4MM013 Python Workshop Week-3

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June, 2023

1 Additional Graphs with MatplotLib

Python's pyplot library will allow us to implement other graph types.

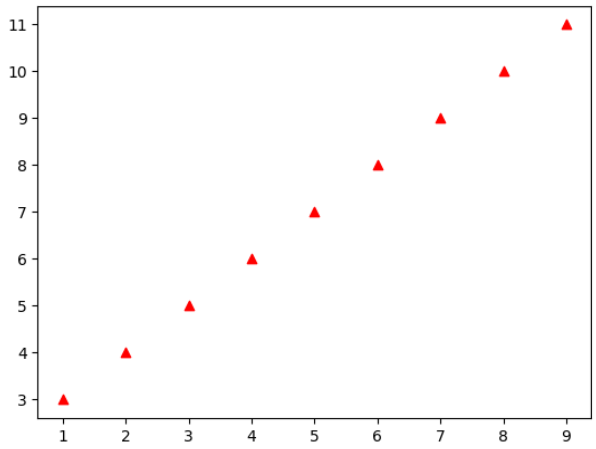
2 Scatter Plot

Scatter (plot) graphs will plot one point per observation, we can use these to graph independent variables to see if there is a correlation. Python will require two sets of variables for a scatter graph, one for the x-axis and another for the corresponding y axis. These sets will need to be of the same length and work best as lists, array, or array-like data types. We can call 'pyplot' to plot a scatter with the pyplot.scatter(x,y) call for example.

Example-1

```
import matplotlib.pyplot as plt
x=[1,2,3,4,5,6,7,8,9]
y=[3,4,5,6,7,8,9,10,11]
plt.scatter(x,y,color='red',marker='^')
plt.show()
```

The plot should look like this:

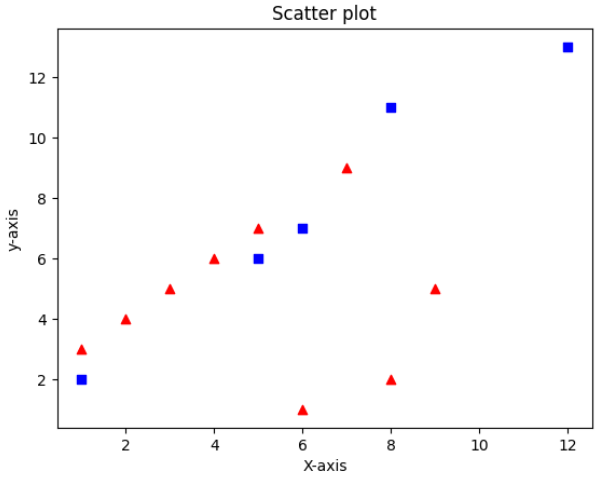


We can also plot more than one series of x, y values on to the same graph.

Example-2

```
import matplotlib.pyplot as plt
x=[1,2,3,4,5,6,7,8,9]
y=[3,4,5,6,7,1,9,2,5]
plt.scatter(x,y,color='red',marker='^')
x1=[1,5,6,8,12]
y1=[2,6,7,11,13]
plt.scatter(x1,y1,color='blue',marker='s')
plt.xlabel("X-axis")
plt.ylabel("y-axis")
plt.title("Scatter plot")
plt.show()
```

The plot should look like this:



2.1 Task-1

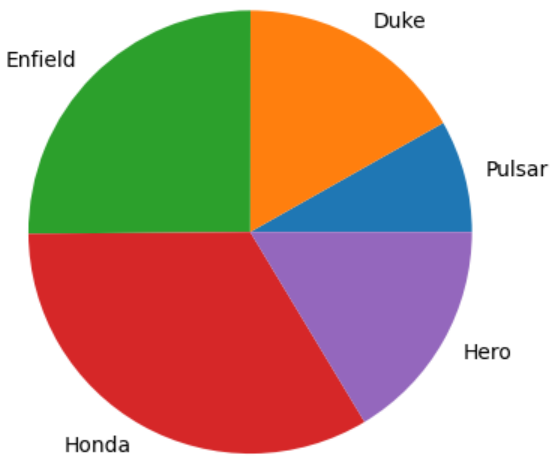
Create a scatter graph of 10 random x and y values between 0 and 50. Label the axis to show
x – Time taken in seconds
y – Distance reached
Title - "Buzzer Game Results"
One you have a working program, add the following code to your program;
colors=["red","green","blue","yellow","pink","orange","purple","brown","cyan","magenta"] and add to your scatter() call the 'c=colors' argument like so; **plt.scatter(x, y, c=colors)** What happens?

3 Pie Charts

A Pie Chart is a circular statistical plot that can display only one series of data. The area of the chart is the total percentage of the given data. The area of slices of the pie represents the percentage of the parts of the data. The slices of pie are called wedges. The area of the wedge is determined by the length of the arc of the wedge. The area of a wedge represents the relative percentage of that part with respect to whole data. Pie charts are commonly used in business presentations like sales, operations, survey results, resources, etc as they provide a quick summary.
With Pyplot, you can use the pie() function to draw pie charts:
Example-3

```
import matplotlib.pyplot as plt
y=[100,205,307,409,200]
groups=['Pulsar','Duke','Enfield','Honda','Hero']
plt.pie(y,labels=groups)
plt.show()
```

The Output should looks like this:



3.1 Task-2

Following data shows the change in population of different animals from 2017 to 2022.

1. Create a pie chart for the population of each year.
2. Can we show all the pie chart on the single pane? Write the code.

	Bear	Dolphins	Whales
2017	8	150	80
2018	54	77	54
2019	93	32	100
2020	116	11	76
2021	137	6	93
2022	184	1	72

3.2 Task-3

Construct a pie chart to visually display the favorite fruits of the students in a class based on the given data: Mango - 45; Orange - 30; Plum - 15; Pineapple - 30; Melon – 30

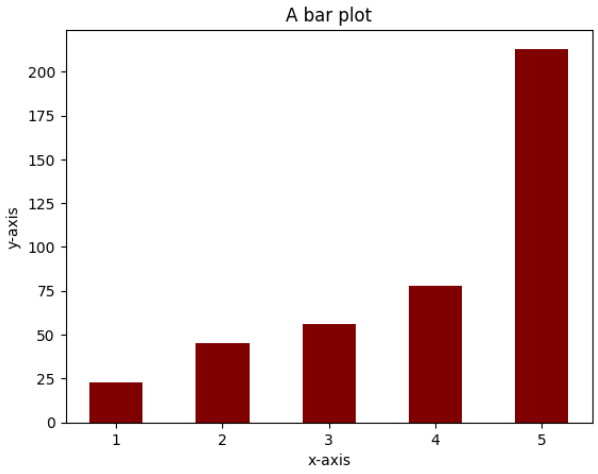
4 Bar Plot

A bar plot or bar chart is a graph that represents the category of data with rectangular bars with lengths and heights that is proportional to the values which they represent. The bar plots can be plotted horizontally or vertically. A bar chart describes the comparisons between the discrete categories. One of the axis of the plot represents the specific categories being compared, while the other axis represents the measured values corresponding to those categories.

Example-4

```
import matplotlib.pyplot as plt
x=[1,2,3,4,5]
data = [23, 45, 56, 78, 213]
plt.bar(x, data,width=0.5,color='maroon')
plt.title("A bar plot")
plt.xlabel("x-axis")
plt.ylabel("y-axis")
plt.show()
```

The plot should look like this:



Add the following code on your program. plt.grid(color='95a5a6', linestyle='–',linewidth=2, axis='y', alpha=0.7) Explain what happens?

4.1 Task-4

Here is some data to use for the tasks.

Car color	Number seen
Red	123
Silver	230
Blue	78
White	193
Green	12

Create a bar chart for the car data above.

1. Implement the code " plt.bar(x, y, width = 0.3)" to plot the bar chart, what is the effect?
2. Implement the code " plt.barh(x, y)" to plot the bar chart, what is the effect?
3. Create a list of colors and using the " plt.bar(x, y, color = you list here) "set the bar chart colors to be the same as the car colors each bar represents.
4. Create a pie chart of the car data above and add a title.
5. Test out the following pie chart additional arguments / settings ("..." is for the normal code you have already)

A	`myexplode = [0.3, 0, 0, 0]` `plt.pie(... , explode = myexplode)`
B	`myexplode = [0.3, 0, 0, 0]` `plt.pie(... , explode = myexplode,shadow = True)`
C	`plt.legend(title = "Car Colours:")`
D	`mycolours = ["Magenta", "Green", "Cyan", "Red"]` `plt.pie(... , colors = mycolours)`

5 Histogram

A histogram is basically used to represent data provided in a form of some groups.It is accurate method for the graphical representation of numerical data distribution.It is a type of bar plot where X-axis represents the bin ranges while Y-axis gives information about frequency.

Example-5

```
from matplotlib import pyplot as plt

# Creating a sample dataset
array = [23, 56, 87, 87, 98,
              12, 76, 98, 34, 87,
              67, 23, 87, 56, 34,
              26, 85, 47, 35, 86,
              76, 45, 86, 34, 37,
             99,23,33,44,56,77,33,
               34,56,88,44,55]

plt.hist(array, bins = 5)
plt.show()
```

5.1 Task-5

What is the use of histogram and explain the meaning of bins =5, in example-5.

Review your Workshop Task from the Tutor.