

DATA SCIENCE & MACHINE LEARNING

LAB CYCLE 3

1. Mathplotlib

Demonstrate creating various types of charts and plots using functions in mathplotlib library

1. Sarah bought a new car in 2001 for \$24,000. The dollar value of her car changed each year as shown in the table below.

Value of Sarah's Car

Year Value

2001 \$24,000

2002 \$22,500

2003 \$19,700

2004 \$17,500

2005 \$14,500

2006 \$10,000

2007 \$ 5,800

Represent the following information using a line graph with following style properties

□ X- axis - Year

Y –axis - Car Value

□ title –Value Depreciation (left Aligned)

□ Line Style dashdot and Line-color should be red

□ point using * symbol with green color and size 20

Subplot() provides multiple plots in one figure.

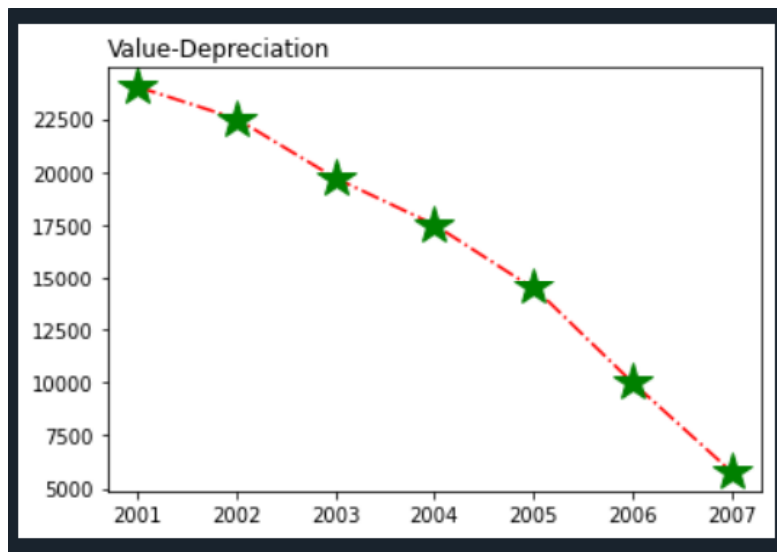
Program

```
import matplotlib.pyplot as plt
import numpy as np
```

```
xpoints = np.array([2001, 2002, 2003, 2004, 2005, 2006, 2007])
ypoints = np.array([24000, 22500, 19700, 17500, 14500, 10000, 5800])
```

```
plt.title("Value-Depreciation", loc = 'left')
plt.plot(xpoints,ypoints, '-.r', marker = '*', ms = 20, mec = 'g', mfc = 'g')
plt.show()
```

Output



2. Following table gives the daily sales of the following items in a shop

| Day | Mon | Tues | Wed | Thurs | Fri |
|--------|-----|------|-----|-------|-----|
| Drinks | 300 | 450 | 150 | 400 | 650 |
| Food | 400 | 500 | 350 | 300 | 500 |

Use subplot function to draw the line graphs with grids(color as blue and line style dotted) for the

above information as 2 separate graphs in two rows

a) Properties for the Graph 1:

- ☐ X label- Days of week
- ☐ Y label-Sale of Drinks
- ☐ Title-Sales Data1 (right aligned)
- ☐ Line –dotted with cyan color
- ☐ Points- hexagon shape with color magenta and outline black

b) Properties for the Graph 2:

- ☐ X label- Days of Week
- ☐ Y label-Sale of Food
- ☐ Title-Sales Data2 (center aligned)
- ☐ Line –dashed with yellow color
- ☐ Points- diamond shape with color green and outline red

Program

```
import matplotlib.pyplot as plt
import numpy as np

#plot 1
x = np.array(['mon', 'tues', 'wed', 'thu', 'fri'])
y = np.array([300, 450, 150, 400, 650])
```

```

plt.subplot(2, 1, 1)
plt.title("Sales Data 1", loc = "right")
plt.xlabel("Days of week")
plt.ylabel("Sale of Drinks")
plt.plot(x,y, color = 'cyan', linestyle = 'dotted', marker = 'H', mec = 'black', mfc = 'm')
plt.grid(color = 'blue', linestyle = 'dotted')

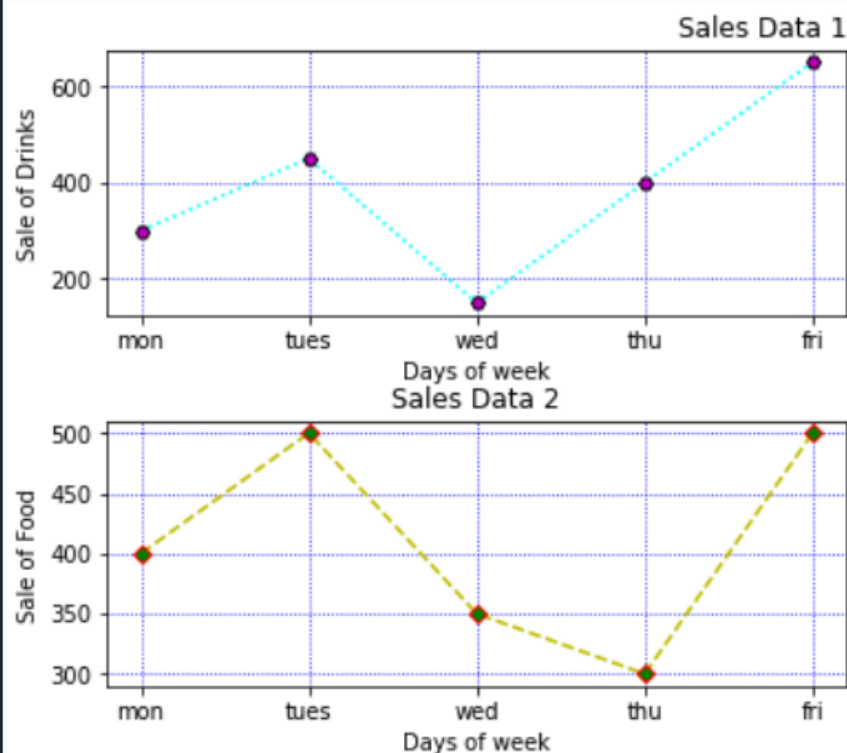
#plot 2
x = np.array(['mon', 'tues', 'wed', 'thu', 'fri'])
y = np.array([400, 500, 350, 300, 500])

plt.subplot(2, 1, 2)
plt.title("Sales Data 2")
plt.xlabel("Days of week")
plt.ylabel("Sale of Food")
plt.plot(x,y, color = 'y', linestyle = '--', marker = 'D', mec = 'r', mfc = 'g')
plt.grid(color = 'blue', linestyle = 'dotted')

plt.subplots_adjust(top=2.5,
                    bottom=1.5,
                    wspace=0.4,
                    hspace=0.4)
plt.show()

```

Output



3. Create scatter plot for the below data:(use Scatter function)

| Product | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Affordable Segment | 173 | 153 | 195 | 147 | 120 | 144 | 148 | 109 | 174 | 130 | 172 | 131 |
| Luxury Segment | 189 | 189 | 105 | 112 | 173 | 109 | 151 | 197 | 174 | 145 | 177 | 161 |
| Super Luxury Segment | 185 | 185 | 126 | 134 | 196 | 153 | 112 | 133 | 200 | 145 | 167 | 110 |

Create scatter plot for each Segment with following properties within one graph

- ☐ X Label- Months of Year with font size 18
- ☐ Y-Label- Sales of Segments
- ☐ Title –Sales Data
- ☐ Color for Affordable segment- pink
- ☐ Color for Luxury Segment- Yellow
- ☐ Color for Super luxury segment-blue

Program

```
import matplotlib.pyplot as plt
import numpy as np
```

```
plt.xlabel("Month of year", fontsize = 18)
plt.ylabel("Sales of Segments", fontsize = 18)
plt.title("Sales Data")
```

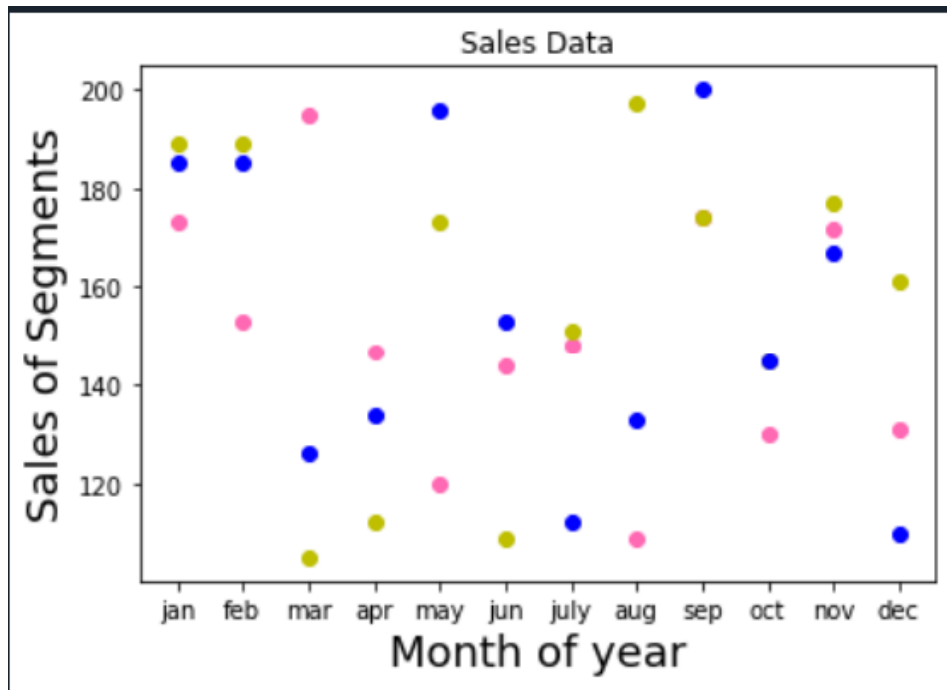
```
x = np.array(["jan", "feb", "mar", "apr", "may", "jun", "july", "aug", "sep", "oct", "nov", "dec"])
afseg = np.array([173, 153, 195, 147, 120, 144, 148, 109, 174, 130, 172, 131])
plt.scatter(x, afseg, color = "hotpink")
```

```
x = np.array(["jan", "feb", "mar", "apr", "may", "jun", "july", "aug", "sep", "oct", "nov", "dec"])
lseg = np.array([189, 189, 105, 112, 173, 109, 151, 197, 174, 145, 177, 161])
plt.scatter(x, lseg, color = "y")
```

```
x = np.array(["jan", "feb", "mar", "apr", "may", "jun", "july", "aug", "sep", "oct", "nov", "dec"])
slseg = np.array([185, 185, 126, 134, 196, 153, 112, 133, 200, 145, 167, 110])
plt.scatter(x, slseg, color = "b")
```

```
plt.show()
```

Output



4. Display the above data using multiline plot(3 different lines in same graph)

- ☐ Display the description of the graph in upper right corner(use legend())
- ☐ Use different colors and line styles for 3 different lines

Program

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

```
x1 = ['jan','feb','mar','apr','may','jun','jul','aug','sep','oct','nov','dec']
x2 = [173, 153, 195, 147, 120, 144, 148, 109, 174, 130, 172, 131]
plt.plot(x1, x2, color = 'hotpink', label = 'line 1', ls = '-.')
```

```
y1 = ['jan','feb','mar','apr','may','jun','jul','aug','sep','oct','nov','dec']
y2 = [189, 189, 105, 112, 173, 109, 151, 197, 174, 145, 177, 161]
plt.plot(y1, y2, color = 'y', label = 'line 2', linestyle = 'dashed')
```

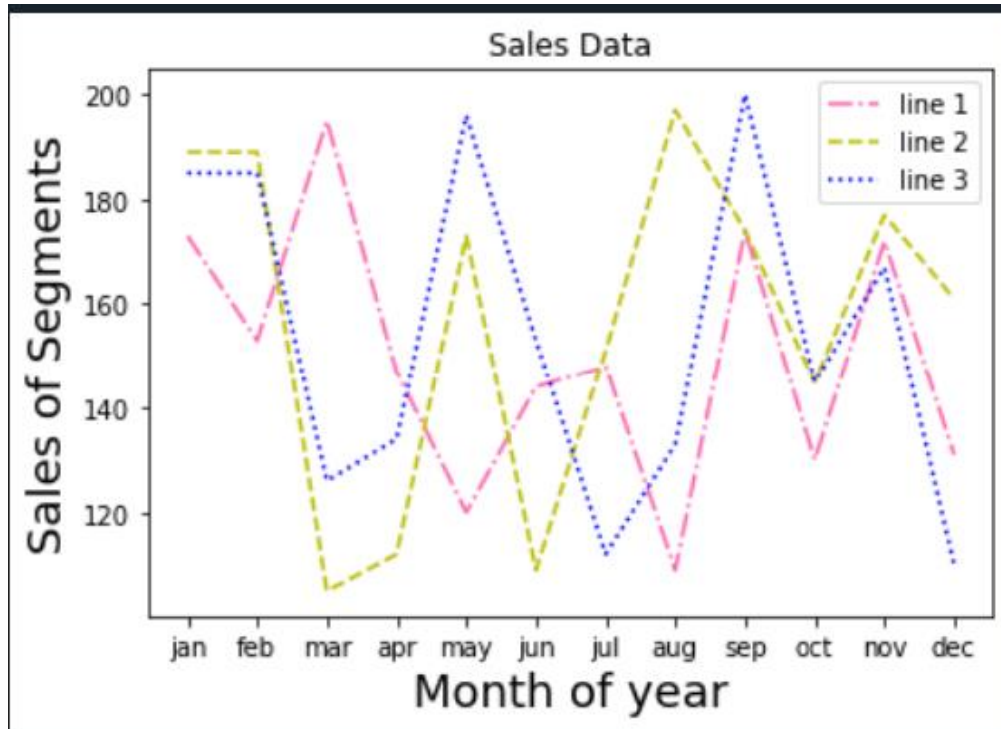
```
z1 = ['jan','feb','mar','apr','may','jun','jul','aug','sep','oct','nov','dec']
z2 = [185, 185, 126, 134, 196, 153, 112, 133, 200, 145, 167, 110]
plt.plot(z1, z2, color = 'blue', label = 'line 3',linestyle = 'dotted')
```

```
plt.xlabel("Month of year", fontsize = 18)
plt.ylabel("Sales of Segments", fontsize = 18)
plt.title("Sales Data")
```

```
plt.legend()
```

plt.show()

Output



5. 100 students were asked what their primary mode of transport for getting to school was. The results of this survey are recorded in the table below. Construct a bar graph representing this information.

| Mode of transport | Frequency |
|-------------------|-----------|
| Walking | 29 |
| Cycling | 15 |
| Car | 35 |
| Bus | 18 |
| Train | 3 |

Create a bar graph with X axis -mode of Transport and Y axis 'frequency'
Provide appropriate labels and title

Width .1, color green

Program

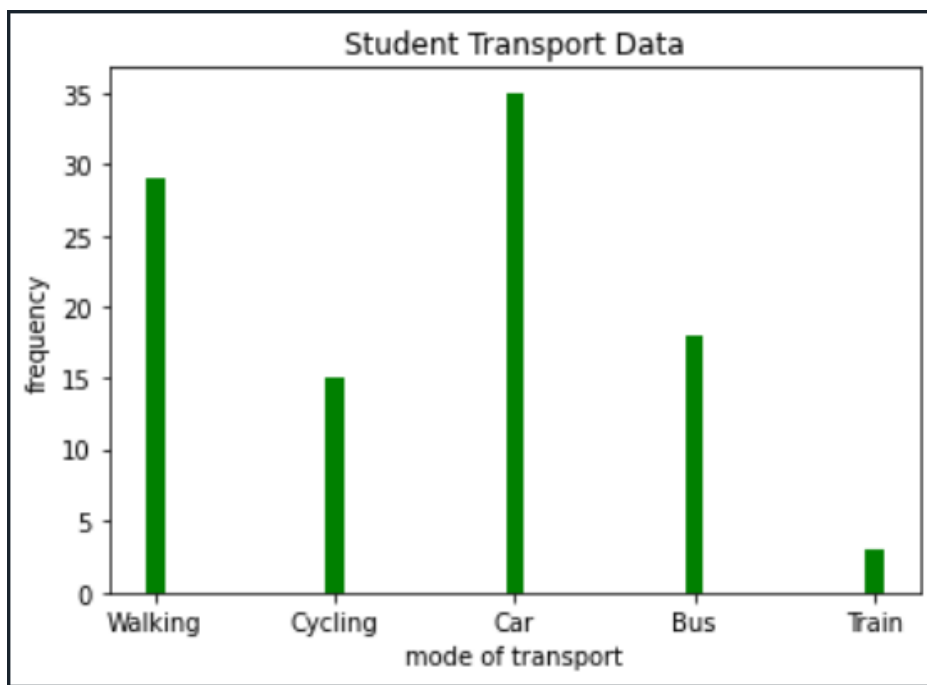
```
import matplotlib.pyplot as plt
import numpy as np

plt.title("Student Transport Data")
plt.xlabel("mode of transport")
plt.ylabel("frequency")

x = np.array(["Walking", "Cycling", "Car", "Bus", "Train"])
y = np.array([29, 15, 35, 18, 3])
plt.bar(x,y, color ="g", width = 0.1)

plt.show()
```

Output



6. We are provided with the height of 30 cherry trees.

The height of the trees (in inches): 61, 63, 64, 66, 68, 69, 71, 71.5, 72, 72.5, 73, 73.5, 74, 74.5, 76, 76.2,

76.5, 77, 77.5, 78, 78.5, 79, 79.2, 80, 81, 82, 83, 84, 85, 87. Create a histogram with a bin size of 5

Program

```
import matplotlib.pyplot as plt

height = [61, 63, 64, 66, 68, 69, 71, 71.5,
          72, 72.5, 73, 73.5, 74, 74.5, 76,
          76.2, 76.5, 77, 77.5, 78, 78.5, 79,
          79.2, 80, 81, 82, 83, 84, 85, 87]

plt.hist(height, edgecolor="r", bins=5)
plt.show()
```

Output

