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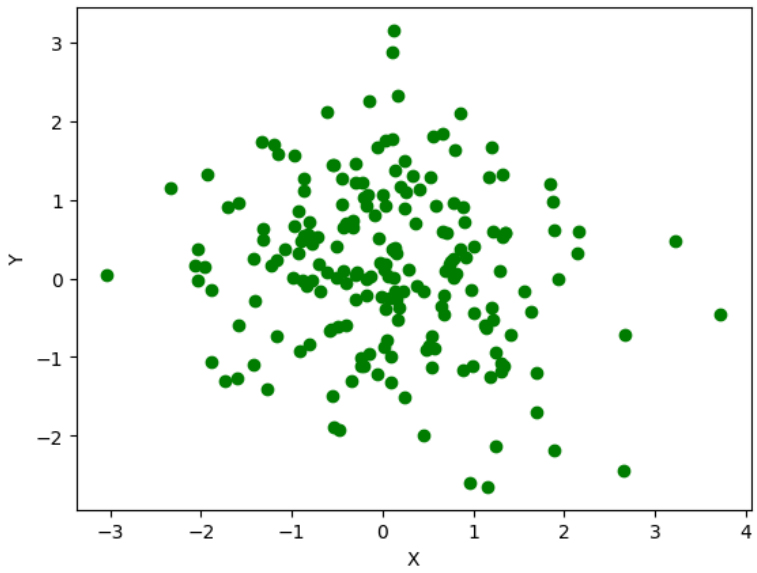
Course: Machine Learning Lab 1

Scatter Plot

1. program to draw a scatter graph taking a random distribution in X and Y and plotted against each other.

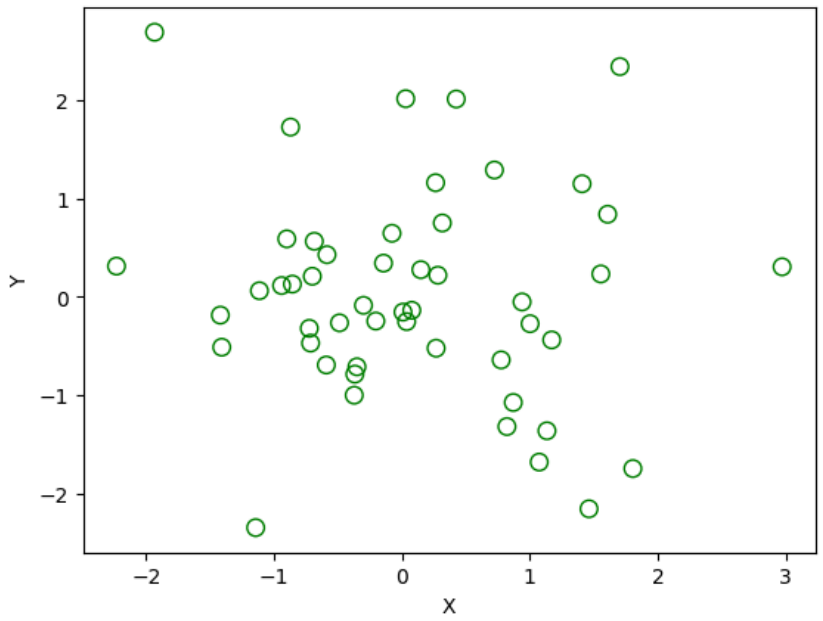
```
import matplotlib.pyplot as plt
from pylab import randn
X = randn(200)
Y = randn(200)
plt.scatter(X,Y, color='g')
plt.xlabel("X")
plt.ylabel("Y")
plt.show()
```



2. program to draw a scatter plot with empty circles taking a random distribution in X and Y and plotted against each other.

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

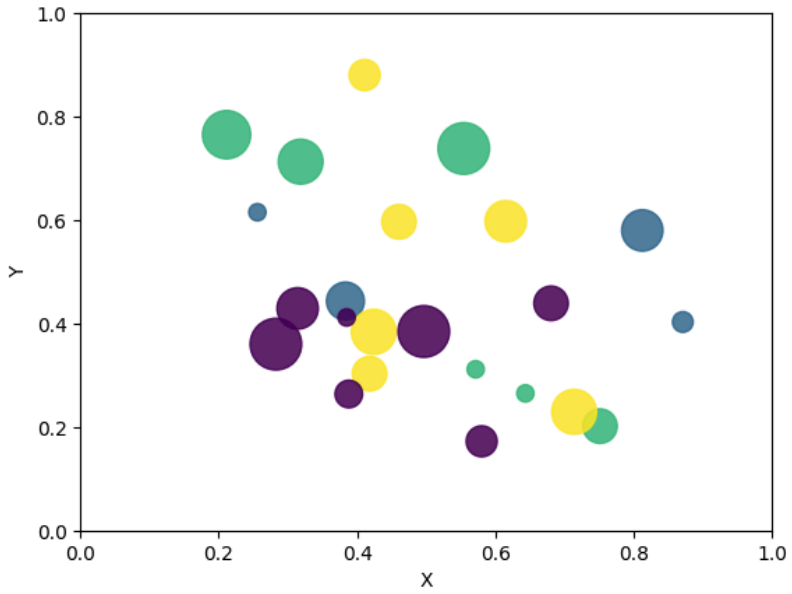
```
x = np.random.randn(50)
y = np.random.randn(50)
plt.scatter(x, y, s=70, facecolors='none', edgecolors='g')
plt.xlabel("X")
plt.ylabel("Y")
plt.show()
```



3. Write a Python program to draw a scatter plot using random distributions to generate balls of different sizes.

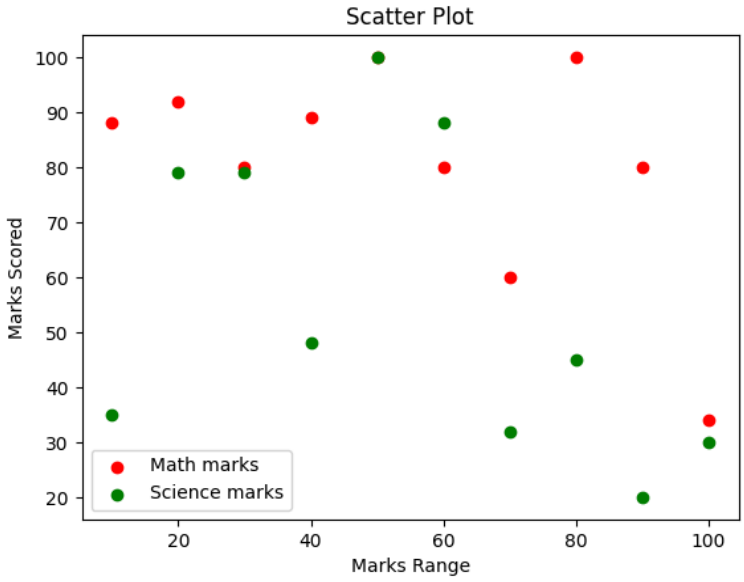
```
import math
import random
import matplotlib.pyplot as plt

no_of_balls = 25
x = [random.triangular() for i in range(no_of_balls)]
y = [random.gauss(0.5, 0.25) for i in range(no_of_balls)]
colors = [random.randint(1, 4) for i in range(no_of_balls)]
areas = [math.pi * random.randint(5, 15)**2 for i in
range(no_of_balls)]

plt.figure()
plt.scatter(x, y, s=areas, c=colors, alpha=0.85)
plt.axis([0.0, 1.0, 0.0, 1.0])
plt.xlabel("X")
```

```
plt.ylabel("Y")
plt.show()
```



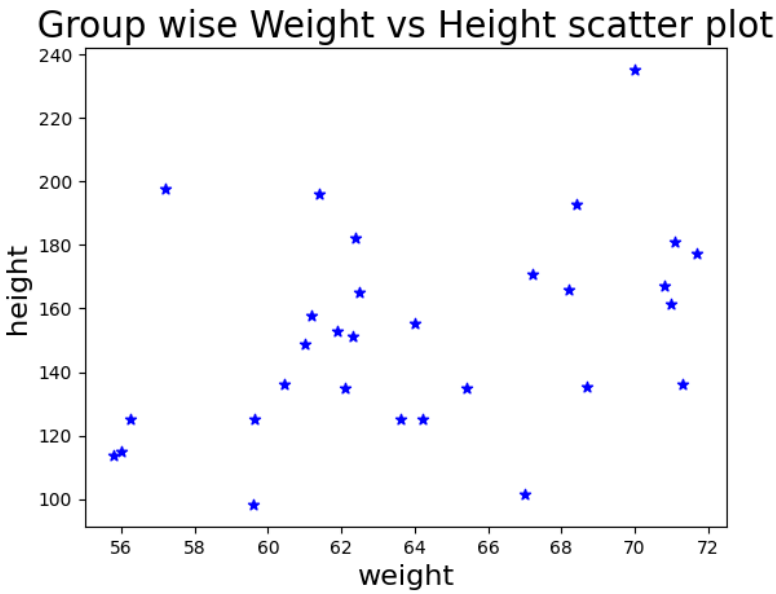
4. program to draw a scatter plot comparing two subject marks of Maths and Science. Use marks of 10 students.

```
import matplotlib.pyplot as plt
import pandas as pd
math_marks = [88, 92, 80, 89, 100, 80, 60, 100, 80, 34]
science_marks = [35, 79, 79, 48, 100, 88, 32, 45, 20, 30]
marks_range = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100]
plt.scatter(marks_range, math_marks, label='Math marks',
color='r')
plt.scatter(marks_range, science_marks, label='Science marks',
color='g')
plt.title('Scatter Plot')
plt.xlabel('Marks Range')
plt.ylabel('Marks Scored')
plt.legend()
plt.show()
```



5. program to draw a scatter plot for three different groups comparing weights and heights.

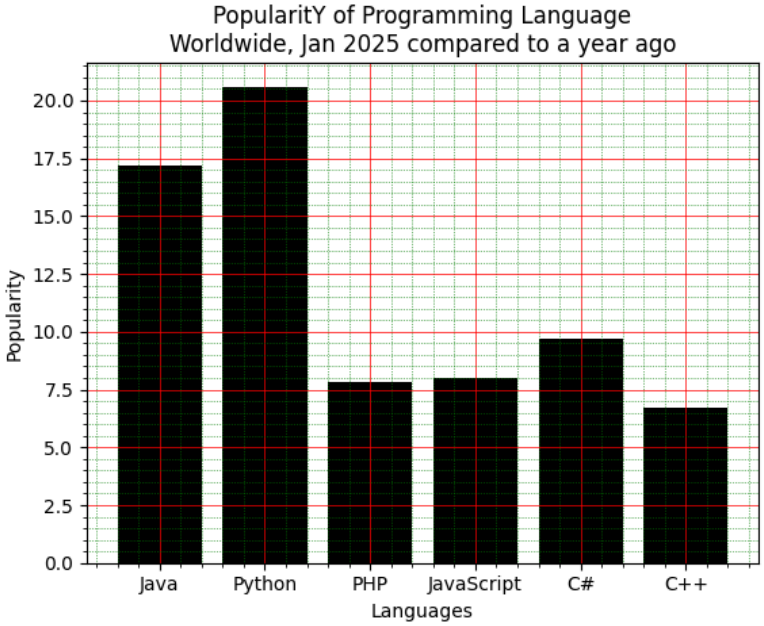
```
import matplotlib.pyplot as plt
import numpy as np
weight1=[67,57.2,59.6,59.64,55.8,61.2,60.45,61,56.23,56]
height1=[101.7,197.6,98.3,125.1,113.7,157.7,136,148.9,125.3,114
.9]
weight2=[61.9,64,62.1,64.2,62.3,65.4,62.4,61.4,62.5,63.6]
height2=[152.8,155.3,135.1,125.2,151.3,135,182.2,195.9,165.1,12
5.1]
weight3=[68.2,67.2,68.4,68.7,71,71.3,70.8,70,71.1,71.7]
height3=[165.8,170.9,192.8,135.4,161.4,136.1,167.1,235.1,181.1,
177.3]
weight=np.concatenate((weight1,weight2,weight3))
height=np.concatenate((height1,height2,height3))
plt.scatter(weight, height, marker='*', color=['blue'])
plt.xlabel('weight', fontsize=16)
plt.ylabel('height', fontsize=16)
plt.title('Group wise Weight vs Height scatter
plot',fontsize=20)
plt.show()
```



Bar Chart

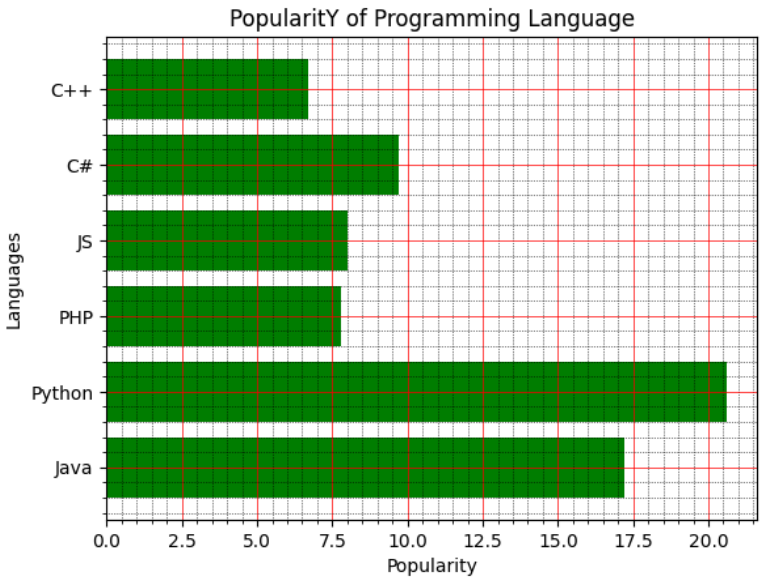
1. Program to display a bar chart of the popularity of programming Languages.

```
import matplotlib.pyplot as plt
x = ['Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++']
popularity = [17.2, 20.6, 7.8, 8, 9.7, 6.7]
x_pos = [i for i, _ in enumerate(x)]
plt.bar(x_pos, popularity, color='black')
plt.xlabel("Languages")
plt.ylabel("Popularity")
plt.title("PopularitY of Programming Language\n" + "Worldwide,
Jan 2025 compared to a year ago")
plt.xticks(x_pos, x)
# Turn on the grid
plt.minorticks_on()
plt.grid(which='major', linestyle='-', linewidth='0.5',
color='red')
# Customize the minor grid
plt.grid(which='minor', linestyle=':', linewidth='0.5',
color='green')
plt.show()
```



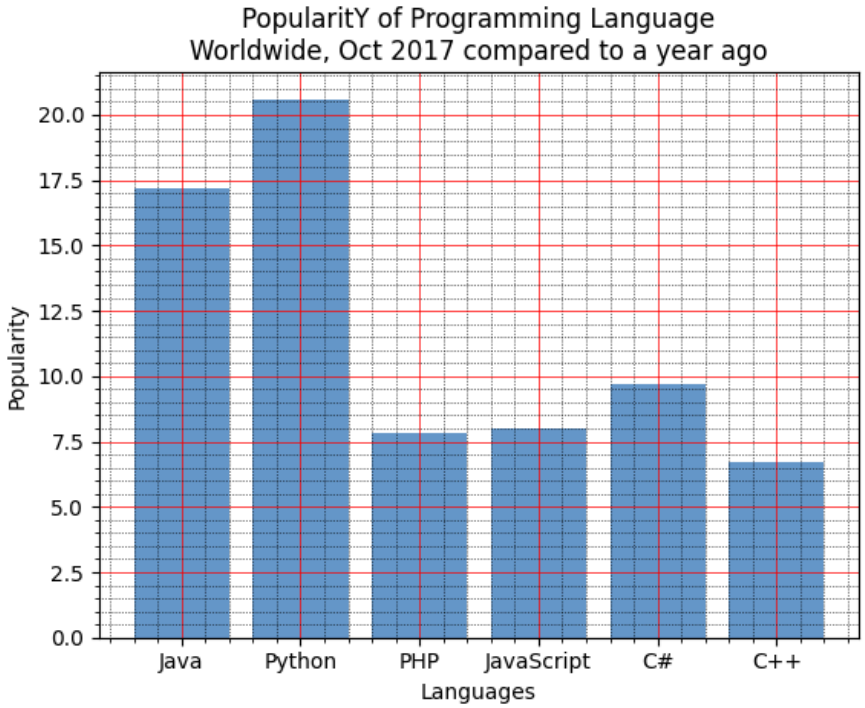
2. Program to display a horizontal bar chart of the popularity of programming languages.

```
import matplotlib.pyplot as plt
x = ['Java', 'Python', 'PHP', 'JS', 'C#', 'C++']
popularity = [17.2, 20.6, 7.8, 8, 9.7, 6.7]
x_pos = [i for i, _ in enumerate(x)]
plt.barh(x_pos, popularity, color='green')
plt.xlabel("Popularity")
plt.ylabel("Languages")
plt.title("PopularitY of Programming Language")
plt.yticks(x_pos, x)
plt.minorticks_on()
plt.grid(which='major', linestyle='-', linewidth='0.5',
color='red')
plt.grid(which='minor', linestyle=':', linewidth='0.5',
color='black')
plt.show()
```



3. Write a Python programming to display a bar chart of the popularity of programming Languages. Use uniform color.

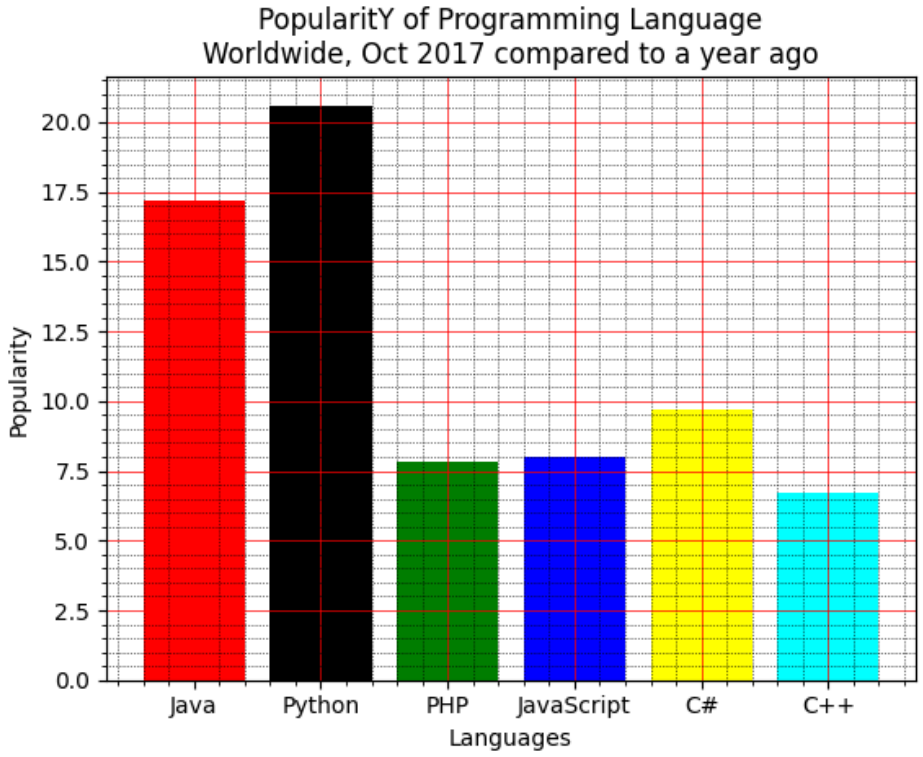
```
import matplotlib.pyplot as plt
x = ['Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++']
popularity = [17.2, 20.6, 7.8, 8, 9.7, 6.7]
x_pos = [i for i, _ in enumerate(x)]

plt.bar(x_pos, popularity, color=(0.4, 0.6, 0.8, 1.0))

plt.xlabel("Languages")
plt.ylabel("Popularity")
plt.title("PopularitY of Programming Language\n" + "Worldwide,
Oct 2017 compared to a year ago")
plt.xticks(x_pos, x)
# Turn on the grid
plt.minorticks_on()
plt.grid(which='major', linestyle='-', linewidth='0.5',
color='red')
# Customize the minor grid
plt.grid(which='minor', linestyle=':', linewidth='0.5',
color='black')
plt.show()
```



4. Write a Python programming to display a bar chart of the popularity of programming Languages. Use different color for each bar.

```
import matplotlib.pyplot as plt
x = ['Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++']
popularity = [17.2, 20.6, 7.8, 8, 9.7, 6.7]
x_pos = [i for i, _ in enumerate(x)]

plt.bar(x_pos, popularity, color=['red', 'black', 'green',
'blue', 'yellow', 'cyan'])

plt.xlabel("Languages")
plt.ylabel("Popularity")
plt.title("PopularitY of Programming Language\n" + "Worldwide,
Oct 2017 compared to a year ago")
plt.xticks(x_pos, x)

plt.minorticks_on()
plt.grid(which='major', linestyle='-', linewidth='0.5',
color='red')
```

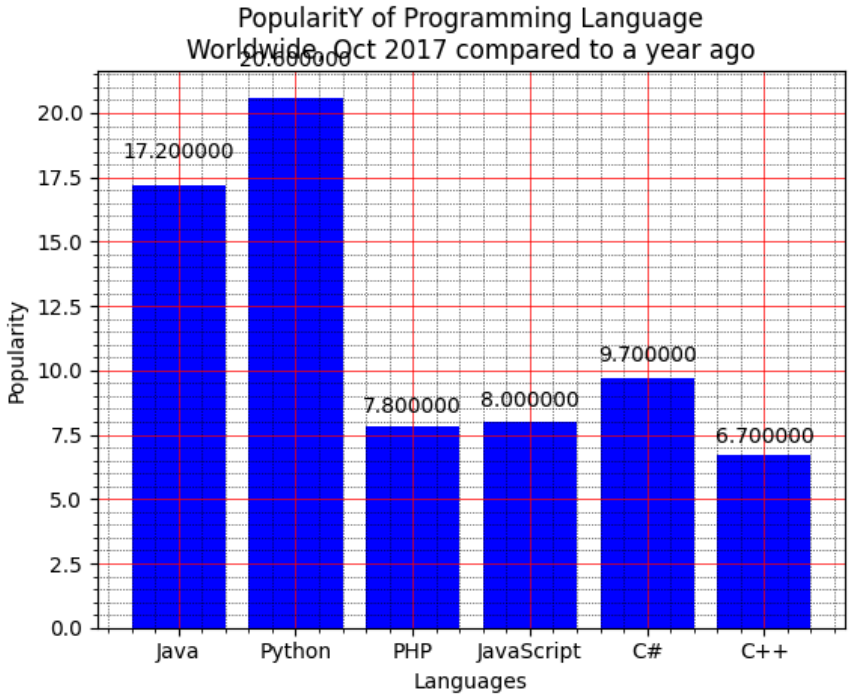
```
plt.grid(which='minor', linestyle=':', linewidth='0.5',
color='black')
plt.show()
```



5. Write a Python programming to display a bar chart of the popularity of programming Languages. Attach a text label above each bar displaying its popularity (float value).

```
import matplotlib.pyplot as plt
x = ['Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++']
popularity = [17.2, 20.6, 7.8, 8, 9.7, 6.7]
x_pos = [i for i, _ in enumerate(x)]

fig, ax = plt.subplots()
rects1 = ax.bar(x_pos, popularity, color='b')
plt.xlabel("Languages")
plt.ylabel("Popularity")
plt.title("PopularitY of Programming Language\n" + "Worldwide,
Oct 2017 compared to a year ago")
plt.xticks(x_pos, x)

plt.minorticks_on()
```

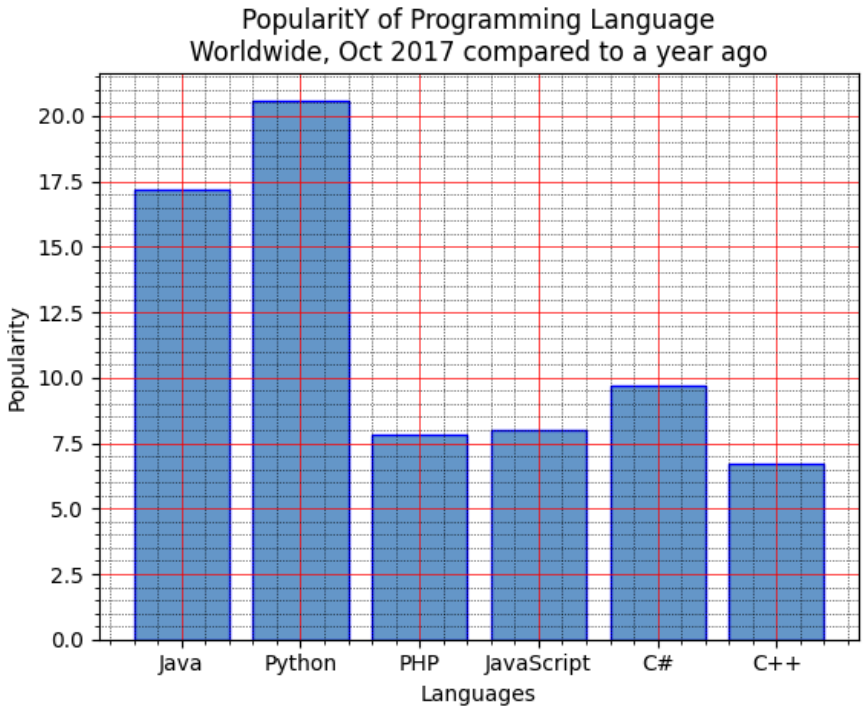
```
plt.grid(which='major', linestyle='-', linewidth='0.5',
color='red')

plt.grid(which='minor', linestyle=':', linewidth='0.5',
color='black')
def autolabel(rects):
    for rect in rects:
        height = rect.get_height()
        ax.text(rect.get_x() + rect.get_width()/2.,
1.05*height,
                '%f' % float(height),
        ha='center', va='bottom')
autolabel(rects1)

plt.show()
```



6. Write a Python programming to display a bar chart of the popularity of programming Languages. Make blue border to each bar.

```
import matplotlib.pyplot as plt
x = ['Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++']
popularity = [17.2, 20.6, 7.8, 8, 9.7, 6.7]
x_pos = [i for i, _ in enumerate(x)]
```

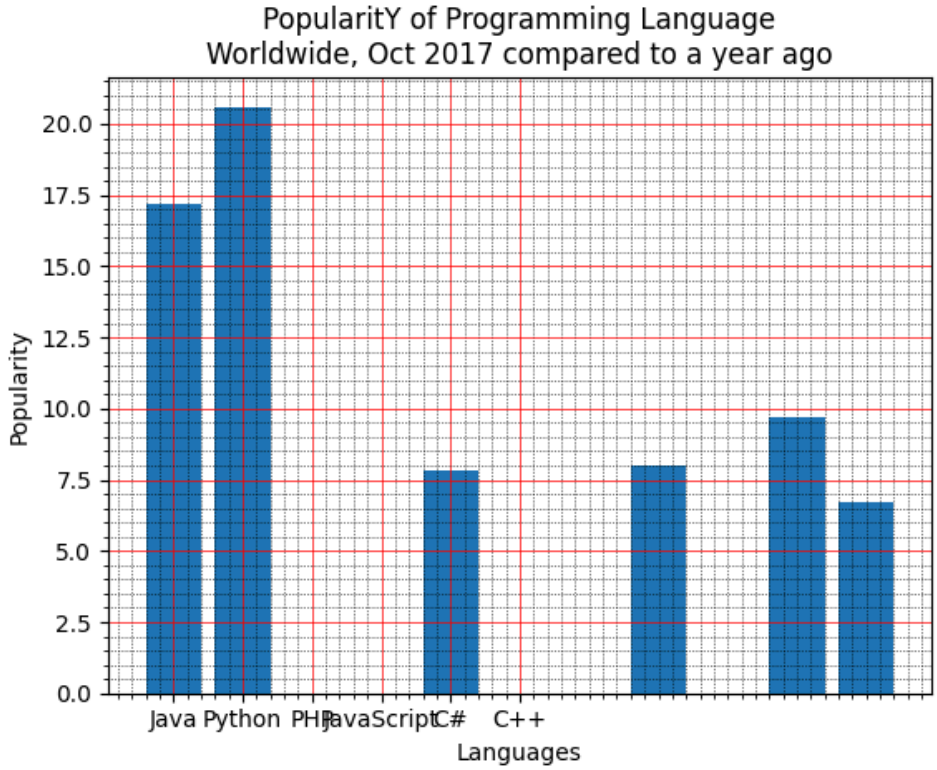
```
plt.bar(x_pos, popularity, color=(0.4, 0.6, 0.8, 1.0),
edgecolor='blue')

plt.xlabel("Languages")
plt.ylabel("Popularity")
plt.title("PopularitY of Programming Language\n" + "Worldwide,
Oct 2017 compared to a year ago")
plt.xticks(x_pos, x)
# Turn on the grid
plt.minorticks_on()
plt.grid(which='major', linestyle='-', linewidth='0.5',
color='red')
# Customize the minor grid
plt.grid(which='minor', linestyle=':', linewidth='0.5',
color='black')
plt.show()
```



7. Write a Python programming to display a bar chart of the popularity of programming Languages. Specify the position of each bar plot.

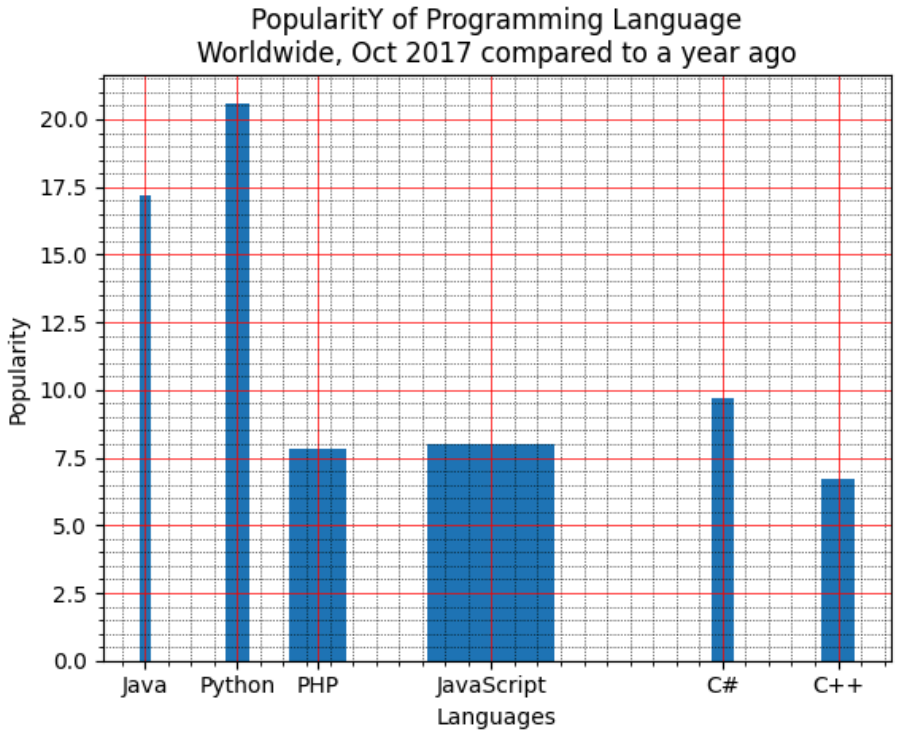
```
import matplotlib.pyplot as plt
x = ['Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++']
popularity = [17.2, 20.6, 7.8, 8, 9.7, 6.7]
```

```
x_pos = [i for i, _ in enumerate(x)]
plt.xlabel("Languages")
plt.ylabel("Popularity")
plt.title("PopularitY of Programming Language\n" + "Worldwide,
Oct 2017 compared to a year ago")
plt.xticks(x_pos, x)

y_pos = [0,1,4,7,9,10]

plt.bar(y_pos, popularity)

plt.minorticks_on()
plt.grid(which='major', linestyle='-', linewidth='0.5',
color='red')

plt.grid(which='minor', linestyle=':', linewidth='0.5',
color='black')
plt.show()
```



8. Write a Python programming to display a bar chart of the popularity of programming Languages. Select the width of each bar and their positions.

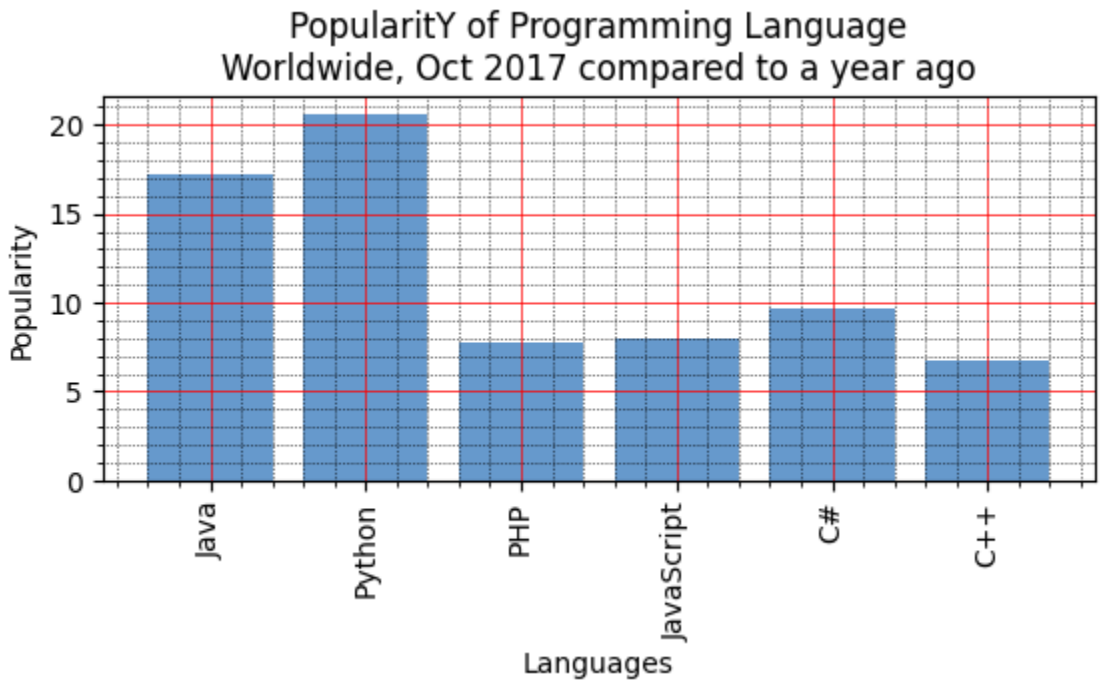
```
import matplotlib.pyplot as plt
x = ['Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++']
popularity =[17.2, 20.6, 7.8, 8, 9.7, 6.7]
x_pos = [i for i, _ in enumerate(x)]
plt.xlabel("Languages")
plt.ylabel("Popularity")
plt.title("PopularitY of Programming Language\n" + "Worldwide,
Oct 2017 compared to a year ago")
plt.xticks(x_pos, x)

width = [0.1,0.2,0.5,1.1,0.2,0.3]
y_pos = [0,.8,1.5,3,5,6]

plt.bar(y_pos, popularity, width=width)
plt.xticks(y_pos, x)

plt.minorticks_on()
plt.grid(which='major', linestyle='-', linewidth='0.5',
color='red')

plt.grid(which='minor', linestyle=':', linewidth='0.5',
color='black')
plt.show()
```



9. Write a Python programming to display a bar chart of the popularity of programming Languages. Increase bottom margin.

```
import matplotlib.pyplot as plt
x = ['Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++']
popularity = [17.2, 20.6, 7.8, 8, 9.7, 6.7]
x_pos = [i for i, _ in enumerate(x)]
plt.bar(x_pos, popularity, color=(0.4, 0.6, 0.8, 1.0))
plt.xlabel("Languages")
plt.ylabel("Popularity")
plt.title("PopularitY of Programming Language\n" + "Worldwide,
Oct 2017 compared to a year ago")

plt.xticks(x_pos, x, rotation=90)

plt.subplots_adjust(bottom=0.4, top=.8)

plt.minorticks_on()
plt.grid(which='major', linestyle='-', linewidth='0.5',
color='red')
```

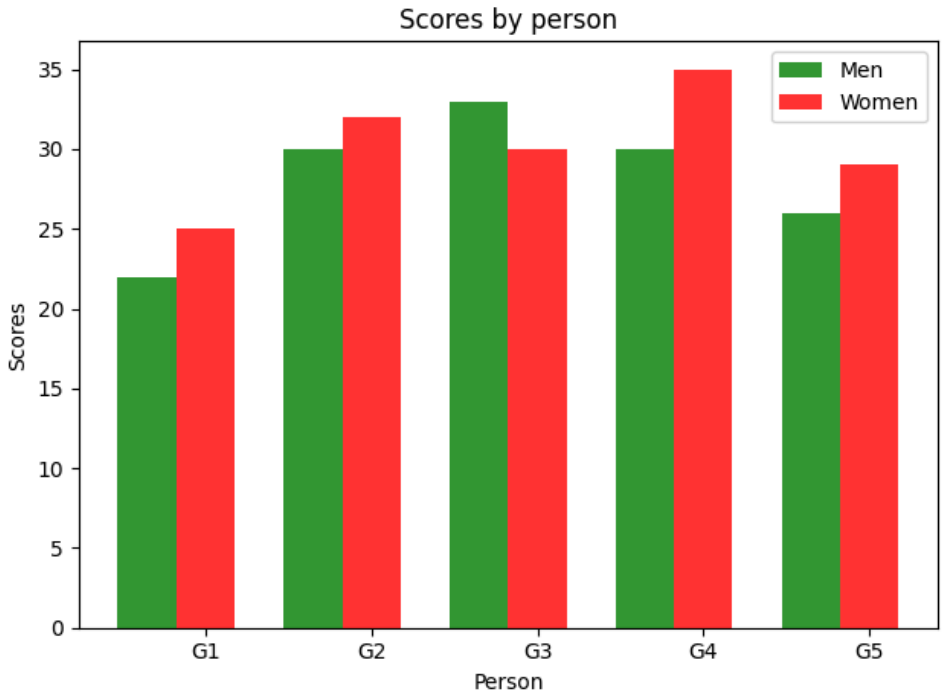
```
plt.grid(which='minor', linestyle=':', linewidth='0.5',
color='black')
plt.show()
```



10. Write a Python program to create bar plot of scores by group and gender. Use multiple X values on the same chart for men and women.

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

# data to plot
n_groups = 5
men_means = (22, 30, 33, 30, 26)
women_means = (25, 32, 30, 35, 29)

# create plot
fig, ax = plt.subplots()
index = np.arange(n_groups)
bar_width = 0.35
opacity = 0.8

rects1 = plt.bar(index, men_means, bar_width,
```

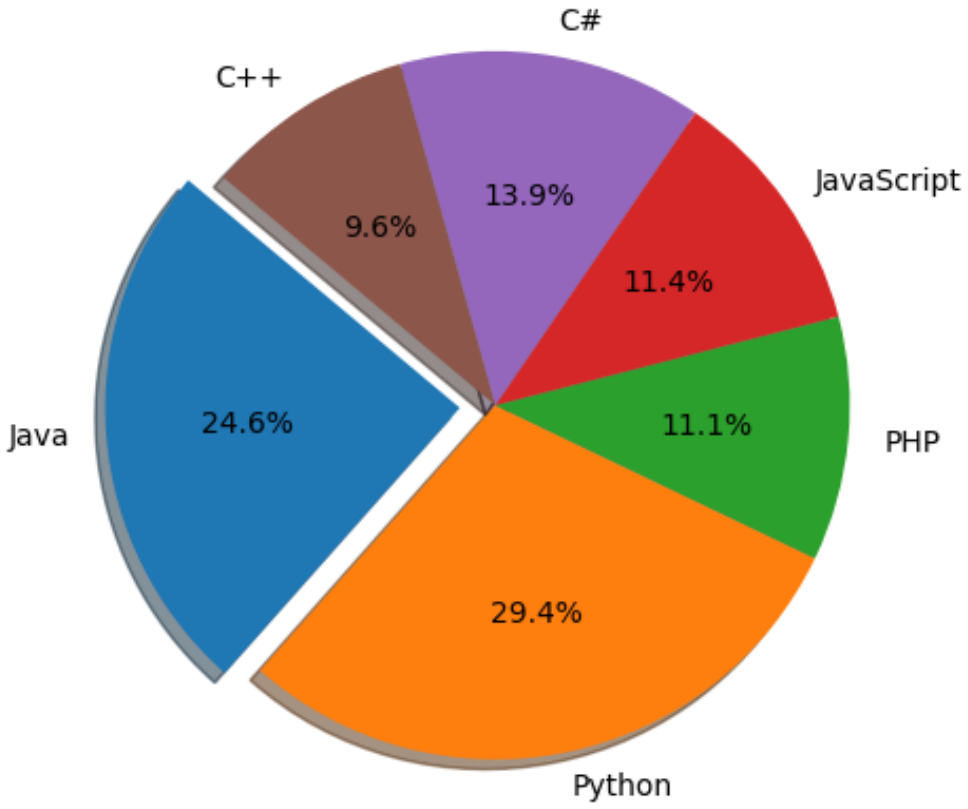
```
alpha=opacity,
color='g',
label='Men')

rects2 = plt.bar(index + bar_width, women_means, bar_width,
alpha=opacity,
color='r',
label='Women')

plt.xlabel('Person')
plt.ylabel('Scores')
plt.title('Scores by person')
plt.xticks(index + bar_width, ('G1', 'G2', 'G3', 'G4', 'G5'))
plt.legend()

plt.tight_layout()
plt.show()
```



Pie Chart

1. Write a program to create a pie chart of the popularity of programming Languages.

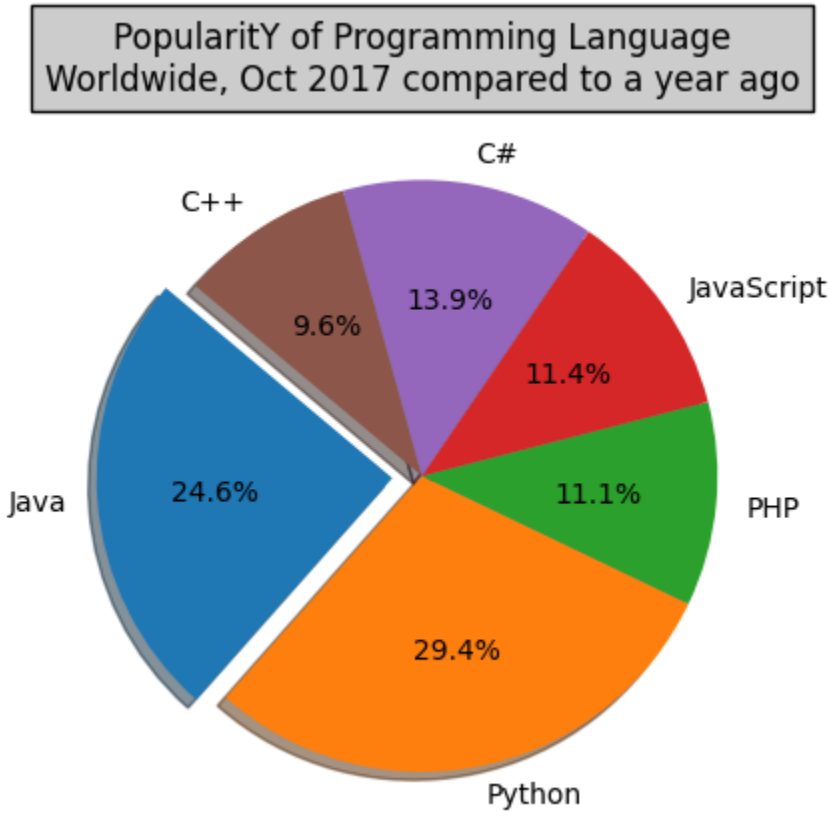
```
import matplotlib.pyplot as plt
# Data to plot
languages = 'Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++'
popuratity = [17.2, 20.6, 7.8, 8, 9.7, 6.7]
colors = ["#1f77b4", "#ff7f0e", "#2ca02c", "#d62728",
"#9467bd", "#8c564b"]

explode = (0.1, 0, 0, 0,0,0)

plt.pie(popuratity, explode=explode, labels=languages,
colors=colors,
autopct='%1.1f%%', shadow=True, startangle=140)

plt.axis('equal')
plt.show()
```



2. Write a Python programming to create a pie chart with a title of the popularity of programming Languages.

```
import matplotlib.pyplot as plt
# Plot data
```

```
languages = 'Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++'
popuratity = [17.2, 20.6, 7.8, 8, 9.7, 6.7]

colors = ["#1f77b4", "#ff7f0e", "#2ca02c", "#d62728",
"#9467bd", "#8c564b"]

explode = (0.1, 0, 0, 0, 0, 0)

plt.pie(popuratity, explode=explode, labels=languages,
colors=colors,
autopct='%1.1f%%', shadow=True, startangle=140)
plt.title("PopularitY of Programming Language\n" + "Worldwide,
Oct 2017 compared to a year ago", bbox={'facecolor':'0.8',
'pad':5})
plt.show()
```



3. Write a Python programming to create a pie chart with a title of the popularity of programming Languages.Make multiple wedges of the pie.

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

```
# Plot data
languages = 'Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++'
popuratity = [17.2, 20.6, 7.8, 8, 9.7, 6.7]
colors = ["#1f77b4", "#ff7f0e", "#2ca02c", "#d62728",
"#9467bd", "#8c564b"]

explode = (0.1, 0, 0, 0, 0, .1)

plt.pie(popuratity, explode=explode, labels=languages,
colors=colors,
autopct='%1.1f%%', shadow=True, startangle=140)
plt.title("PopularitY of Programming Language\n" + "Worldwide,
Oct 2017 compared to a year ago", bbox={'facecolor':'0.8',
'pad':5})
plt.show()
```