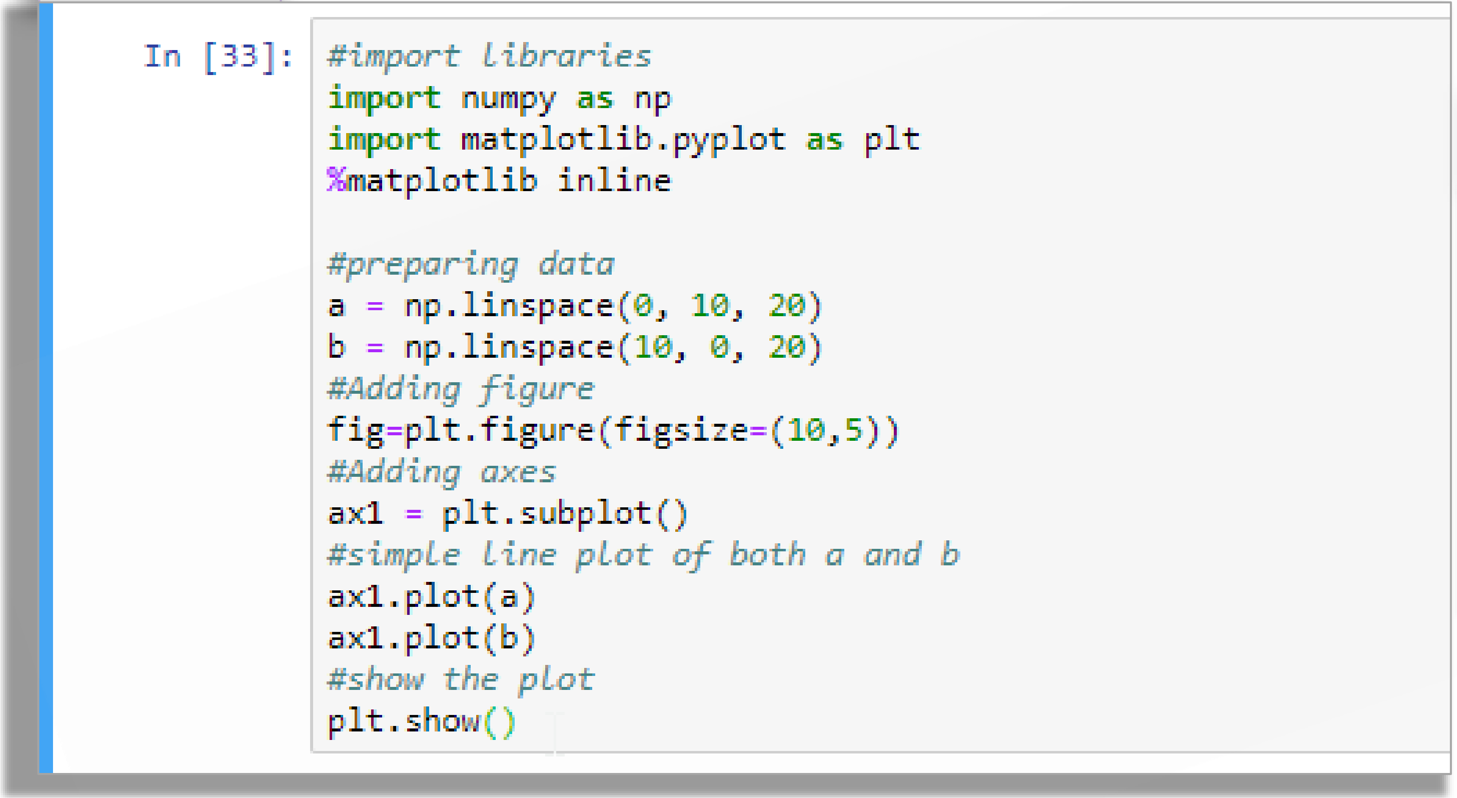
India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

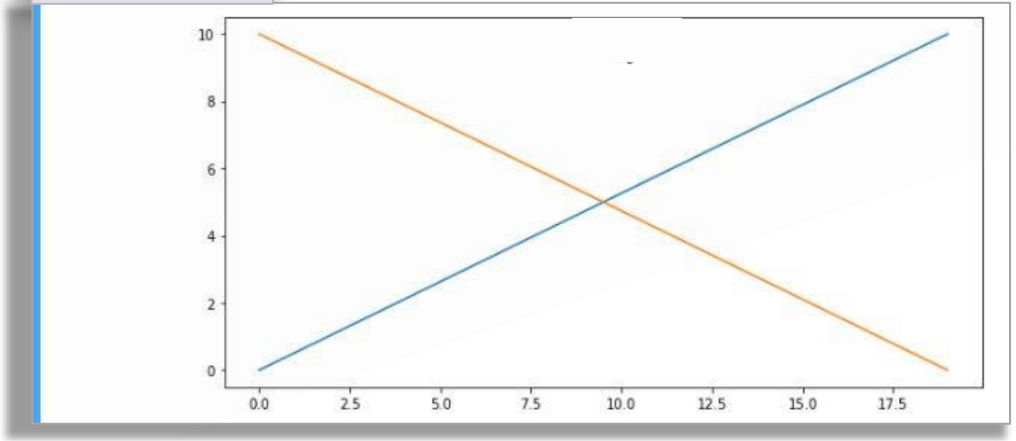
Demonstration: Line Plot

Input



```
In [33]: #import libraries
         import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline

         #preparing data
         a = np.linspace(0, 10, 20)
         b = np.linspace(10, 0, 20)
         #Adding figure
         fig=plt.figure(figsize=(10,5))
         #Adding axes
         ax1 = plt.subplot()
         #simple line plot of both a and b
         ax1.plot(a)
         ax1.plot(b)
         #show the plot
         plt.show()
```

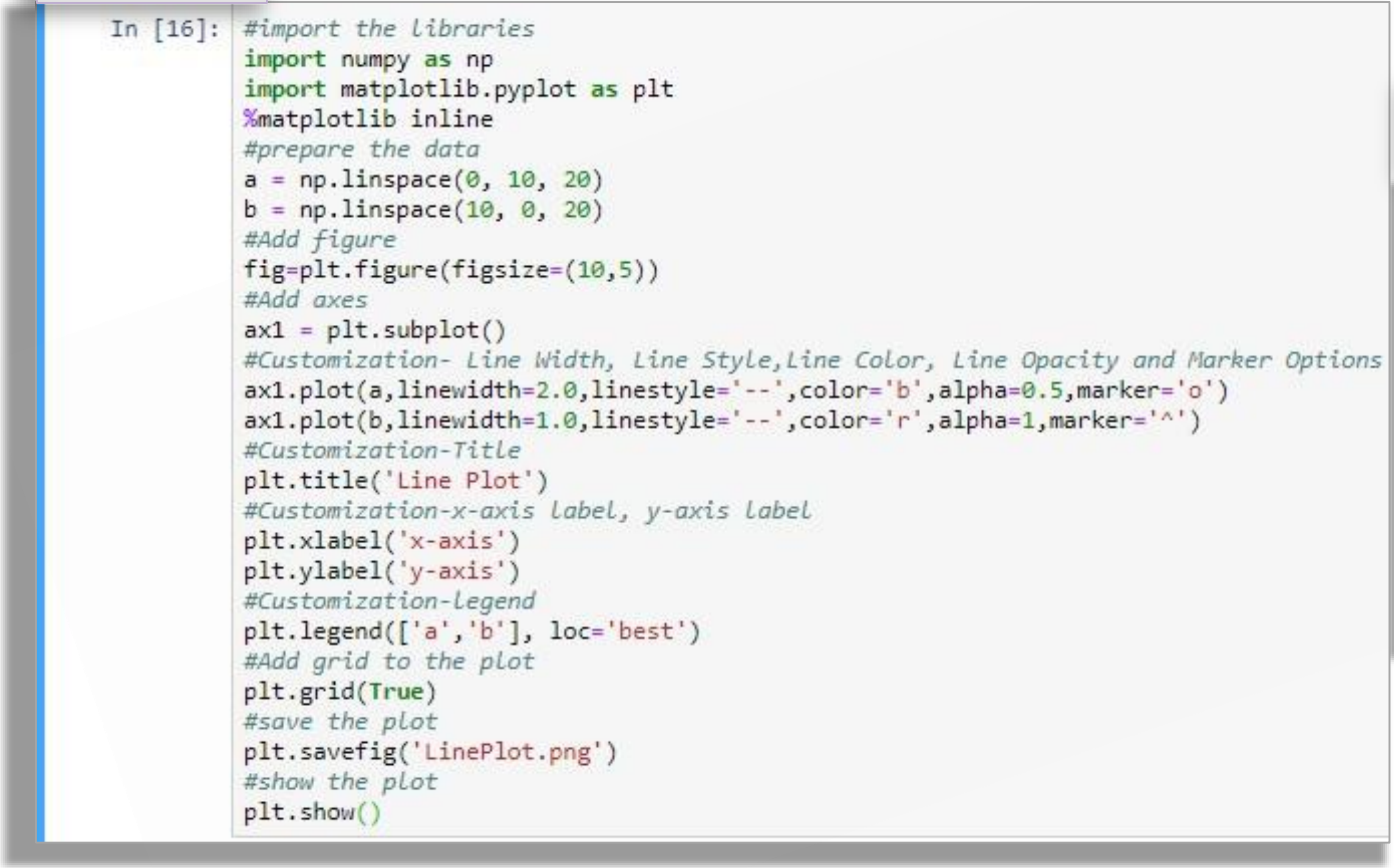
Output



It is best to use a line plot when comparing fewer than 25 numbers. It is a quick, simple way to organize data.

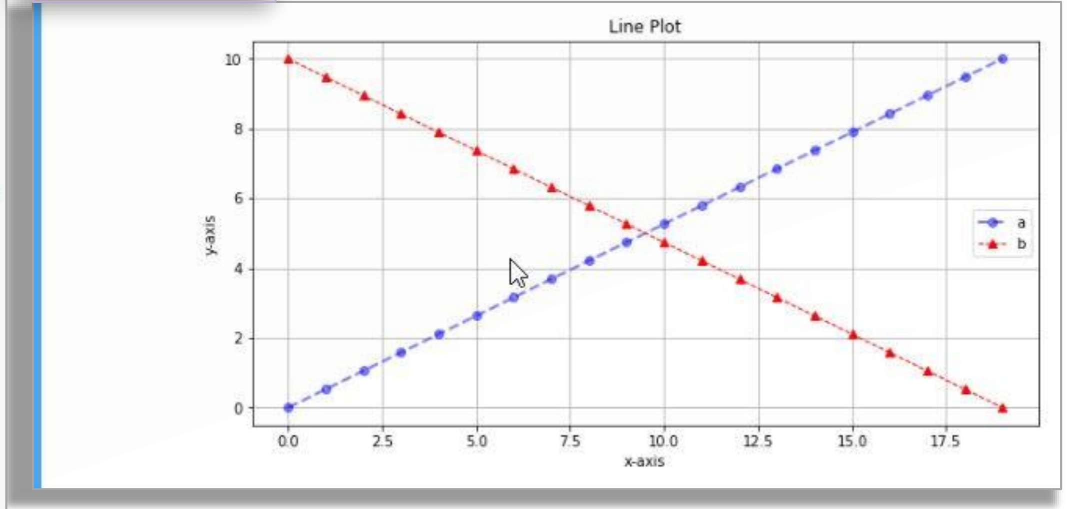
Demonstration: Customized Line Plot

Input



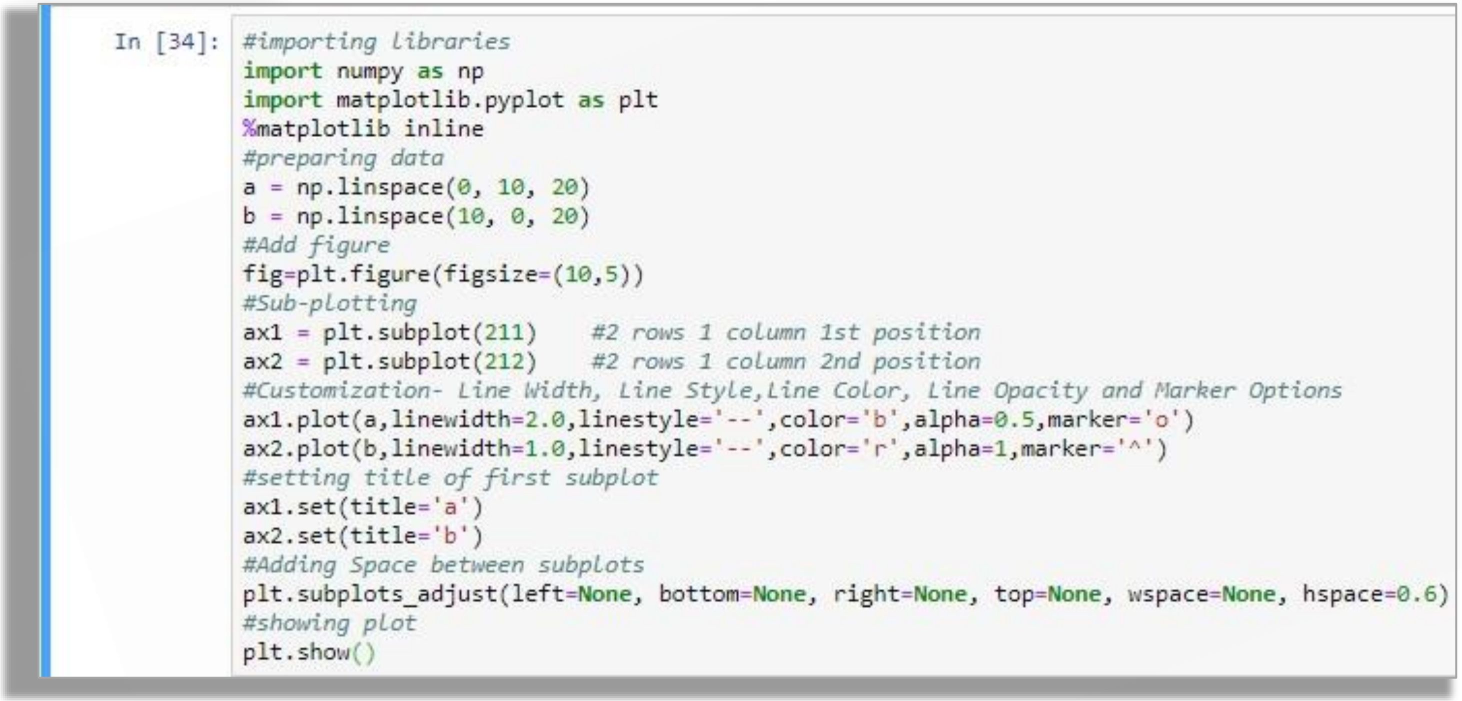
```
In [16]: #import the libraries
         import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare the data
         a = np.linspace(0, 10, 20)
         b = np.linspace(10, 0, 20)
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #Add axes
         ax1 = plt.subplot()
         #Customization- Line Width, Line Style,Line Color, Line Opacity and Marker Options
         ax1.plot(a,linewidth=2.0,linestyle='--',color='b',alpha=0.5,marker='o')
         ax1.plot(b,linewidth=1.0,linestyle='--',color='r',alpha=1,marker='^')
         #Customization-Title
         plt.title('Line Plot')
         #Customization-x-axis label, y-axis label
         plt.xlabel('x-axis')
         plt.ylabel('y-axis')
         #Customization-legend
         plt.legend(['a','b'], loc='best')
         #Add grid to the plot
         plt.grid(True)
         #save the plot
         plt.savefig('LinePlot.png')
         #show the plot
         plt.show()
```

Output



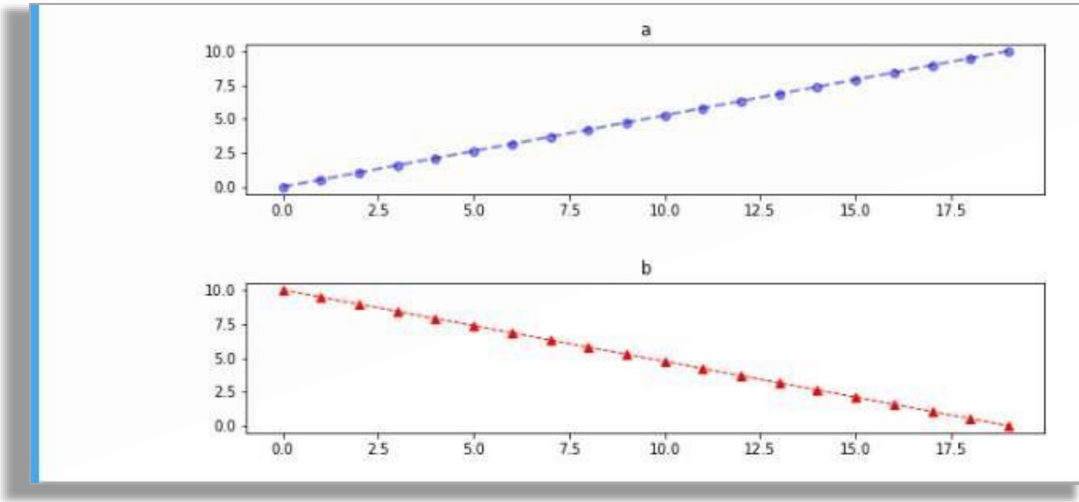
Demonstration: Sub-plotting

Input



```
In [34]: #importing libraries
         import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline
         #preparing data
         a = np.linspace(0, 10, 20)
         b = np.linspace(10, 0, 20)
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #Sub-plotting
         ax1 = plt.subplot(211)    #2 rows 1 column 1st position
         ax2 = plt.subplot(212)    #2 rows 1 column 2nd position
         #Customization- Line Width, Line Style,Line Color, Line Opacity and Marker Options
         ax1.plot(a,linewidth=2.0,linestyle='--',color='b',alpha=0.5,marker='o')
         ax2.plot(b,linewidth=1.0,linestyle='--',color='r',alpha=1,marker='^')
         #setting title of first subplot
         ax1.set(title='a')
         ax2.set(title='b')
         #Adding Space between subplots
         plt.subplots_adjust(left=None, bottom=None, right=None, top=None, wspace=None, hspace=0.6)
         #showing plot
         plt.show()
```

Output



Use sub-plotting while comparing plots

IntelliPaat

www.intellipaat.com

CALL US NOW

India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

Python Certification Course

How to create a Bar Plot?

Things you will learn after this Session

Hands On: How to create a Bar Plot

- How to create a Bar Plot?
- How to customize a Bar Plot?
- How to create a horizontal Bar Plot?

Hands-on: Bar Plot

www.intellipaat.com

CALL US NOW

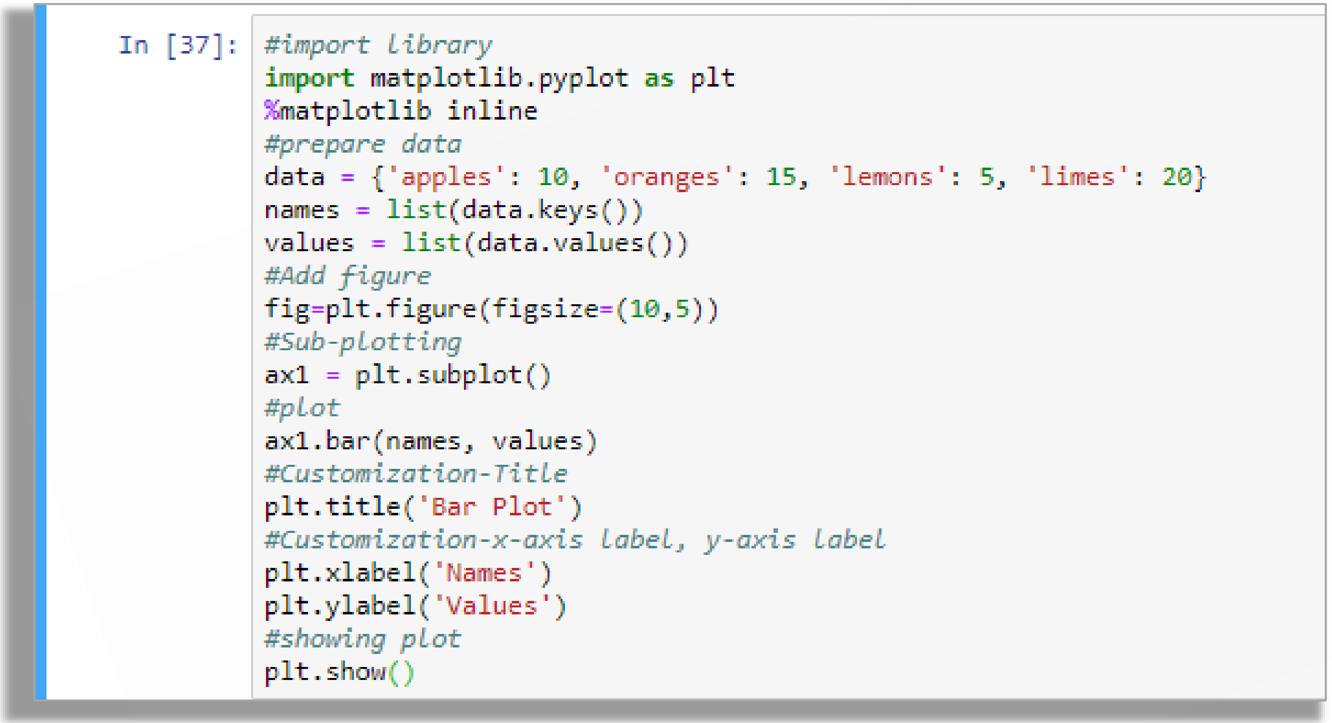
India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

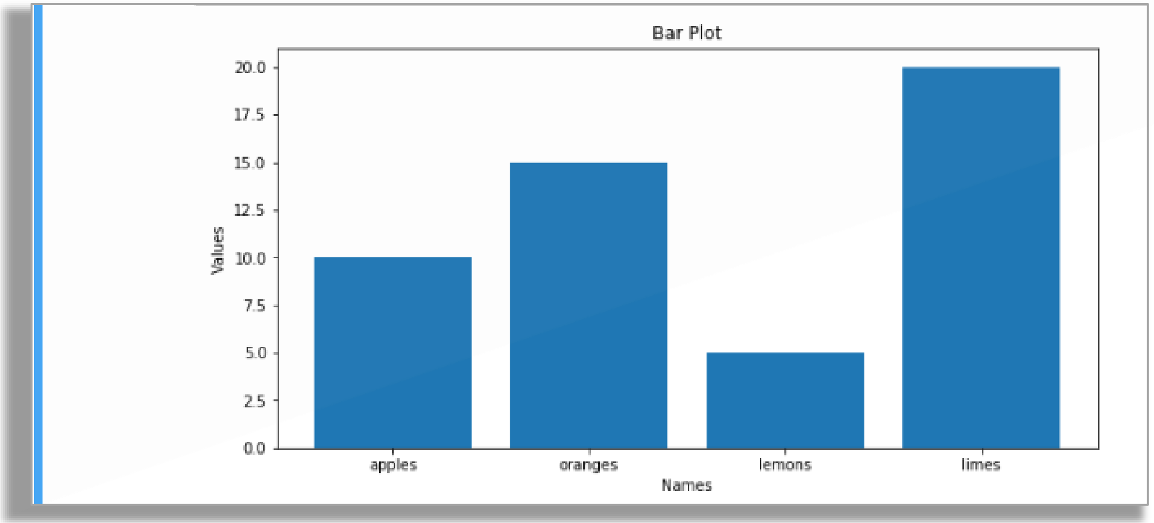
Demonstration: Bar Plot

Input



```
In [37]: #import library
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         data = {'apples': 10, 'oranges': 15, 'lemons': 5, 'limes': 20}
         names = list(data.keys())
         values = list(data.values())
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #Sub-plotting
         ax1 = plt.subplot()
         #plot
         ax1.bar(names, values)
         #Customization-Title
         plt.title('Bar Plot')
         #Customization-x-axis label, y-axis label
         plt.xlabel('Names')
         plt.ylabel('Values')
         #showing plot
         plt.show()
```

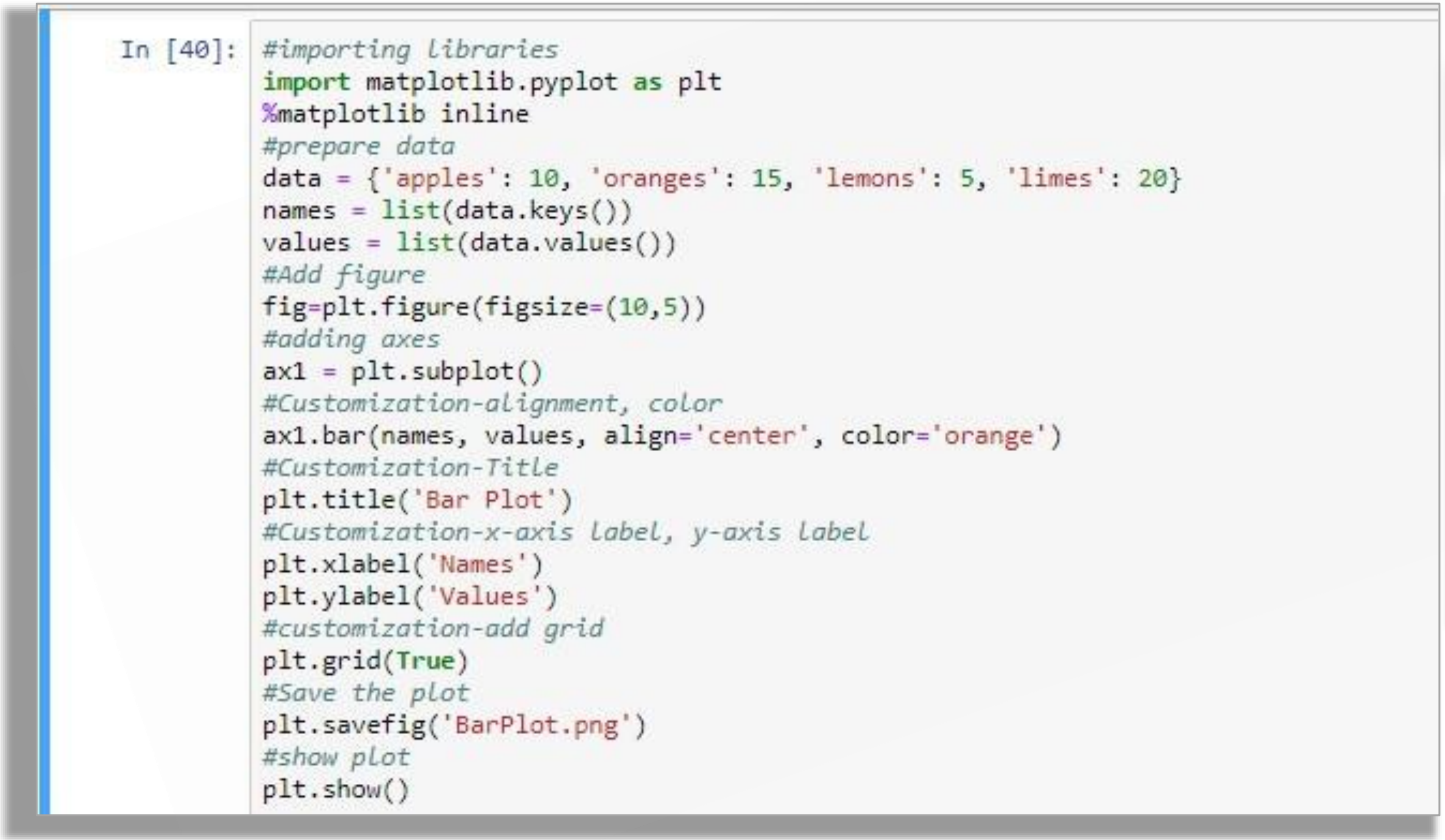
Output



A bar chart or bar graph is a chart or graph that presents categorical data with rectangular bars with heights or lengths proportional to the values that they represent. The bars can be plotted vertically or horizontally.

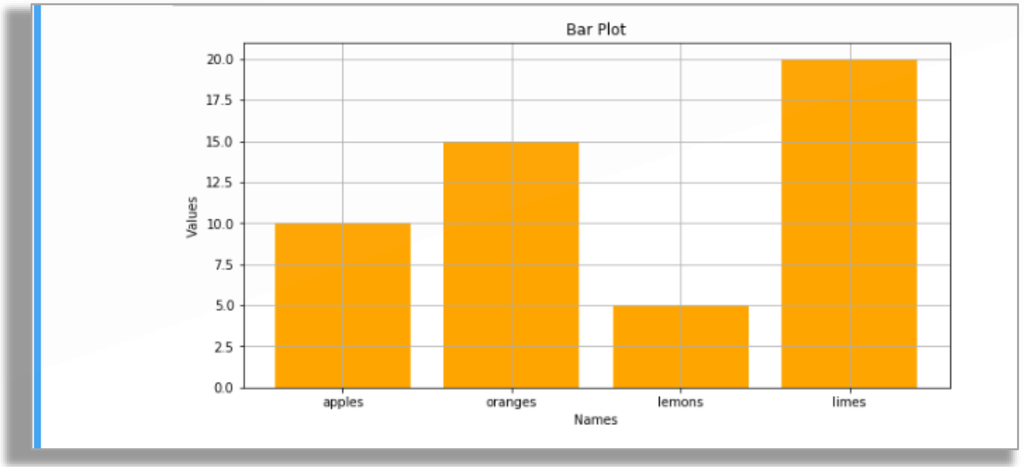
Demonstration: Customized Bar Plot

Input



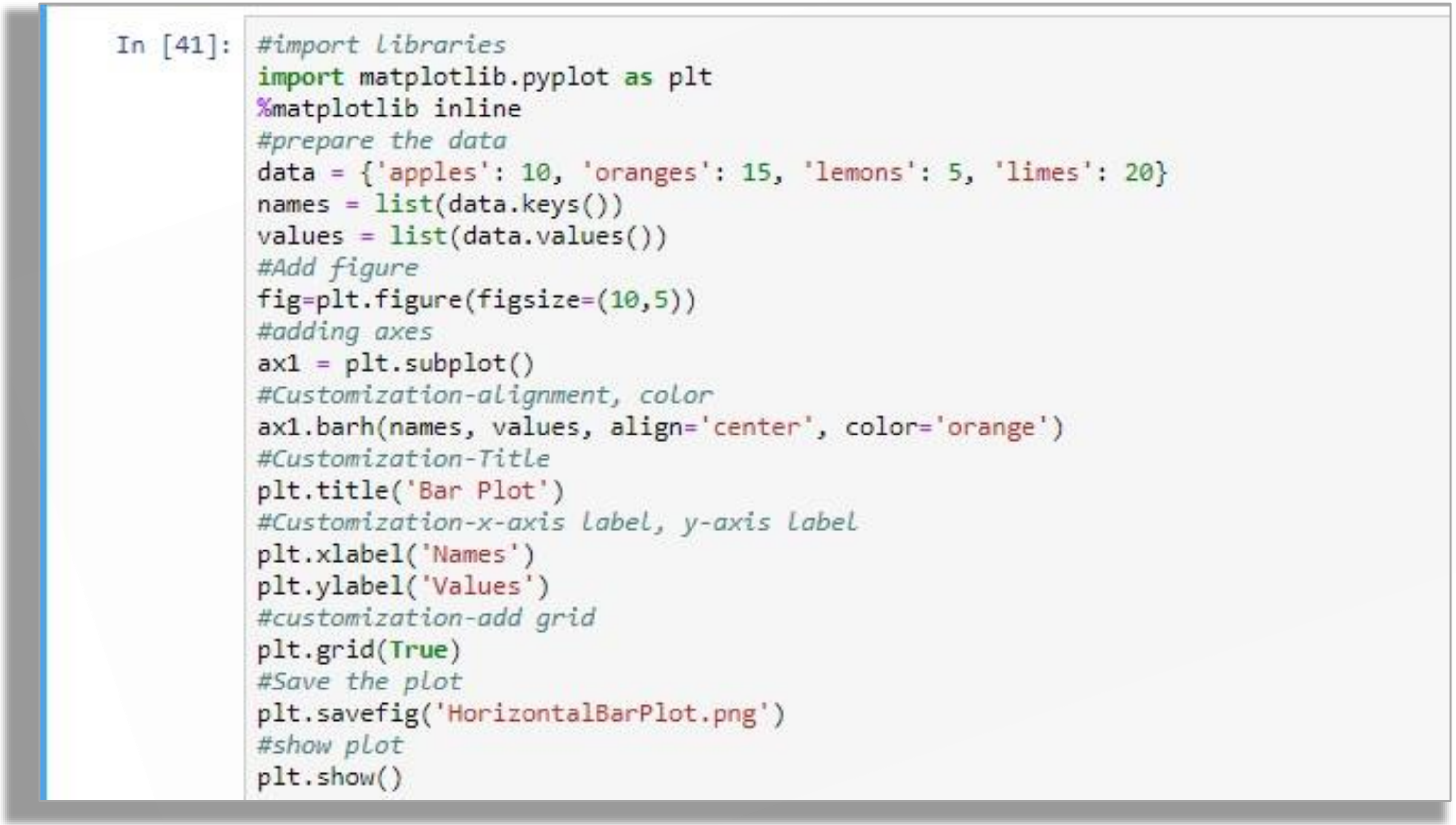
```
In [40]: #importing libraries
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         data = {'apples': 10, 'oranges': 15, 'lemons': 5, 'limes': 20}
         names = list(data.keys())
         values = list(data.values())
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #adding axes
         ax1 = plt.subplot()
         #Customization-alignment, color
         ax1.bar(names, values, align='center', color='orange')
         #Customization-Title
         plt.title('Bar Plot')
         #Customization-x-axis label, y-axis label
         plt.xlabel('Names')
         plt.ylabel('Values')
         #customization-add grid
         plt.grid(True)
         #Save the plot
         plt.savefig('BarPlot.png')
         #show plot
         plt.show()
```

Output



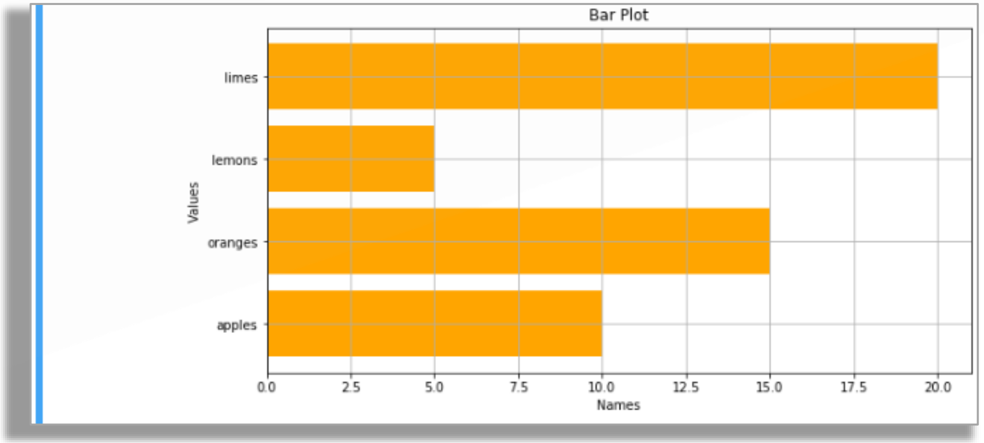
Demonstration: Horizontal Bar Plot

Input



```
In [41]: #import libraries
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare the data
         data = {'apples': 10, 'oranges': 15, 'lemons': 5, 'limes': 20}
         names = list(data.keys())
         values = list(data.values())
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #adding axes
         ax1 = plt.subplot()
         #Customization-alignment, color
         ax1.barh(names, values, align='center', color='orange')
         #Customization-Title
         plt.title('Bar Plot')
         #Customization-x-axis label, y-axis label
         plt.xlabel('Names')
         plt.ylabel('Values')
         #customization-add grid
         plt.grid(True)
         #Save the plot
         plt.savefig('HorizontalBarPlot.png')
         #show plot
         plt.show()
```

Output



www.intellipaat.com

India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

Hands-on: Scatter Plot

Python Certification Course

How to create a Scatter Plot?

Things you will learn after this Session

Hands On: How to create a Scatter Plot

- How to create a Scatter Plot?
- How to customize a Scatter Plot?

Hands-on: Scatter Plot

www.intellipaat.com

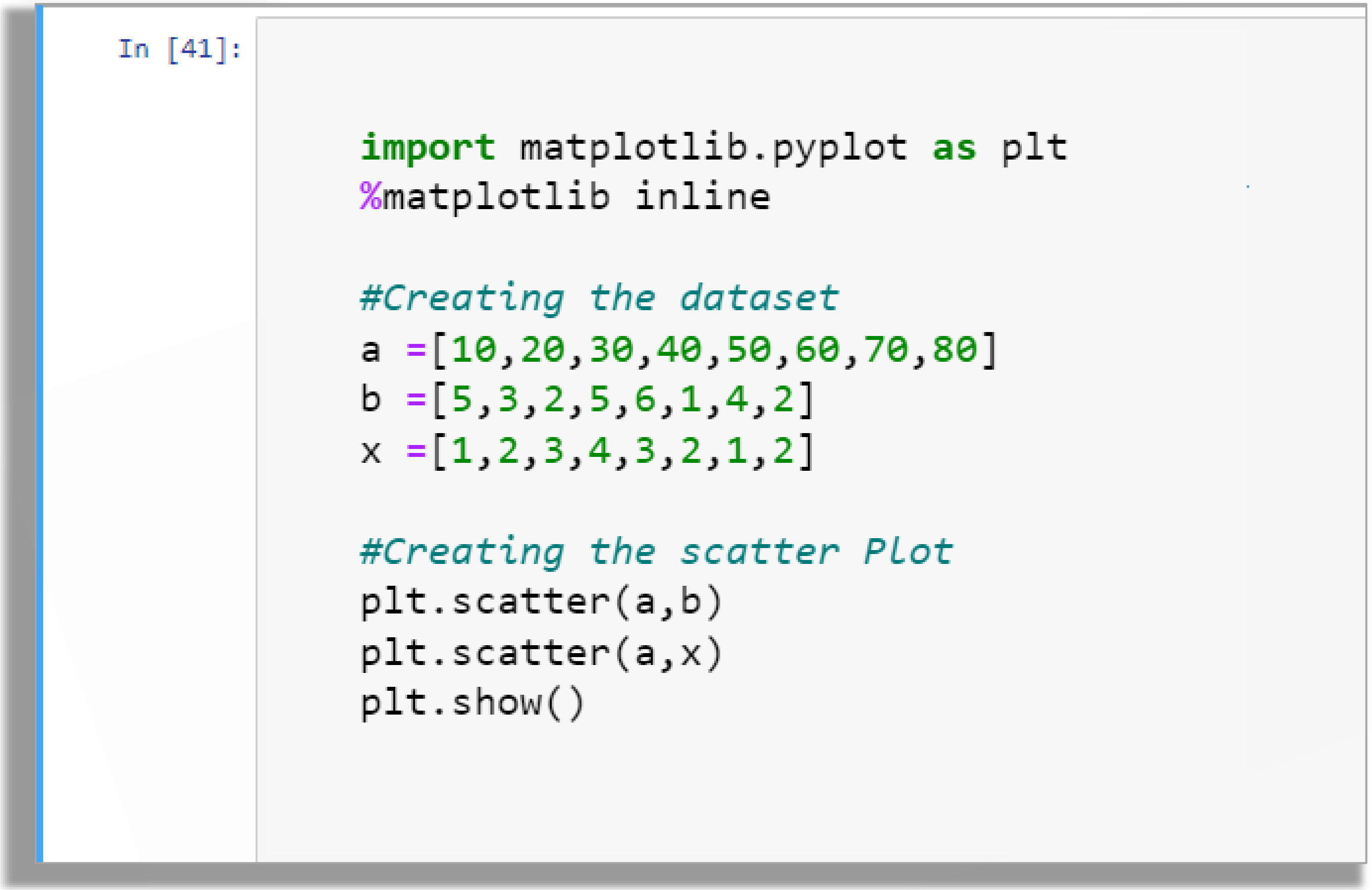
India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

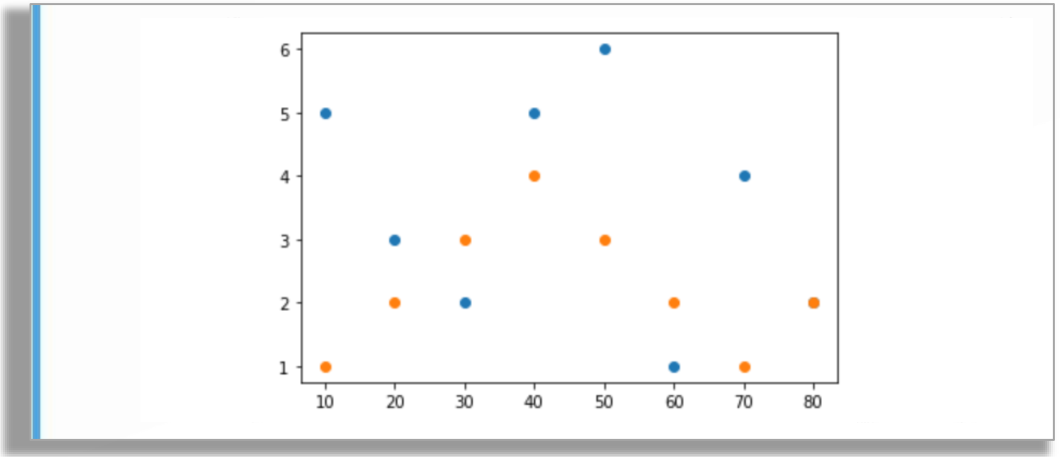
Demonstration: Scatter Plot

Input



```
In [41]:

import matplotlib.pyplot as plt
%matplotlib inline

#Creating the dataset
a =[10,20,30,40,50,60,70,80]
b =[5,3,2,5,6,1,4,2]
x =[1,2,3,4,3,2,1,2]

#Creating the scatter Plot
plt.scatter(a,b)
plt.scatter(a,x)
plt.show()
```

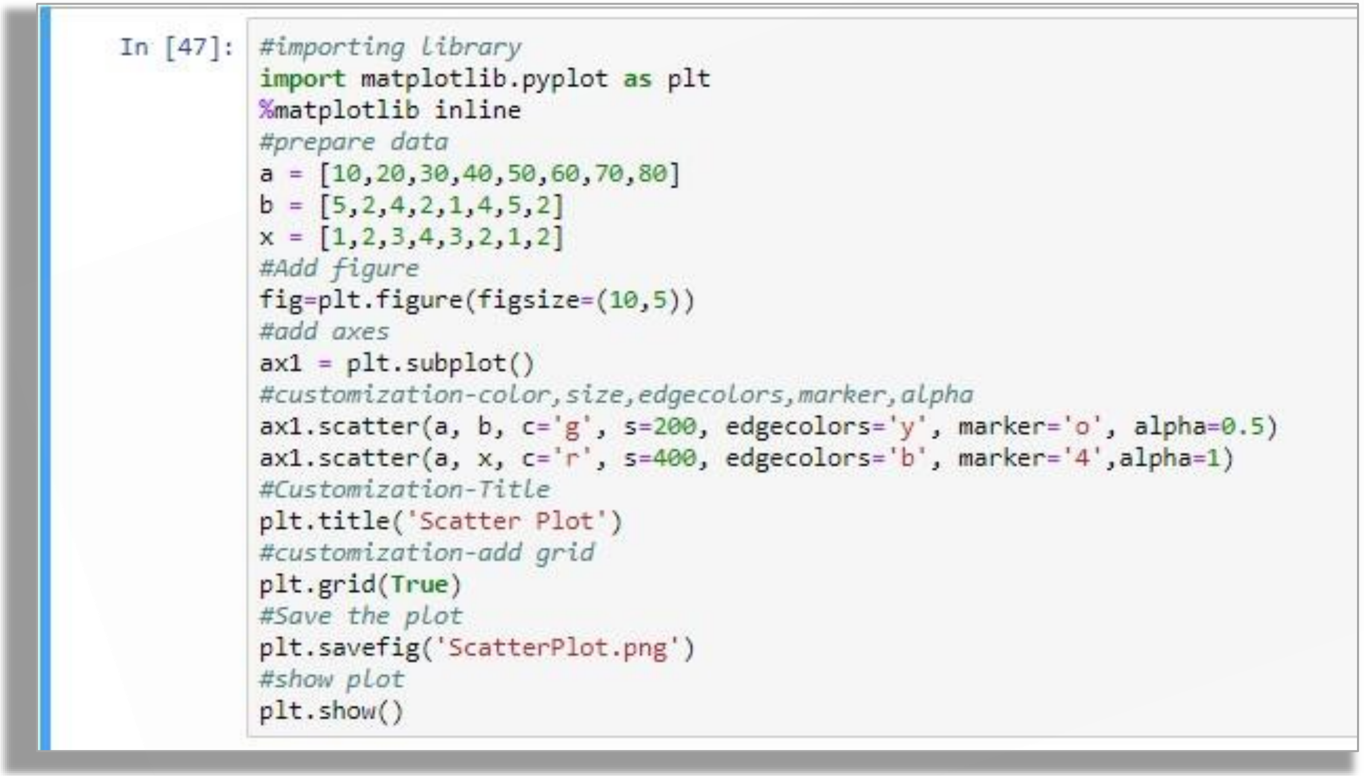
Output



Scatter plots are used to plot data points on a horizontal and a vertical axis in the attempt to show how much one variable is affected by another. Helps visualizing the correlation.

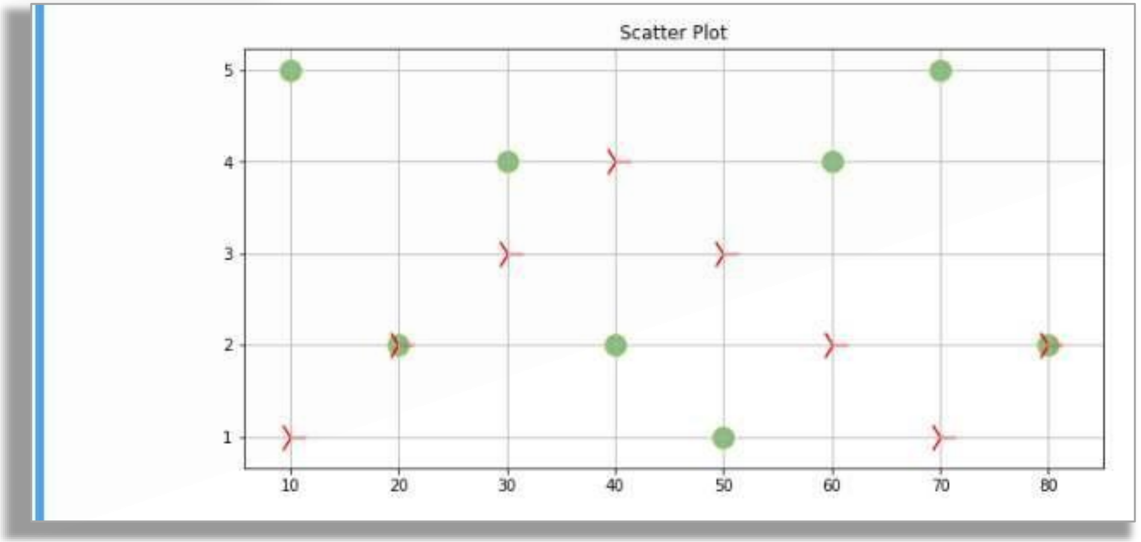
Demonstration: Customized Scatter Plot

Input



```
In [47]:  #importing library
          import matplotlib.pyplot as plt
          %matplotlib inline
          #prepare data
          a = [10,20,30,40,50,60,70,80]
          b = [5,2,4,2,1,4,5,2]
          x = [1,2,3,4,3,2,1,2]
          #Add figure
          fig=plt.figure(figsize=(10,5))
          #add axes
          ax1 = plt.subplot()
          #customization-color,size,edgecolors,marker,alpha
          ax1.scatter(a, b, c='g', s=200, edgecolors='y', marker='o', alpha=0.5)
          ax1.scatter(a, x, c='r', s=400, edgecolors='b', marker='4',alpha=1)
          #Customization-Title
          plt.title('Scatter Plot')
          #customization-add grid
          plt.grid(True)
          #Save the plot
          plt.savefig('ScatterPlot.png')
          #show plot
          plt.show()
```

Output



www.intellipaat.com

India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

Python Certification Course

How to create a Histogram?

Things you will learn after this Session

Hands On: How to create a Histogram?

- How to create a Histogram?
- How to customize a Histogram?

Hands-on: Histogram

IntelliPaat

www.intellipaat.com

CALL US NOW

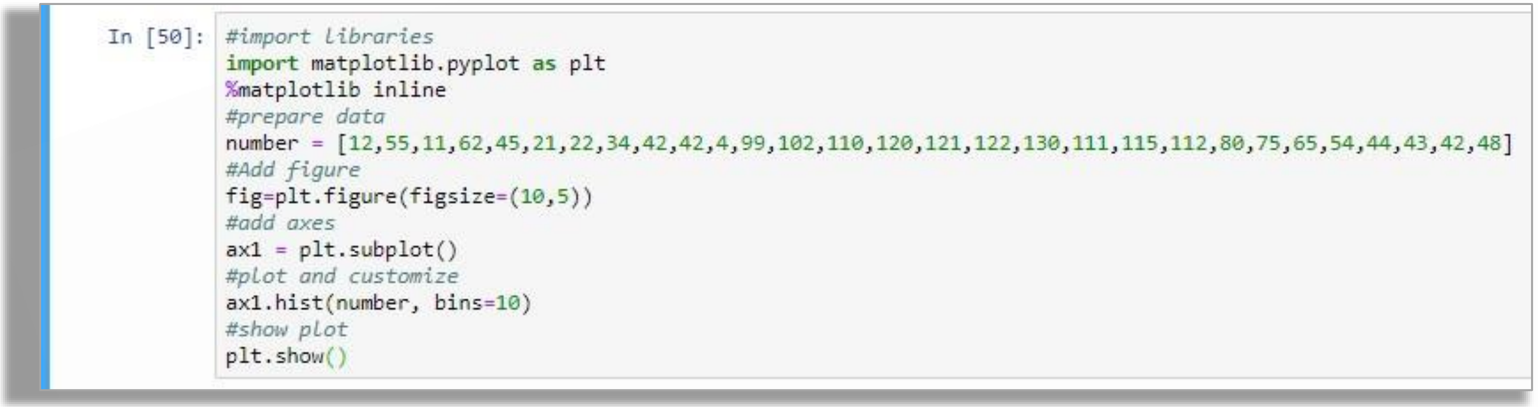
India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

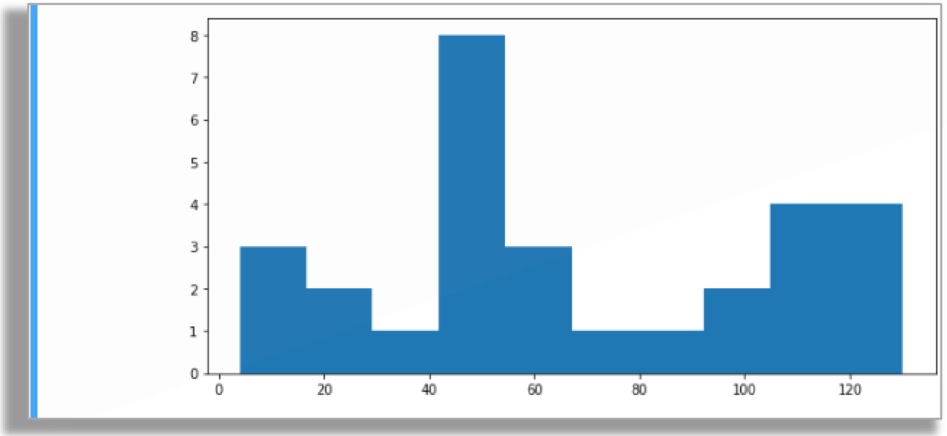
Demonstration: Histogram

Input



```
In [50]: #import Libraries
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         number = [12,55,11,62,45,21,22,34,42,42,4,99,102,110,120,121,122,130,111,115,112,80,75,65,54,44,43,42,48]
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #add axes
         ax1 = plt.subplot()
         #plot and customize
         ax1.hist(number, bins=10)
         #show plot
         plt.show()
```

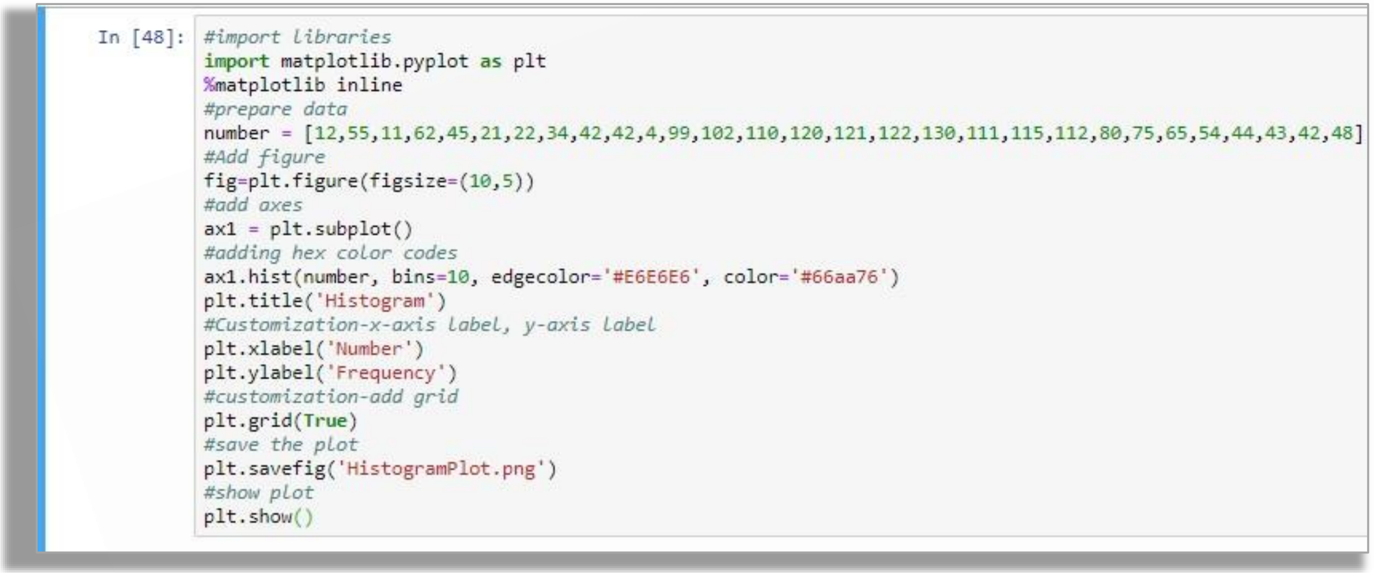
Output



Plots used to display frequency across a continuous or discrete variable

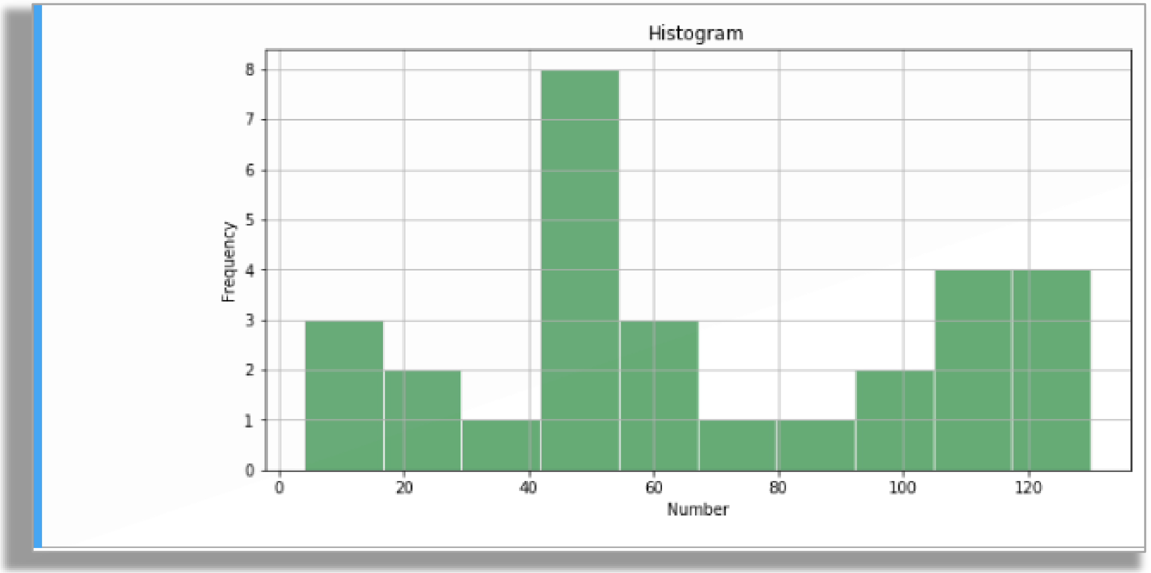
Demonstration: Customized Histogram

Input



```
In [48]: #import libraries
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         number = [12,55,11,62,45,21,22,34,42,42,4,99,102,110,120,121,122,130,111,115,112,80,75,65,54,44,43,42,48]
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #add axes
         ax1 = plt.subplot()
         #adding hex color codes
         ax1.hist(number, bins=10, edgecolor='#E6E6E6', color='#66aa76')
         plt.title('Histogram')
         #Customization-x-axis label, y-axis label
         plt.xlabel('Number')
         plt.ylabel('Frequency')
         #customization-add grid
         plt.grid(True)
         #save the plot
         plt.savefig('HistogramPlot.png')
         #show plot
         plt.show()
```

Output



IntelliPaat

www.intellipaat.com

CALL US NOW

India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

Python Certification Course

How to create a Box Plot & Violin Plot?

Things you will learn after this Session

Hands On: Box Plot and Violin Plot

- How to create a Box Plot?
- How to create a Violin Plot?

Hands-on: Box Plot and Violin Plot

www.intellipaat.com

CALL US NOW

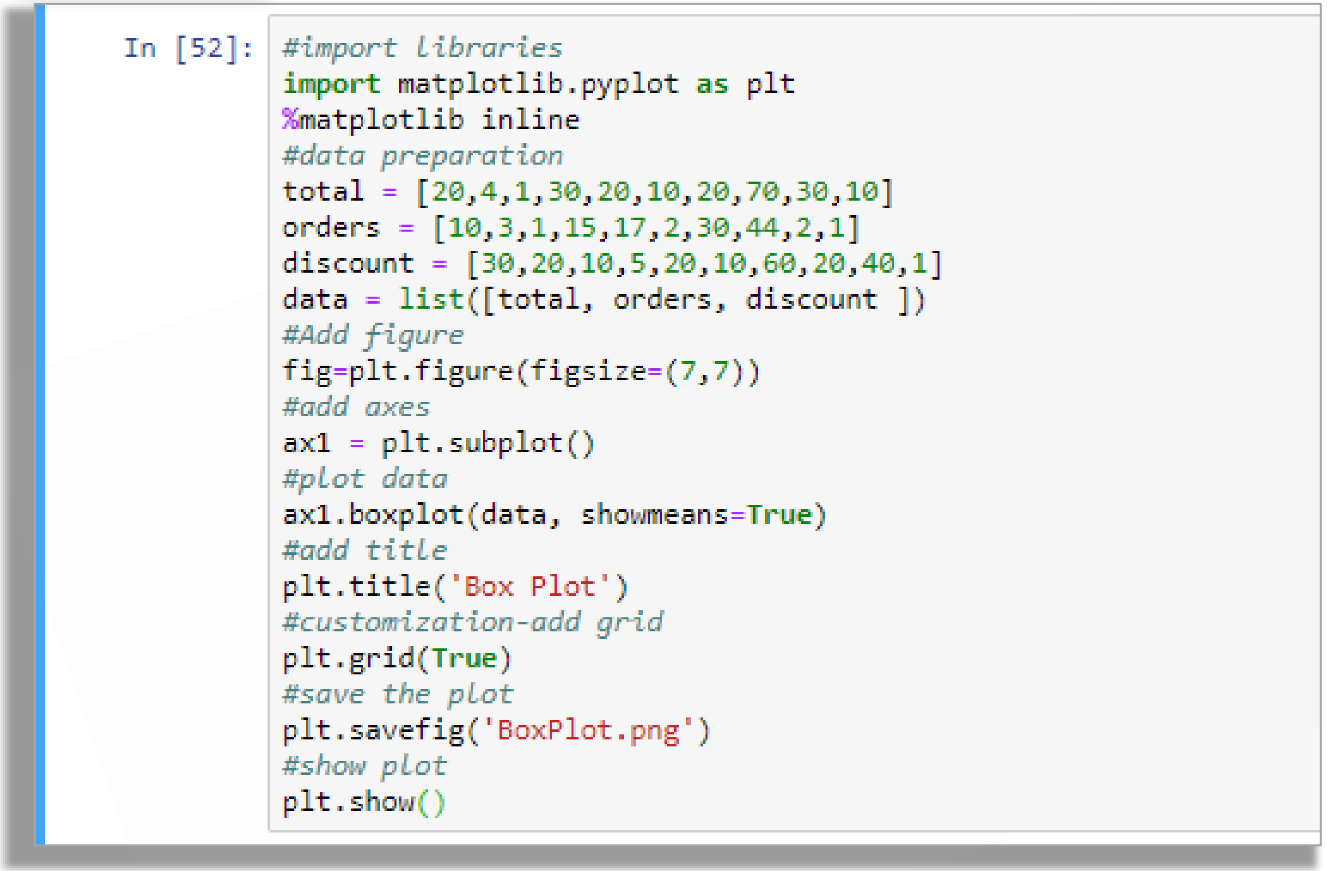
India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

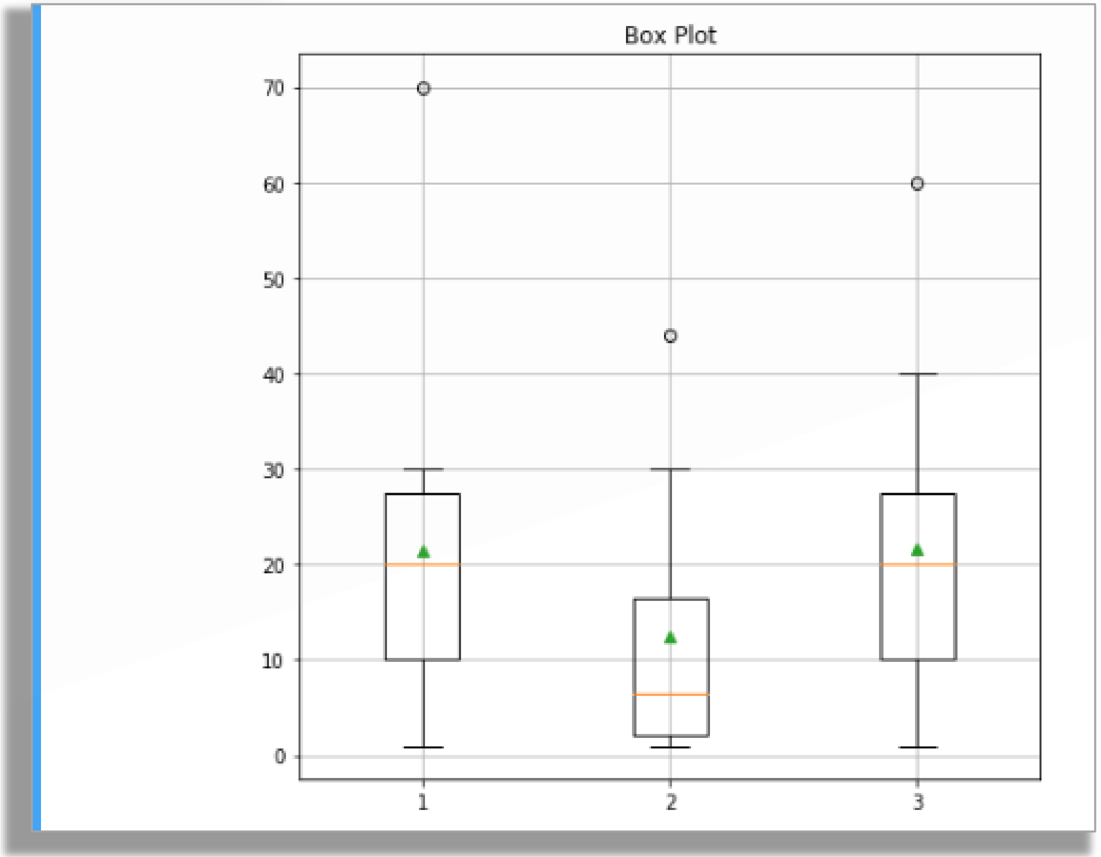
Demonstration: Box Plot

Input



```
In [52]: #import libraries
         import matplotlib.pyplot as plt
         %matplotlib inline
         #data preparation
         total = [20,4,1,30,20,10,20,70,30,10]
         orders = [10,3,1,15,17,2,30,44,2,1]
         discount = [30,20,10,5,20,10,60,20,40,1]
         data = list([total, orders, discount ])
         #Add figure
         fig=plt.figure(figsize=(7,7))
         #add axes
         ax1 = plt.subplot()
         #plot data
         ax1.boxplot(data, showmeans=True)
         #add title
         plt.title('Box Plot')
         #customization-add grid
         plt.grid(True)
         #save the plot
         plt.savefig('BoxPlot.png')
         #show plot
         plt.show()
```

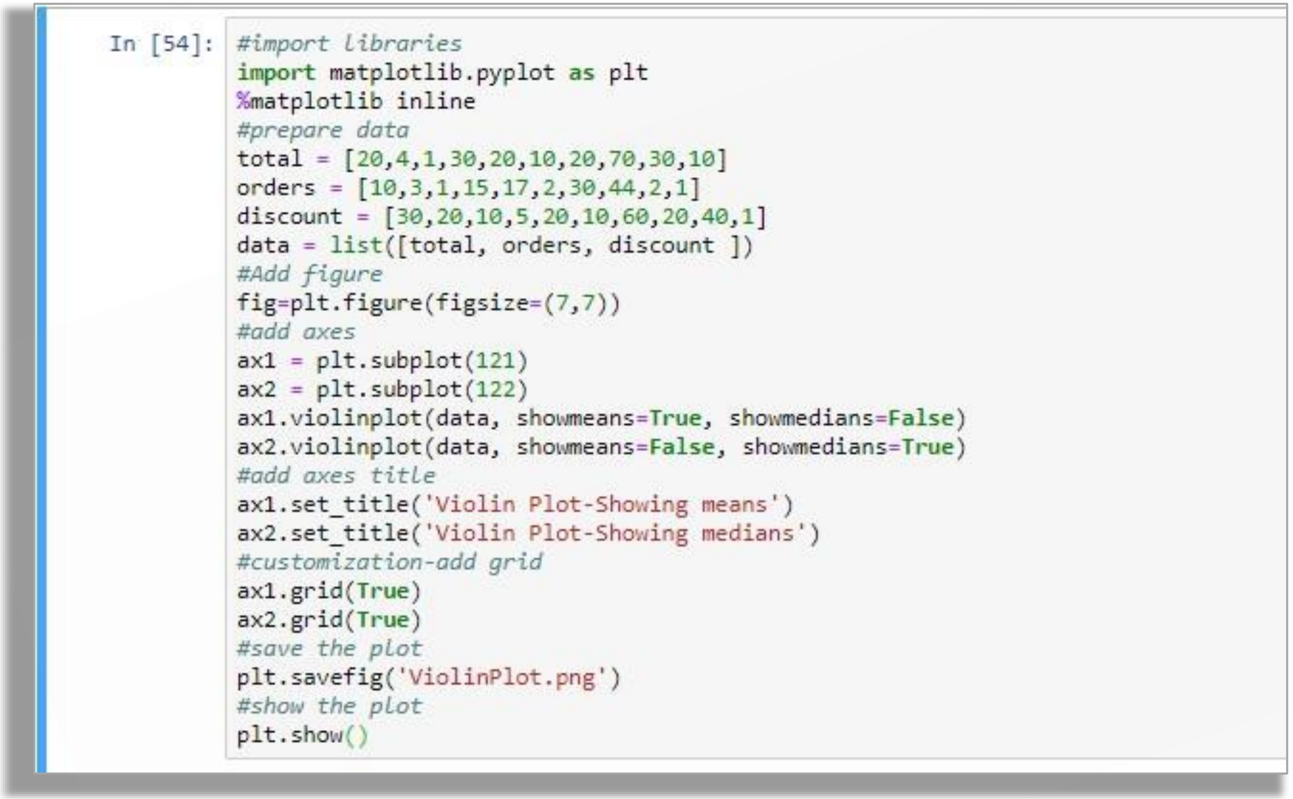
Output



Box plot is very helpful in viewing the summary of dataset in an efficient way also box plot helps you in doing outlier analysis

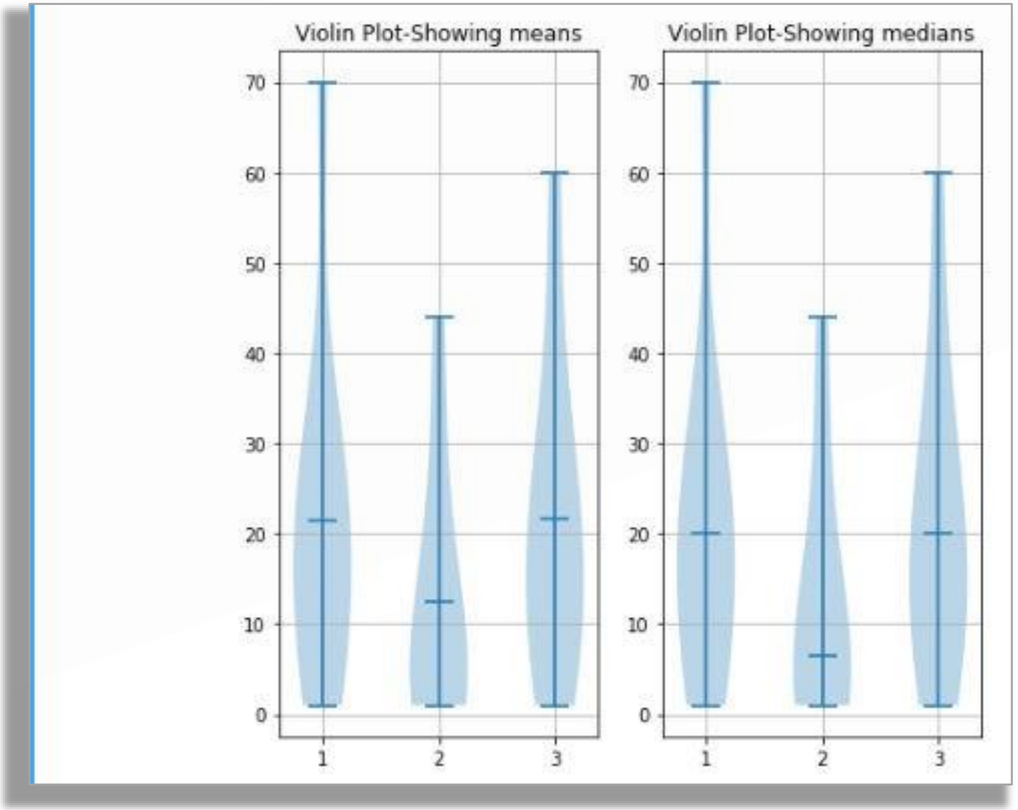
Demonstration: Violin Plot

Input



```
In [54]: #import libraries
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         total = [20,4,1,30,20,10,20,70,30,10]
         orders = [10,3,1,15,17,2,30,44,2,1]
         discount = [30,20,10,5,20,10,60,20,40,1]
         data = list([total, orders, discount ])
         #Add figure
         fig=plt.figure(figsize=(7,7))
         #add axes
         ax1 = plt.subplot(121)
         ax2 = plt.subplot(122)
         ax1.violinplot(data, showmeans=True, showmedians=False)
         ax2.violinplot(data, showmeans=False, showmedians=True)
         #add axes title
         ax1.set_title('Violin Plot-Showing means')
         ax2.set_title('Violin Plot-Showing medians')
         #customization-add grid
         ax1.grid(True)
         ax2.grid(True)
         #save the plot
         plt.savefig('ViolinPlot.png')
         #show the plot
         plt.show()
```

Output



Allows to visualize the distribution of a numeric variable for one or several groups. Adapted when the amount of data is huge and showing individual observations gets impossible.

www.intellipaat.com

India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

Hands-on: Image Plot

Python Certification Course

How to create a Image Plot?

Things you will learn after this Session

Hands On: Image Plot

- How to create a Box Plot?
- How to create a Violin Plot?

Hands-on: Image Plot

IntelliPaat

www.intellipaat.com

CALL US NOW

India : +91-7847955955

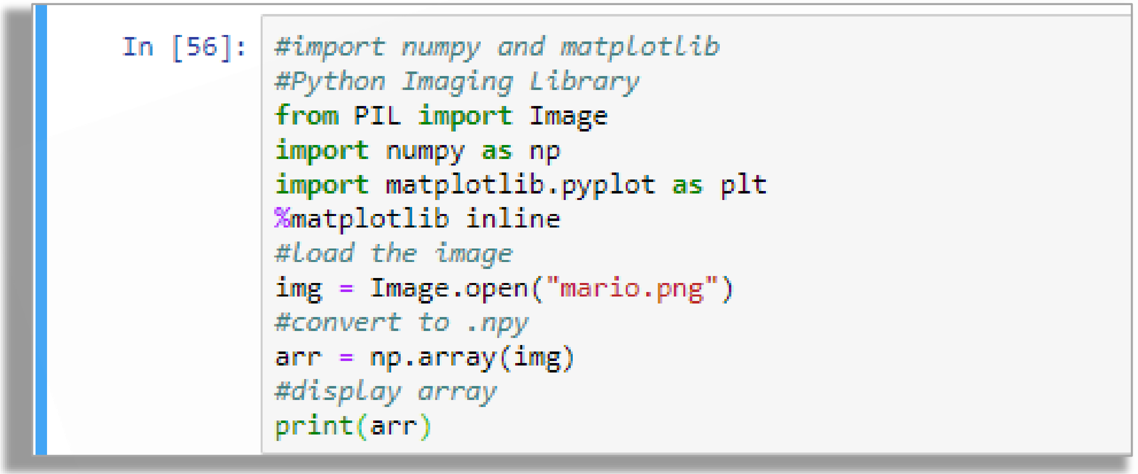
US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

Demonstration: Image Plot

Converting PNG to Numpy Array

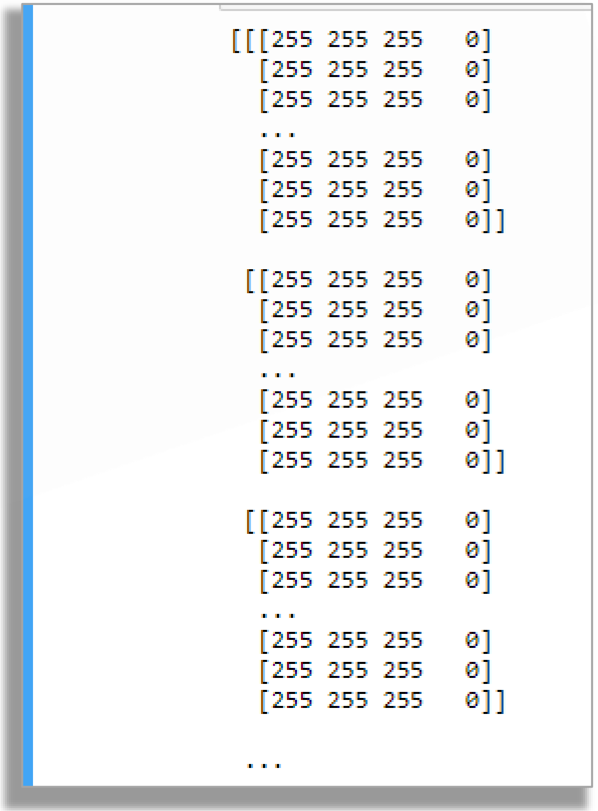
Input



```
In [56]: #import numpy and matplotlib
         #Python Imaging Library
         from PIL import Image
         import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline
         #load the image
         img = Image.open("mario.png")
         #convert to .npy
         arr = np.array(img)
         #display array
         print(arr)
```

.png

Output



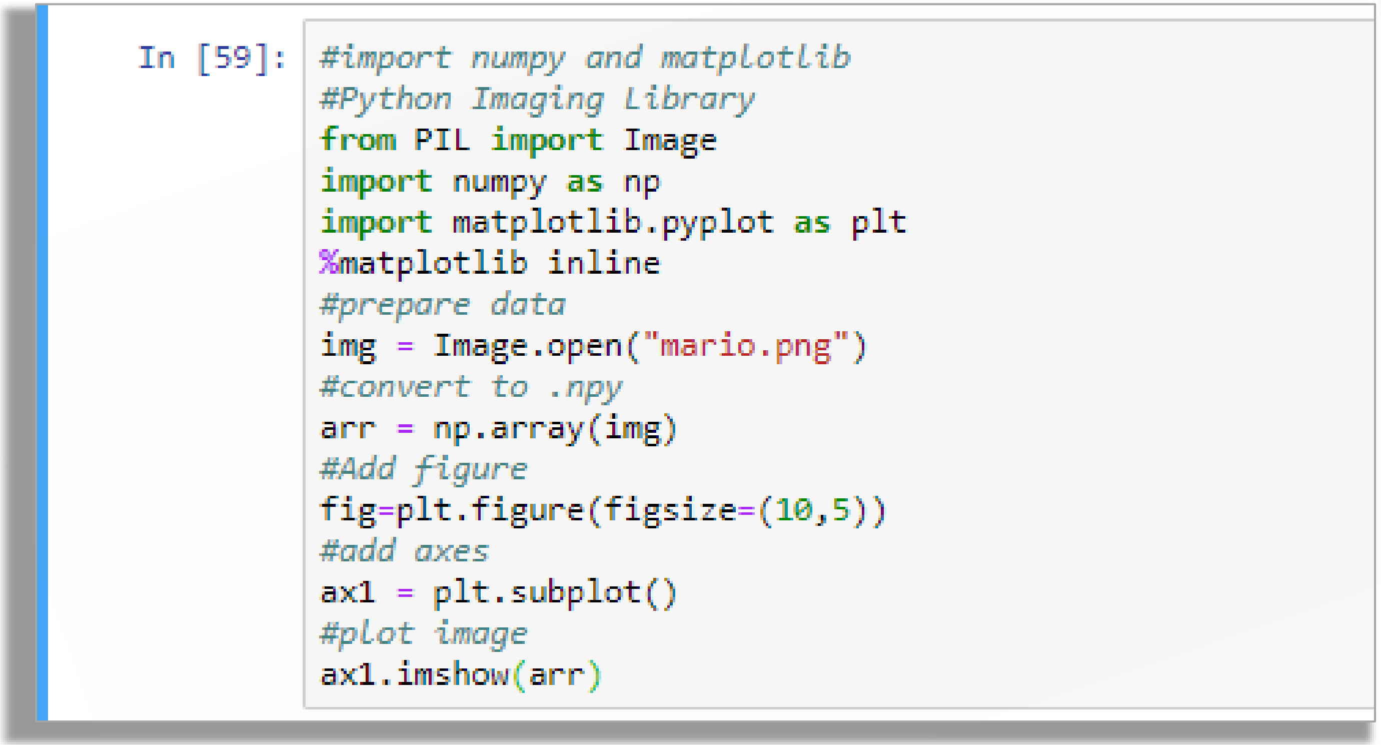
```
[[[255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]
  ...
  [255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]]

 [[255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]
  ...
  [255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]]

 [[255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]
  ...
  [255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]]

 ...
```

Numpy array

Used for image manipulation

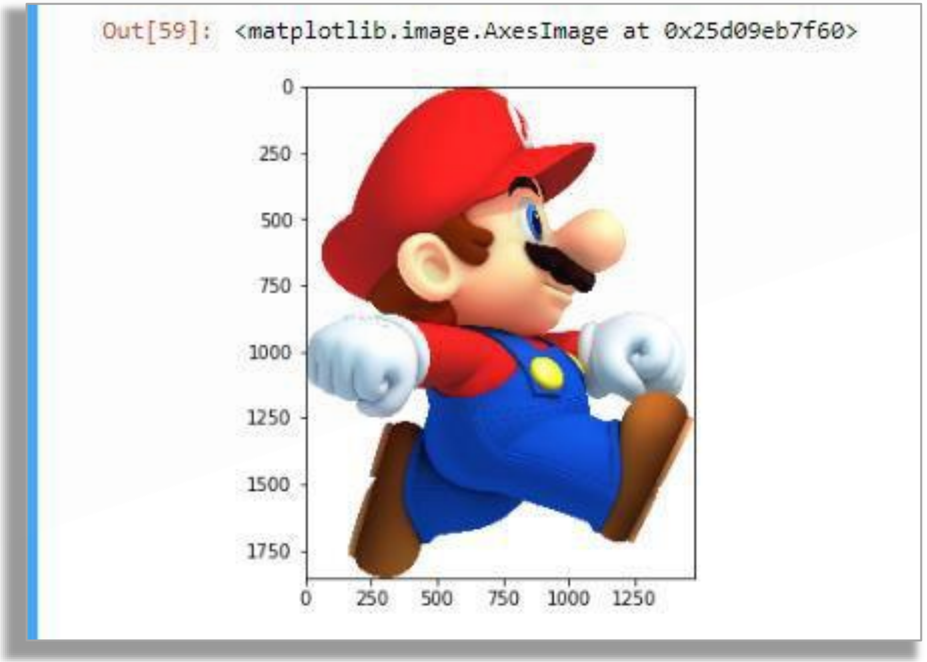
Demonstration: Image Plot

Input



```
In [59]: #import numpy and matplotlib
         #Python Imaging Library
         from PIL import Image
         import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         img = Image.open("mario.png")
         #convert to .npy
         arr = np.array(img)
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #add axes
         ax1 = plt.subplot()
         #plot image
         ax1.imshow(arr)
```

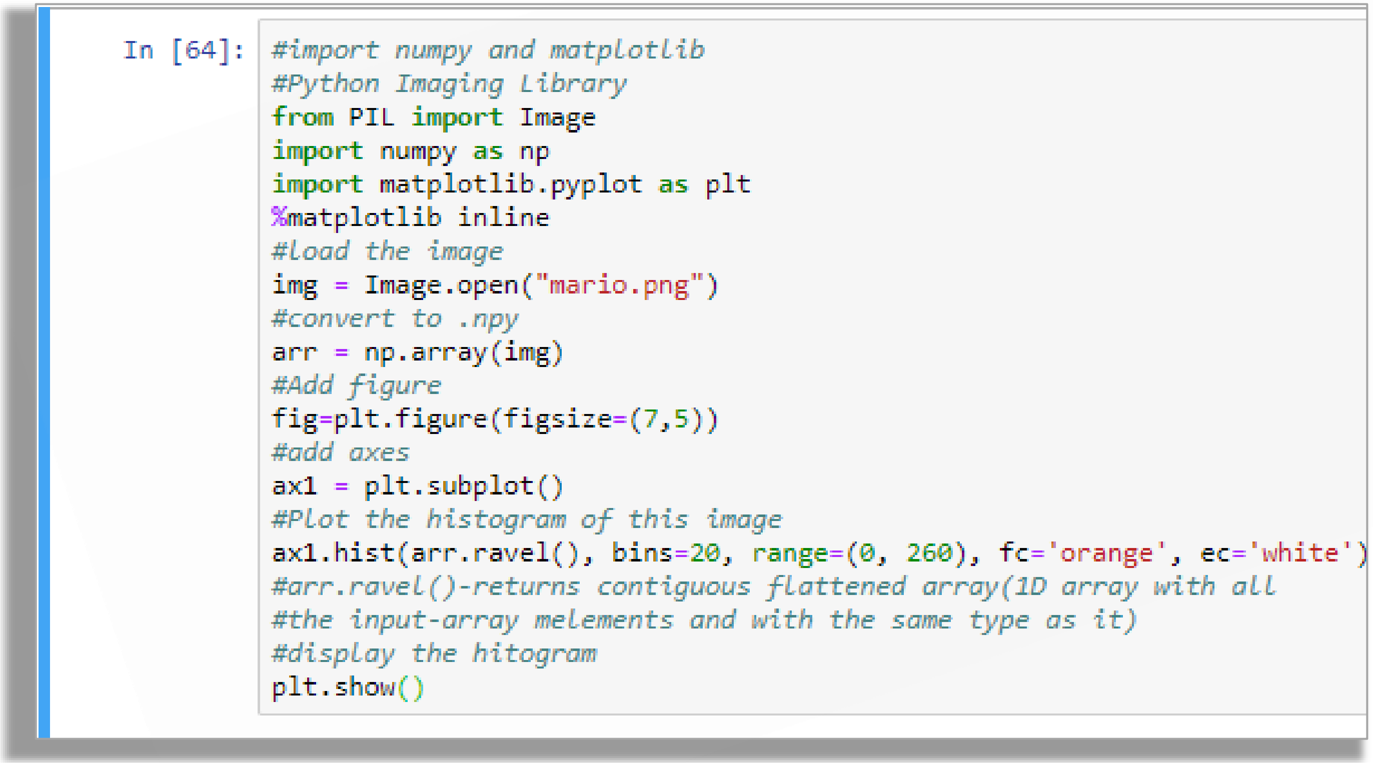
Output



```
Out[59]: <matplotlib.image.AxesImage at 0x25d09eb7f60>
```

Demonstration: Image to Histogram

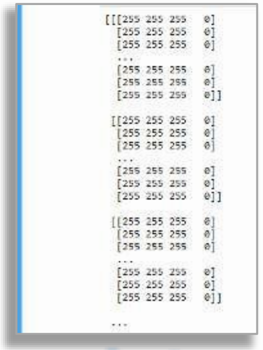
Input



```
In [64]: #import numpy and matplotlib
         #Python Imaging Library
         from PIL import Image
         import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline
         #load the image
         img = Image.open("mario.png")
         #convert to .npy
         arr = np.array(img)
         #Add figure
         fig=plt.figure(figsize=(7,5))
         #add axes
         ax1 = plt.subplot()
         #Plot the histogram of this image
         ax1.hist(arr.ravel(), bins=20, range=(0, 260), fc='orange', ec='white')
         #arr.ravel()-returns contiguous flattened array(1D array with all
         #the input-array melements and with the same type as it)
         #display the hitogram
         plt.show()
```

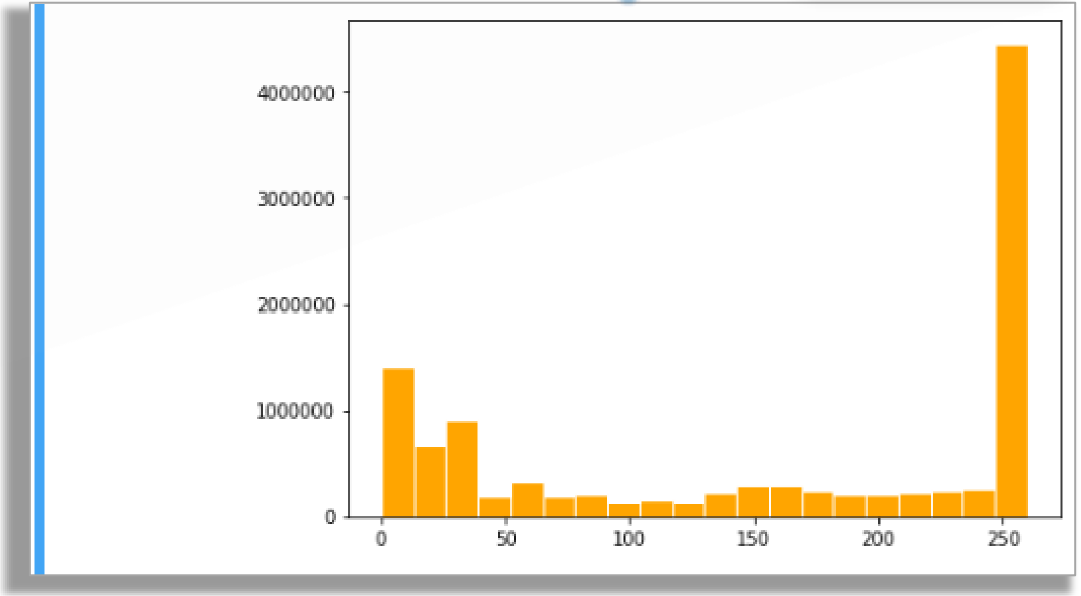
.png

Numpy array



```
[[[255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]
  ...
  [255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]]

 [[255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]
  ...
  [255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]]

 [[255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]
  ...
  [255 255 255   0]
  [255 255 255   0]
  [255 255 255   0]]

 ...
```

Output



www.intellipaat.com

www.intellipaat.com

☎ CALL US NOW

India : +91-7847955955

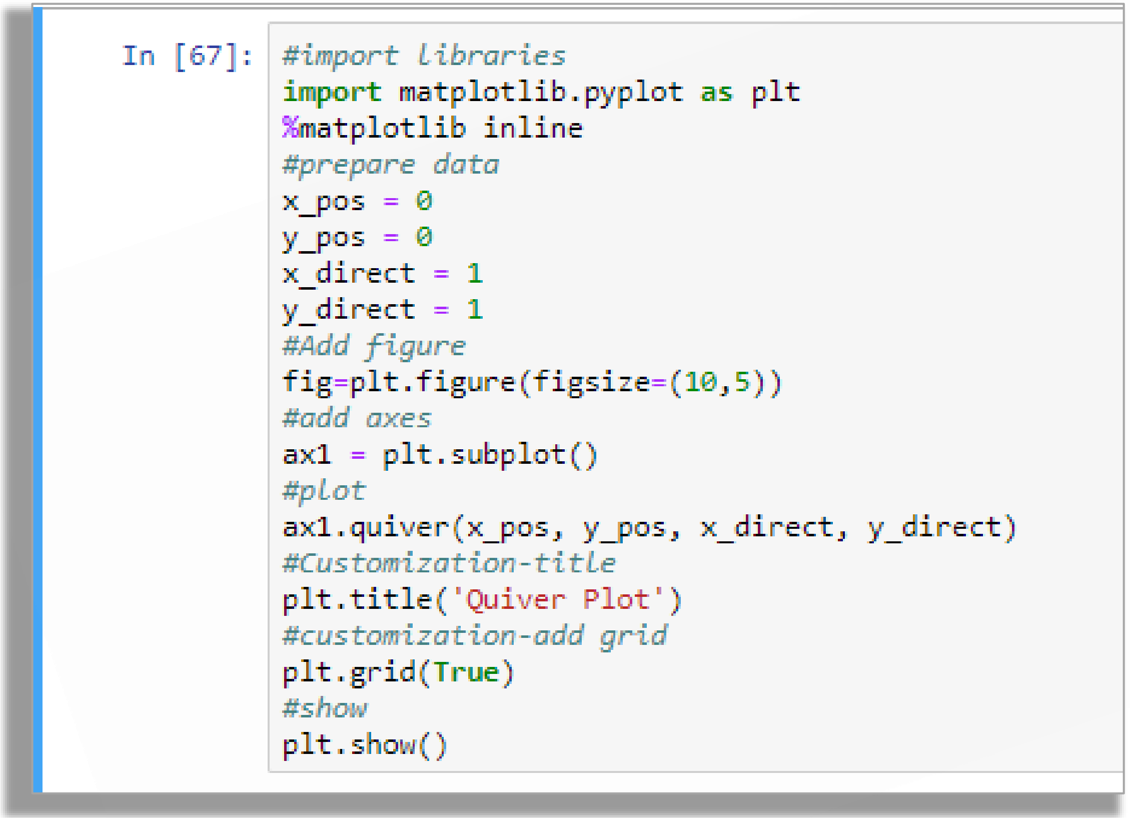
US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

Hands-on: Quiver and Stream Plot

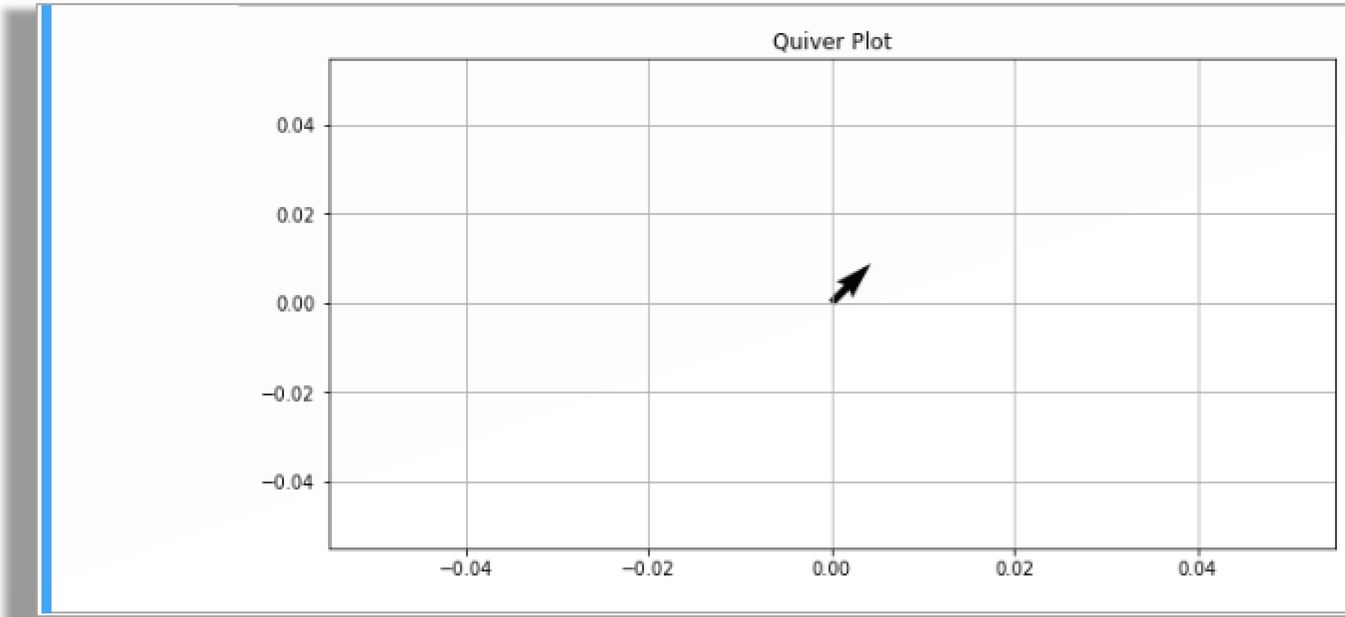
Demonstration: Quiver Plot

Input



```
In [67]: #import libraries
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         x_pos = 0
         y_pos = 0
         x_direct = 1
         y_direct = 1
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #add axes
         ax1 = plt.subplot()
         #plot
         ax1.quiver(x_pos, y_pos, x_direct, y_direct)
         #Customization-title
         plt.title('Quiver Plot')
         #customization-add grid
         plt.grid(True)
         #show
         plt.show()
```

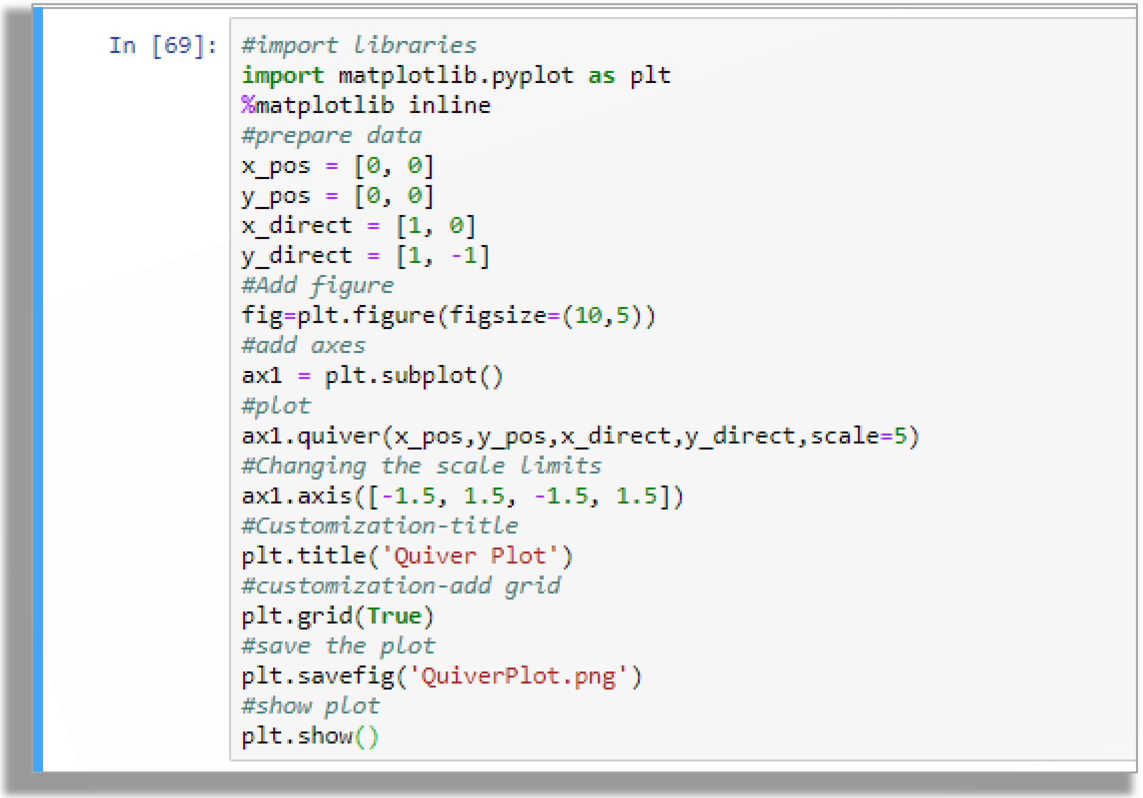
Output



Shows vector lines as arrows, useful in electrical engineering to visualize electrical potential.

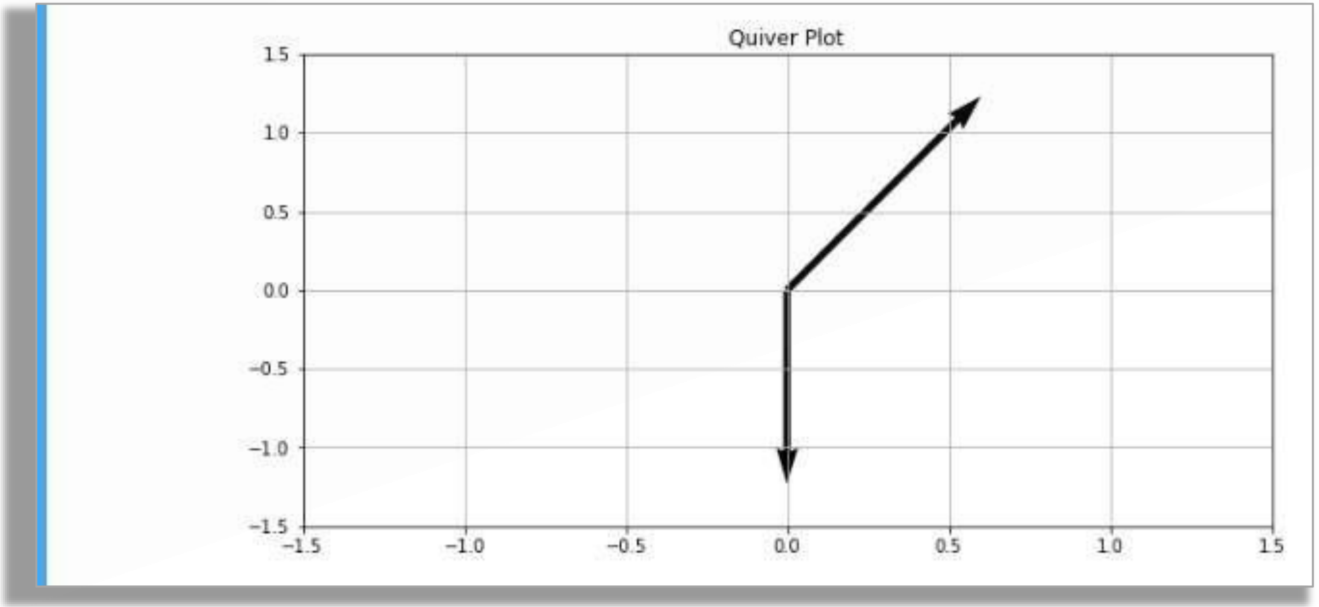
Demonstration: Quiver Plot

Input



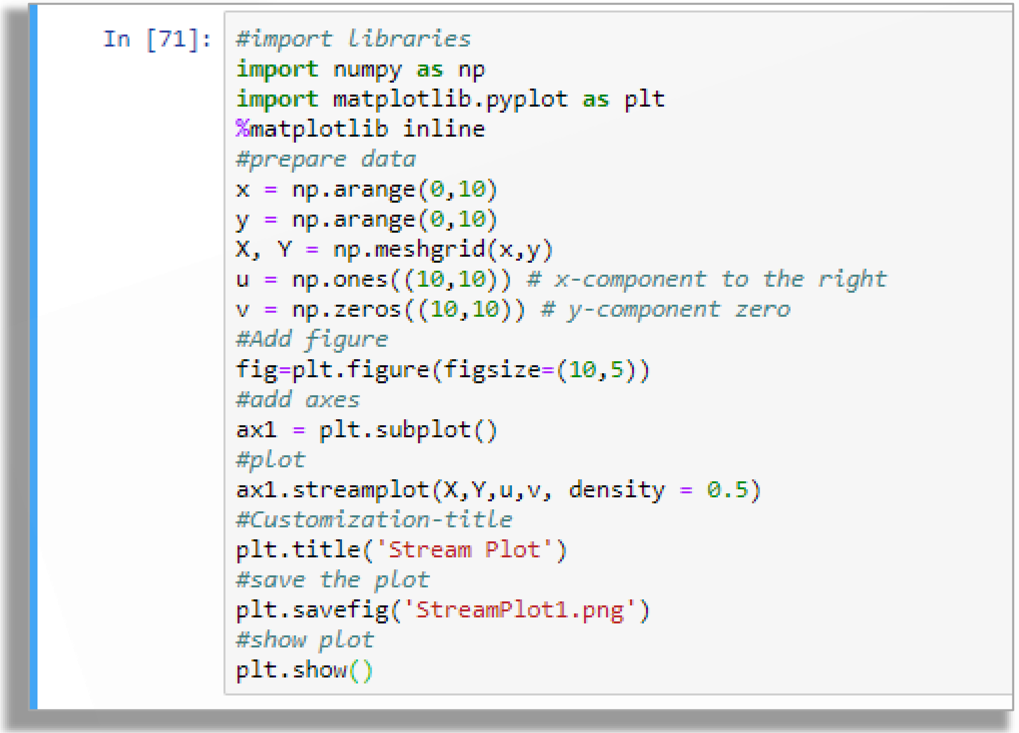
```
In [69]: #import libraries
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         x_pos = [0, 0]
         y_pos = [0, 0]
         x_direct = [1, 0]
         y_direct = [1, -1]
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #add axes
         ax1 = plt.subplot()
         #plot
         ax1.quiver(x_pos,y_pos,x_direct,y_direct,scale=5)
         #Changing the scale limits
         ax1.axis([-1.5, 1.5, -1.5, 1.5])
         #Customization-title
         plt.title('Quiver Plot')
         #customization-add grid
         plt.grid(True)
         #save the plot
         plt.savefig('QuiverPlot.png')
         #show plot
         plt.show()
```

Output



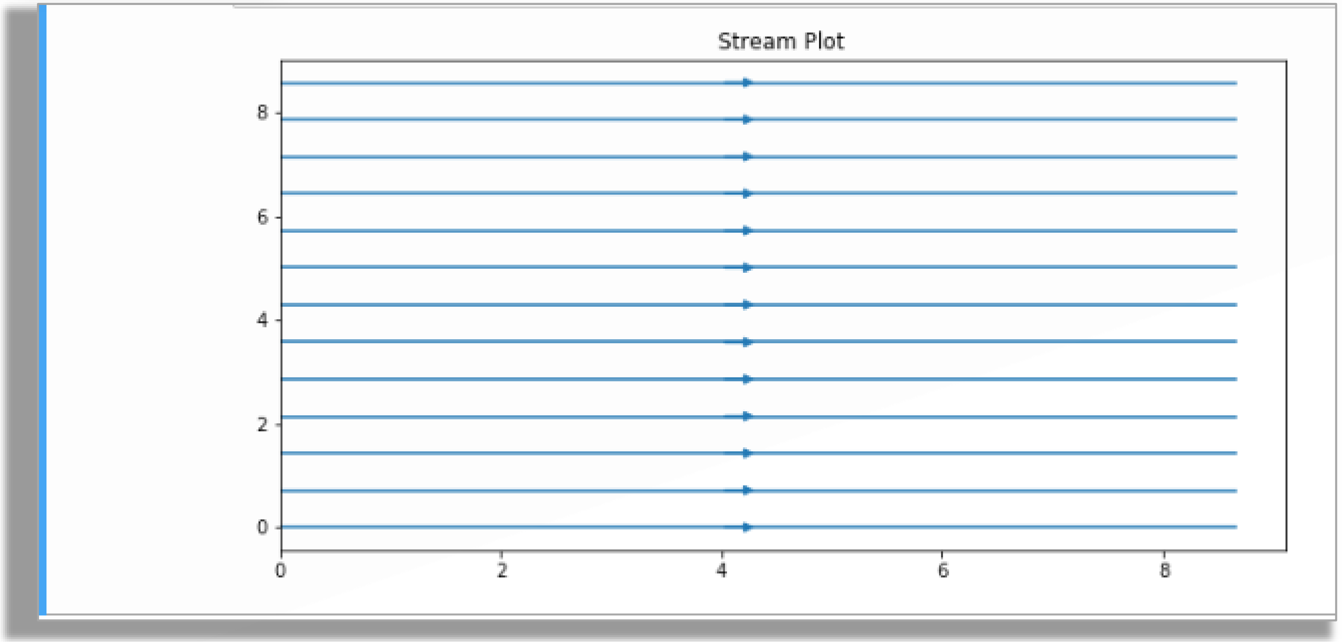
Demonstration: Stream Plot

Input



```
In [71]: #import libraries
         import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         x = np.arange(0,10)
         y = np.arange(0,10)
         X, Y = np.meshgrid(x,y)
         u = np.ones((10,10)) # x-component to the right
         v = np.zeros((10,10)) # y-component zero
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #add axes
         ax1 = plt.subplot()
         #plot
         ax1.streamplot(X,Y,u,v, density = 0.5)
         #Customization-title
         plt.title('Stream Plot')
         #save the plot
         plt.savefig('StreamPlot1.png')
         #show plot
         plt.show()
```

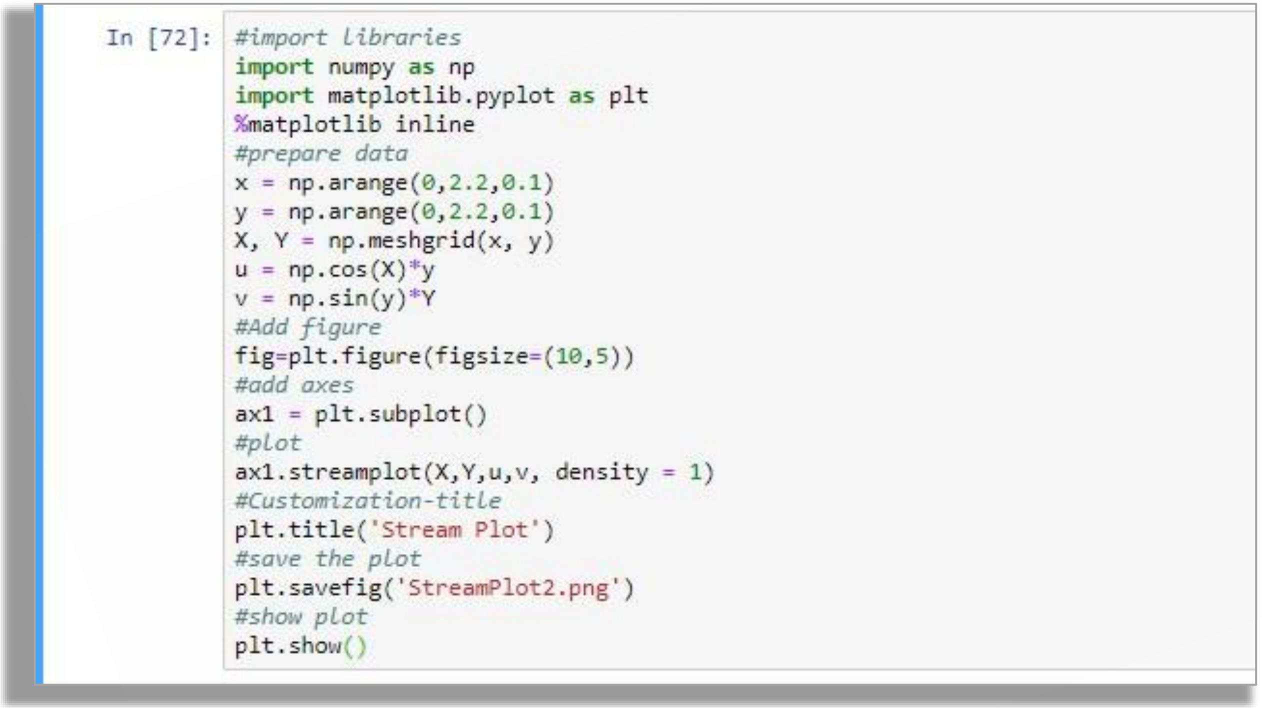
Output



A stream plot is a type of 2D plot used to show fluid flow and 2D field gradients.

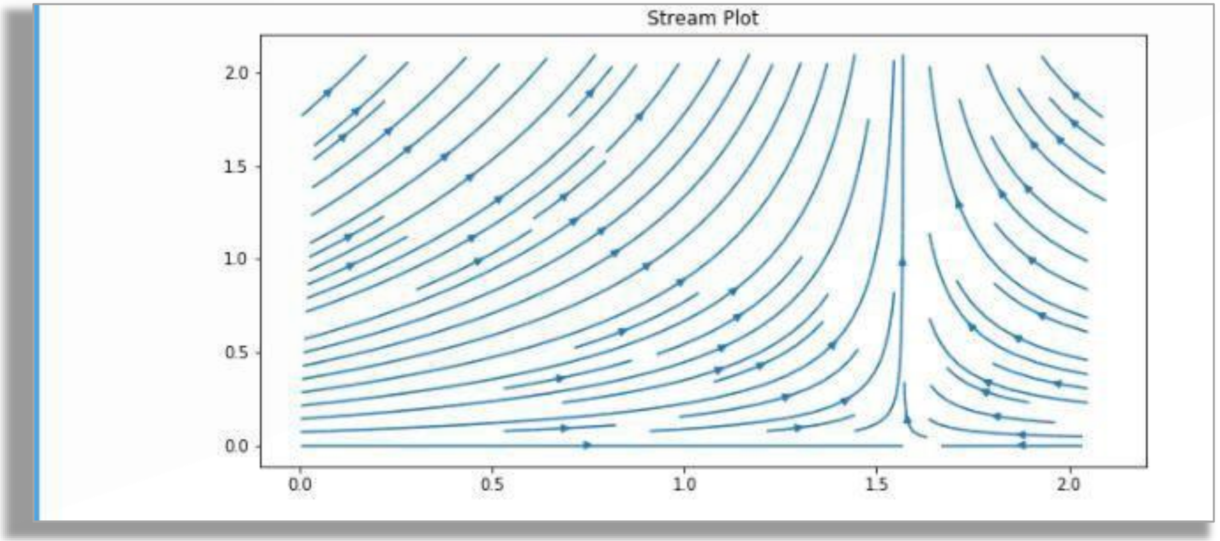
Demonstration: Stream Plot

Input



```
In [72]: #import libraries
         import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         x = np.arange(0,2.2,0.1)
         y = np.arange(0,2.2,0.1)
         X, Y = np.meshgrid(x, y)
         u = np.cos(X)*y
         v = np.sin(y)*Y
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #add axes
         ax1 = plt.subplot()
         #plot
         ax1.streamplot(X,Y,u,v, density = 1)
         #Customization-title
         plt.title('Stream Plot')
         #save the plot
         plt.savefig('StreamPlot2.png')
         #show plot
         plt.show()
```

Output



IntelliPaat

www.intellipaat.com

CALL US NOW

India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

Python Certification Course

How to create a Pie Chart?

Things you will learn after this Session

Hands On: Pie Chart

- How to create a Pie Chart?
- How to customize a Pie Chart?
- How to create a Doughnut Chart?

Hands-on: Pie Chart

www.intellipaat.com

CALL US NOW

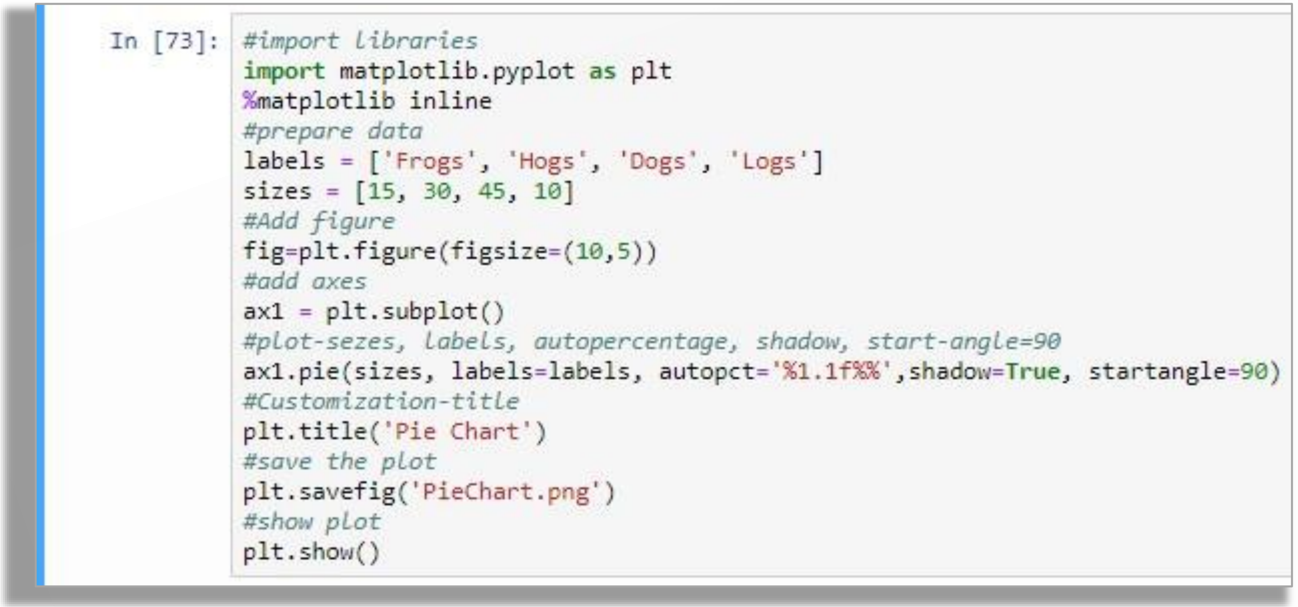
India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

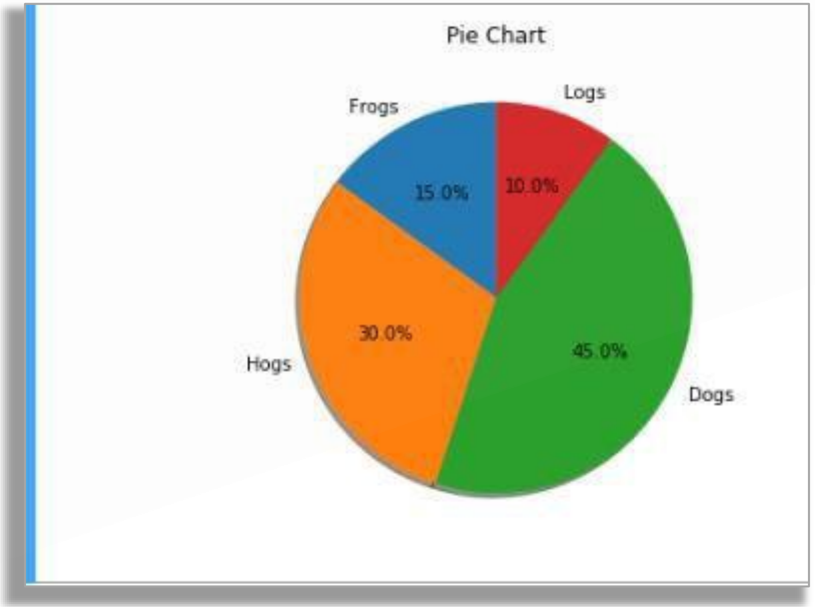
Demonstration: Pie Chart

Input



```
In [73]: #import libraries
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         labels = ['Frogs', 'Hogs', 'Dogs', 'Logs']
         sizes = [15, 30, 45, 10]
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #add axes
         ax1 = plt.subplot()
         #plot-sezes, labels, autopercentage, shadow, start-angle=90
         ax1.pie(sizes, labels=labels, autopct='%1.1f%%',shadow=True, startangle=90)
         #Customization-title
         plt.title('Pie Chart')
         #save the plot
         plt.savefig('PieChart.png')
         #show plot
         plt.show()
```

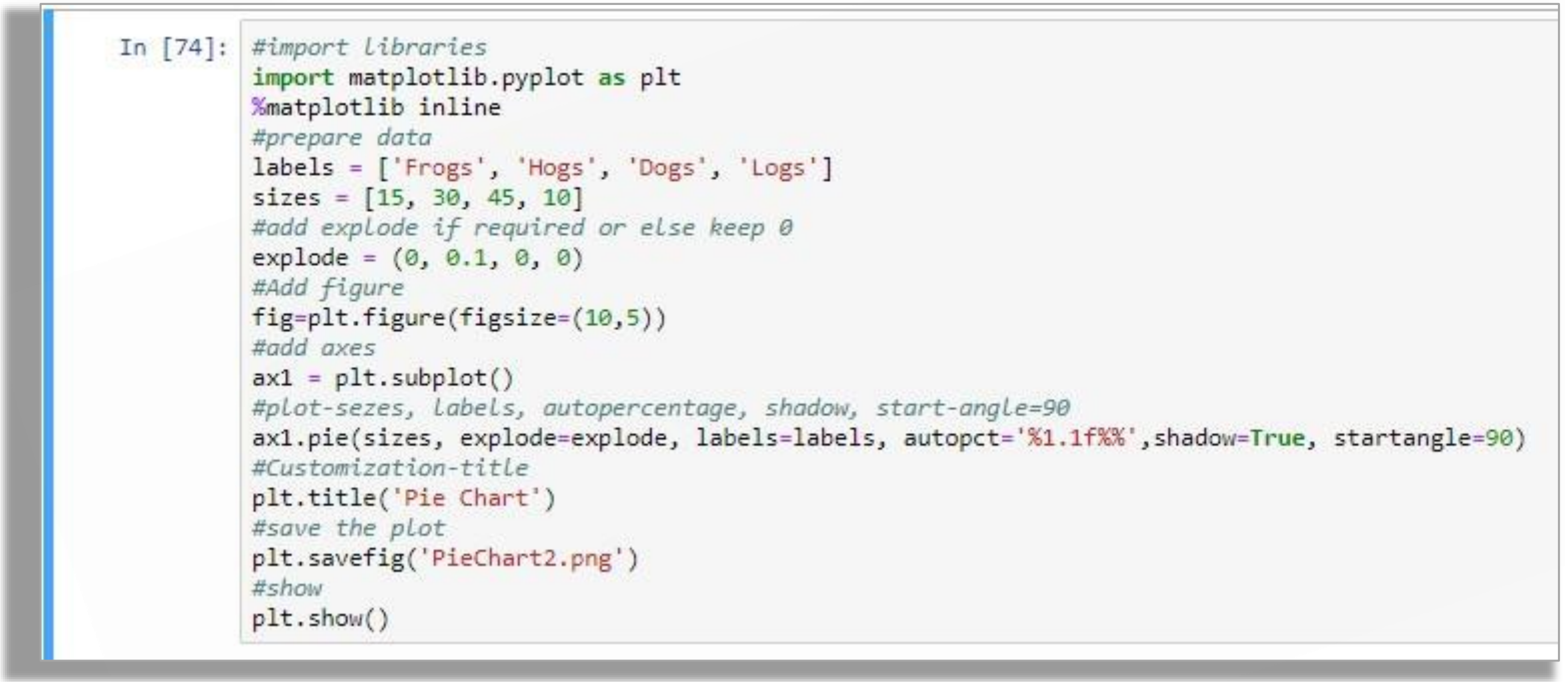
Output



Used to show percentage or proportional data, good for displaying data for around 6 categories or fewer.

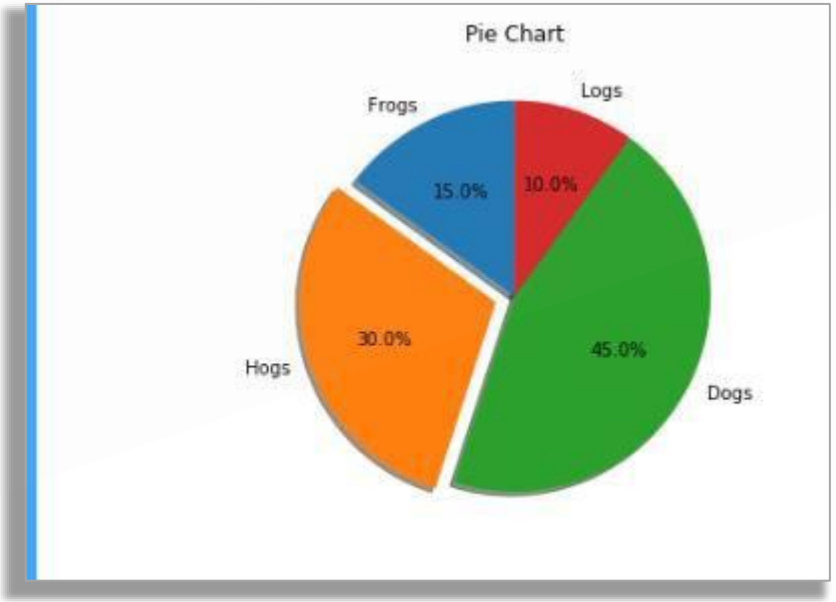
Demonstration: Customized Pie Chart

Input



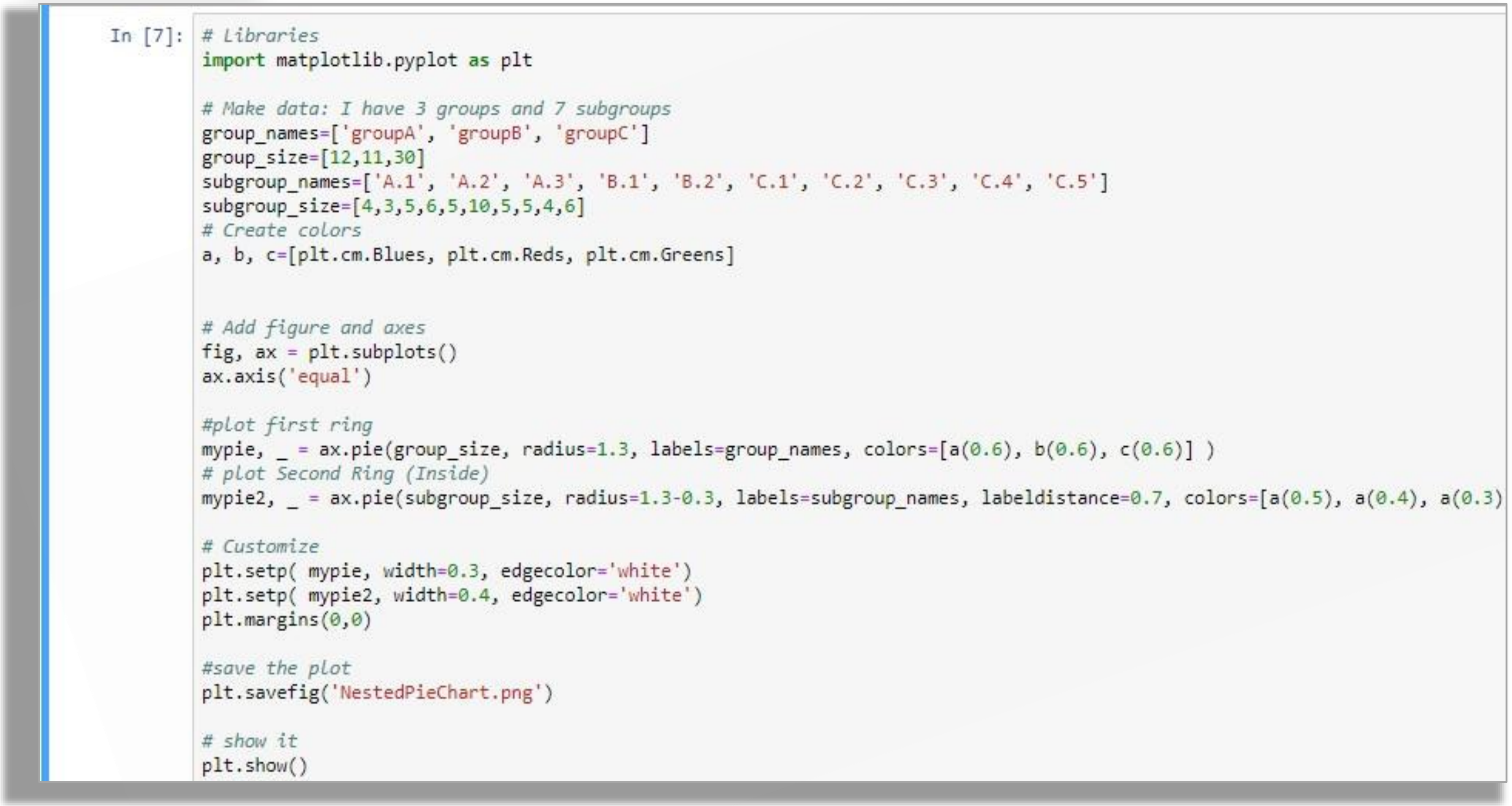
```
In [74]: #import libraries
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         labels = ['Frogs', 'Hogs', 'Dogs', 'Logs']
         sizes = [15, 30, 45, 10]
         #add explode if required or else keep 0
         explode = (0, 0.1, 0, 0)
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #add axes
         ax1 = plt.subplot()
         #plot-sezes, labels, autopercentage, shadow, start-angle=90
         ax1.pie(sizes, explode=explode, labels=labels, autopct='%1.1f%%',shadow=True, startangle=90)
         #Customization-title
         plt.title('Pie Chart')
         #save the plot
         plt.savefig('PieChart2.png')
         #show
         plt.show()
```

Output



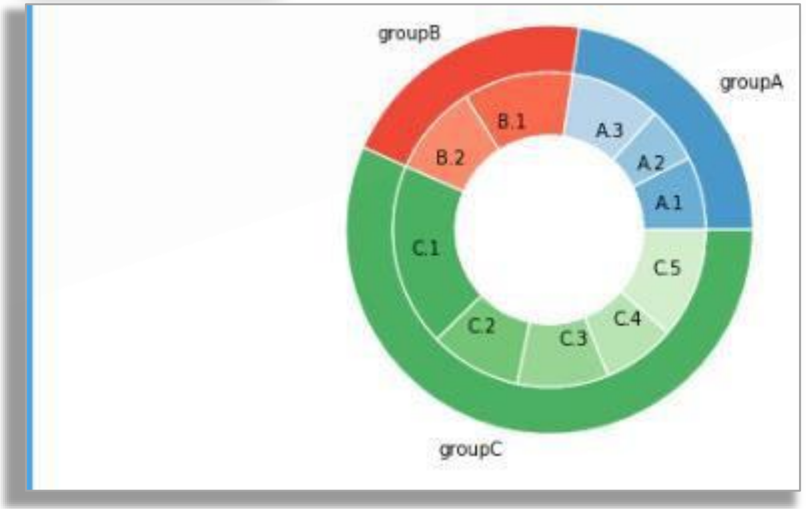
Demonstration: Donut Chart

Input



```
In [7]: # Libraries
        import matplotlib.pyplot as plt

        # Make data: I have 3 groups and 7 subgroups
        group_names=['groupA', 'groupB', 'groupC']
        group_size=[12,11,30]
        subgroup_names=['A.1', 'A.2', 'A.3', 'B.1', 'B.2', 'C.1', 'C.2', 'C.3', 'C.4', 'C.5']
        subgroup_size=[4,3,5,6,5,10,5,5,4,6]
        # Create colors
        a, b, c=[plt.cm.Blues, plt.cm.Reds, plt.cm.Greens]


        # Add figure and axes
        fig, ax = plt.subplots()
        ax.axis('equal')

        #plot first ring
        mypie, _ = ax.pie(group_size, radius=1.3, labels=group_names, colors=[a(0.6), b(0.6), c(0.6)] )
        # plot Second Ring (Inside)
        mypie2, _ = ax.pie(subgroup_size, radius=1.3-0.3, labels=subgroup_names, labeldistance=0.7, colors=[a(0.5), a(0.4), a(0.3)

        # Customize
        plt.setp( mypie, width=0.3, edgecolor='white')
        plt.setp( mypie2, width=0.4, edgecolor='white')
        plt.margins(0,0)

        #save the plot
        plt.savefig('NestedPieChart.png')

        # show it
        plt.show()
```

Output



Donut chart can contain more than one data series. Each data series that you plot in a doughnut chart adds a ring to the chart

Python Certification Course

How to create an Area Chart?

Things you will learn after this Session

Hands On: Area Chart

- How to create an Area Chart?
- How to merge line chart and area chart?

Hands-on: Area Plot

Thank You

www.intellipaat.com

CALL US NOW

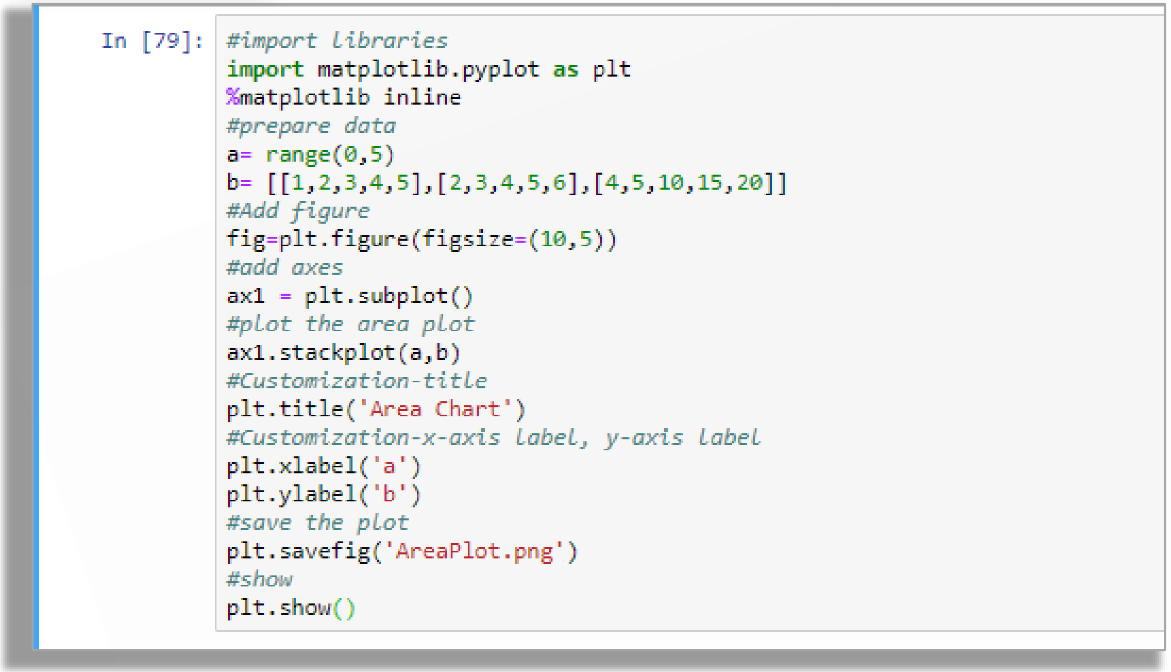
India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

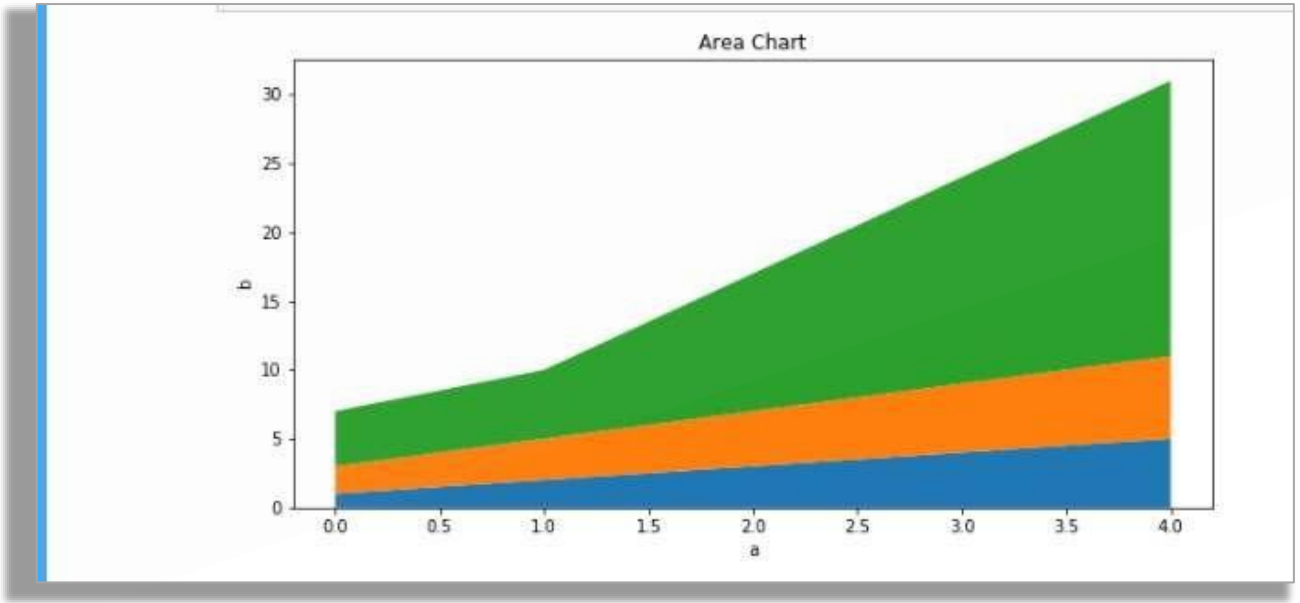
Demonstration: Area Plot

Input



```
In [79]: #import libraries
         import matplotlib.pyplot as plt
         %matplotlib inline
         #prepare data
         a= range(0,5)
         b= [[1,2,3,4,5],[2,3,4,5,6],[4,5,10,15,20]]
         #Add figure
         fig=plt.figure(figsize=(10,5))
         #add axes
         ax1 = plt.subplot()
         #plot the area plot
         ax1.stackplot(a,b)
         #Customization-title
         plt.title('Area Chart')
         #Customization-x-axis label, y-axis label
         plt.xlabel('a')
         plt.ylabel('b')
         #save the plot
         plt.savefig('AreaPlot.png')
         #show
         plt.show()
```

Output



Used to represent cumulative totals using numbers or percentages over time.

IntelliPaat

www.intellipaat.com

India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

sales@intellipaat.com

☎ India : +91-7847955955

US : 1-800-216-8930 (TOLL FREE)

✉ sales@intellipaat.com

24X7 Chat with our Course Advisor

www.intellipaat.com