

Load Necessary Libraries

```
In [2]: import matplotlib.pyplot as plt  
import numpy as np  
import pandas as pd
```

Basic Graph

```
In [6]: x = [0,1,2,3,4]
        y = [0,2,4,6,8]

        # Resize your Graph (dpi specifies pixels per inch. When saving probably should use 300 if possible)
        plt.figure(figsize=(8,5), dpi=100)

        # Line 1

        # Keyword Argument Notation
        #plt.plot(x,y, label='2x', color='red', linewidth=2, marker='.', linestyle='--', markersize=10, markeredgecolor='blue')

        # Shorthand notation
        # fmt = '[color][marker][line]'
        plt.plot(x,y, 'b^--', label='2x')

        ## Line 2

        # select interval we want to plot points at
        x2 = np.arange(0,4.5,0.5)

        # Plot part of the graph as line
        plt.plot(x2[:6], x2[:6]**2, 'r', label='X^2')

        # Plot remainder of graph as a dot
        plt.plot(x2[5:], x2[5:]**2, 'r--')

        # Add a title (specify font parameters with fontdict)
        plt.title('Our First Graph!', fontdict={'fontname': 'Comic Sans MS', 'fontsize': 20})

        # X and Y Labels
        plt.xlabel('X Axis')
        plt.ylabel('Y Axis')

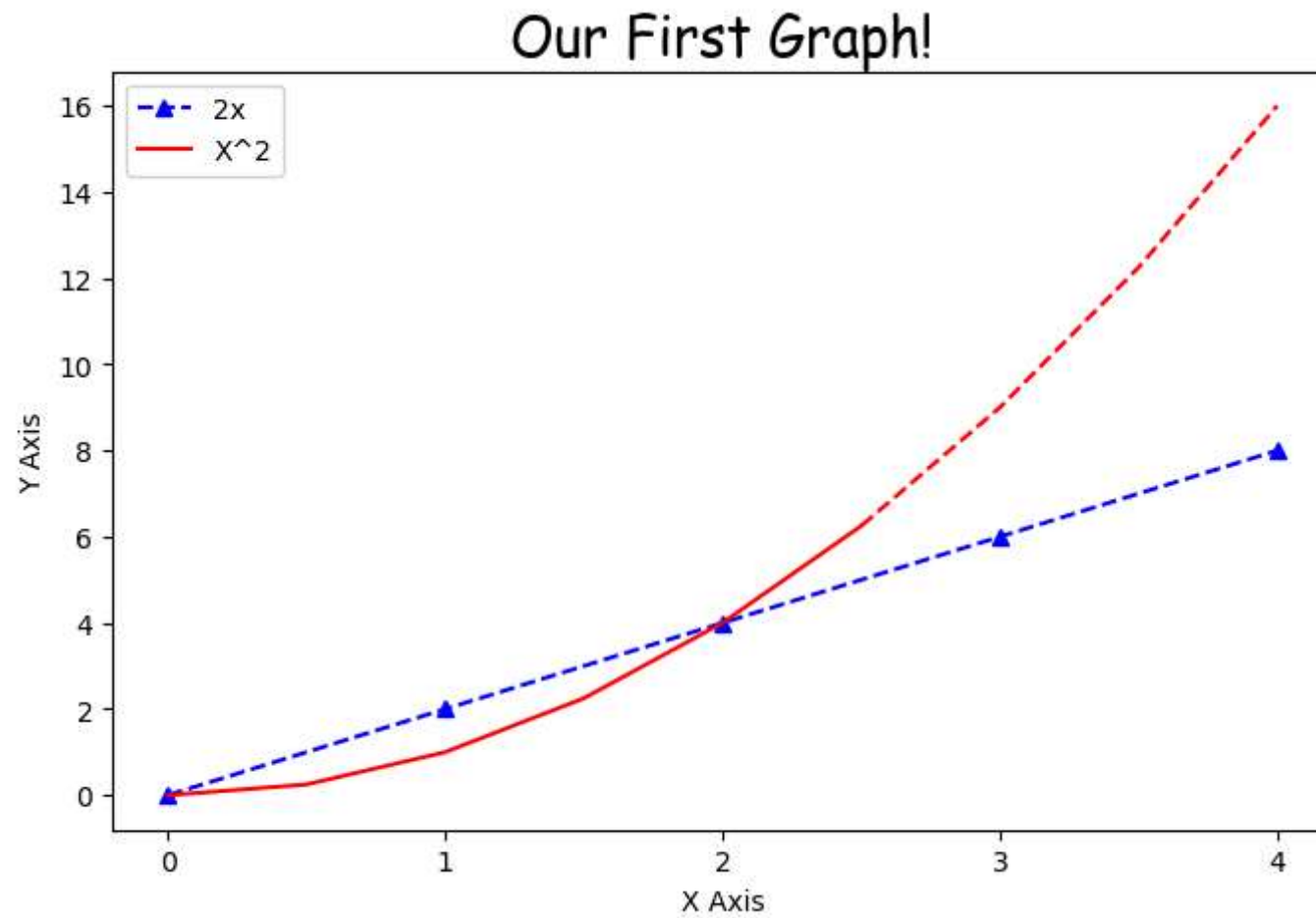
        # X, Y axis Tickmarks (scale of your graph)
        plt.xticks([0,1,2,3,4,])
        #plt.yticks([0,2,4,6,8,10])

        # Add a Legend
        plt.legend()

        # Save figure (dpi 300 is good when saving so graph has high resolution)
```

```
plt.savefig('mygraph.png', dpi=300)
```

```
# Show plot  
plt.show()
```



Bar Chart

```
In [10]: labels = ['A', 'B', 'C']
values = [1,4,2]

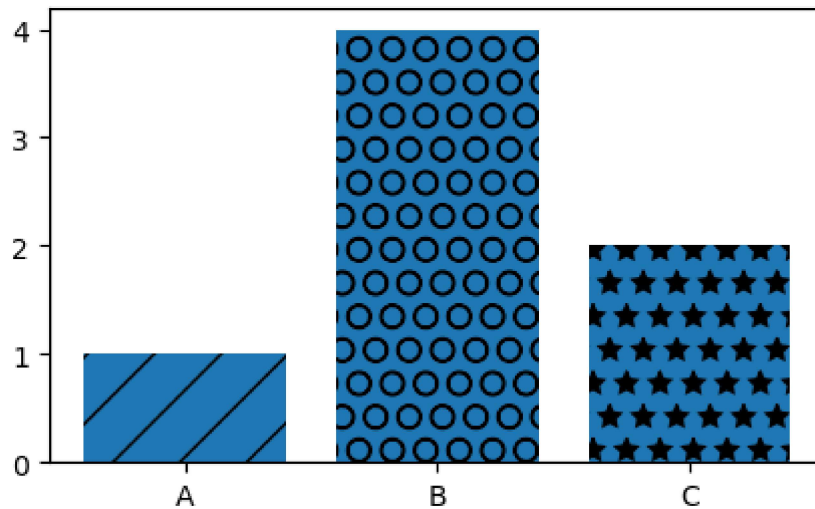
plt.figure(figsize=(5,3), dpi=100)

bars = plt.bar(labels, values)

patterns = ['/', 'O', '*']
for bar in bars:
    bar.set_hatch(patterns.pop(0))

plt.savefig('barchart.png', dpi=300)

plt.show()
```



Real World Examples

Download data from my Github ([gas_prices.csv](#) & [fifa_data.csv](#))

Line Graph

```
In [4]: gas = pd.read_csv('gas_prices.csv')

plt.figure(figsize=(8,5))

plt.title('Gas Prices over Time (in USD)', fontdict={'fontweight':'bold', 'fontsize': 18})

plt.plot(gas.Year, gas.USA, 'b.-', label='United States')
plt.plot(gas.Year, gas.Canada, 'r.-')
plt.plot(gas.Year, gas['South Korea'], 'g.-')
plt.plot(gas.Year, gas.Australia, 'y.-')

# Another way to plot many values!
# countries_to_look_at = ['Australia', 'USA', 'Canada', 'South Korea']
# for country in gas:
#     if country in countries_to_look_at:
#         plt.plot(gas.Year, gas[country], marker='.')

plt.xticks(gas.Year[::3].tolist()+[2011])

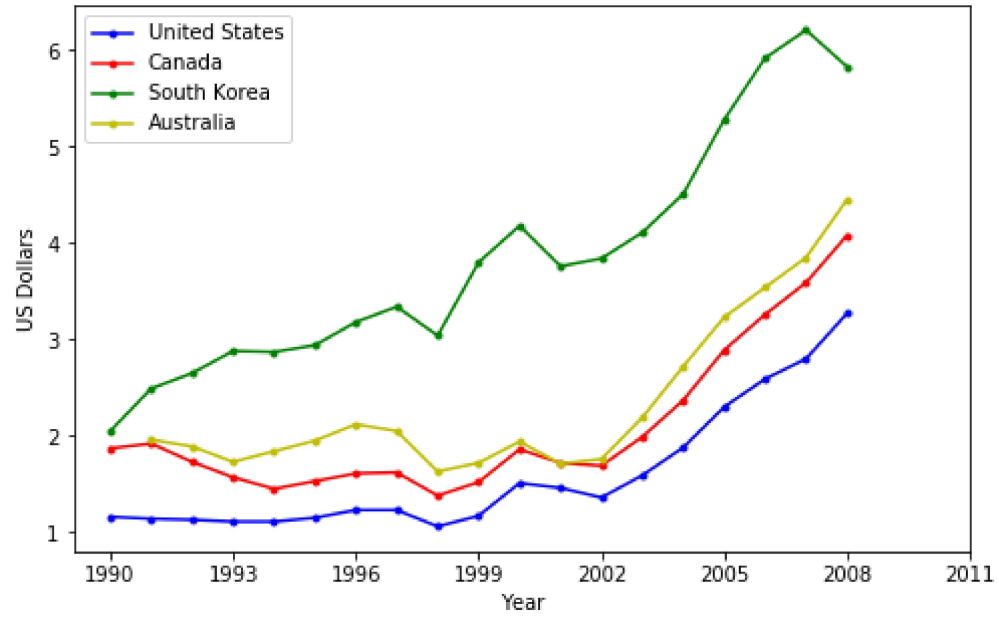
plt.xlabel('Year')
plt.ylabel('US Dollars')

plt.legend()

plt.savefig('Gas_price_figure.png', dpi=300)

plt.show()
```

Gas Prices over Time (in USD)



Load Fifa Data

```
In [8]: fifa = pd.read_csv('fifa_data.csv')

fifa.head(5)
```

Out[8]:

	Unnamed: 0	ID	Name	Age	Photo	Nationality	Flag	Overall	Potential	
0	0	158023	L. Messi	31	https://cdn.sofifa.org/players/4/19/158023.png	Argentina	https://cdn.sofifa.org/flags/52.png	94	94	Barce
1	1	20801	Cristiano Ronaldo	33	https://cdn.sofifa.org/players/4/19/20801.png	Portugal	https://cdn.sofifa.org/flags/38.png	94	94	Juve
2	2	190871	Neymar Jr	26	https://cdn.sofifa.org/players/4/19/190871.png	Brazil	https://cdn.sofifa.org/flags/54.png	92	93	Paris S Gen
3	3	193080	De Gea	27	https://cdn.sofifa.org/players/4/19/193080.png	Spain	https://cdn.sofifa.org/flags/45.png	91	93	Manche U
4	4	192985	K. De Bruyne	27	https://cdn.sofifa.org/players/4/19/192985.png	Belgium	https://cdn.sofifa.org/flags/7.png	91	92	Manche

5 rows × 89 columns



Histogram

```
In [9]: bins = [40,50,60,70,80,90,100]

plt.figure(figsize=(8,5))

plt.hist(fifa.Overall, bins=bins, color='#abcdef')

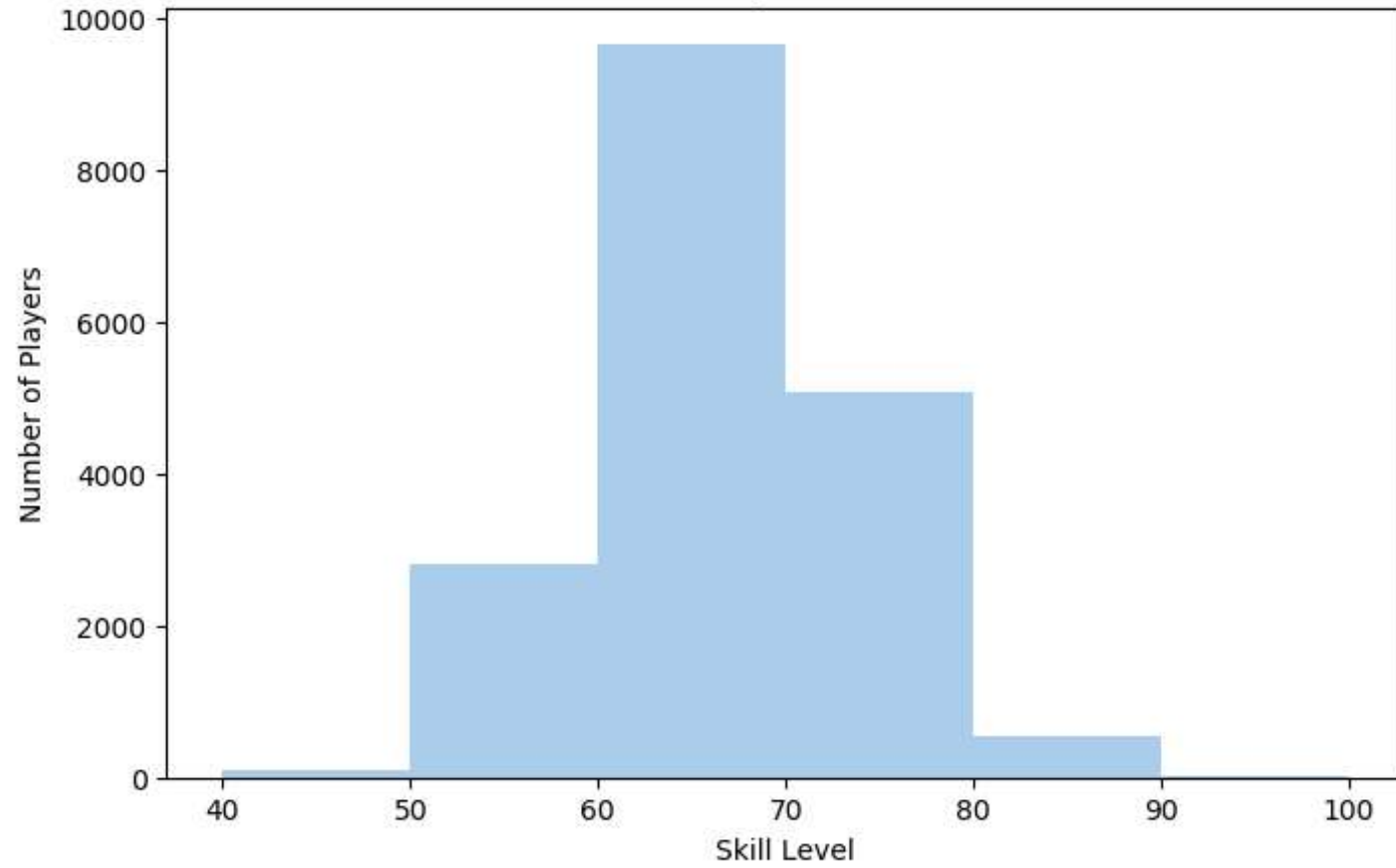
plt.xticks(bins)

plt.ylabel('Number of Players')
plt.xlabel('Skill Level')
plt.title('Distribution of Player Skills in FIFA 2018')

plt.savefig('histogram.png', dpi=300)

plt.show()
```

Distribution of Player Skills in FIFA 2018



Pie Chart

```
In [10]: left = fifa.loc[fifa['Preferred Foot'] == 'Left'].count()[0]
right = fifa.loc[fifa['Preferred Foot'] == 'Right'].count()[0]

plt.figure(figsize=(8,5))

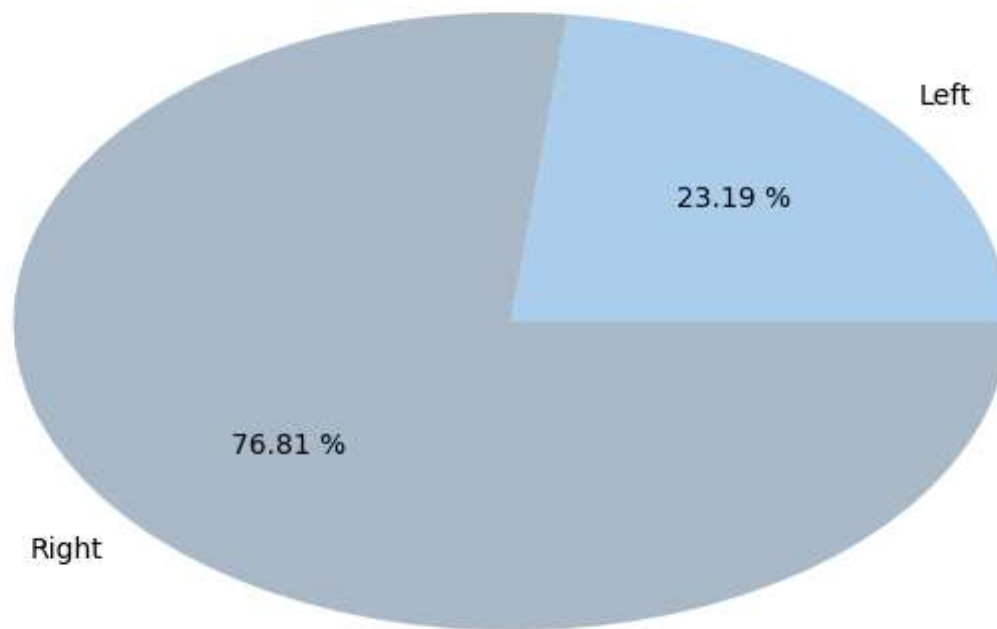
labels = ['Left', 'Right']
colors = ['#abcdef', '#aabbcc']

plt.pie([left, right], labels = labels, colors=colors, autopct='%.2f %%')

plt.title('Foot Preference of FIFA Players')

plt.show()
```

Foot Preference of FIFA Players



Pie Chart #2

```
In [11]: plt.figure(figsize=(8,5), dpi=100)

plt.style.use('ggplot')

fifa.Weight = [int(x.strip('lbs')) if type(x)==str else x for x in fifa.Weight]

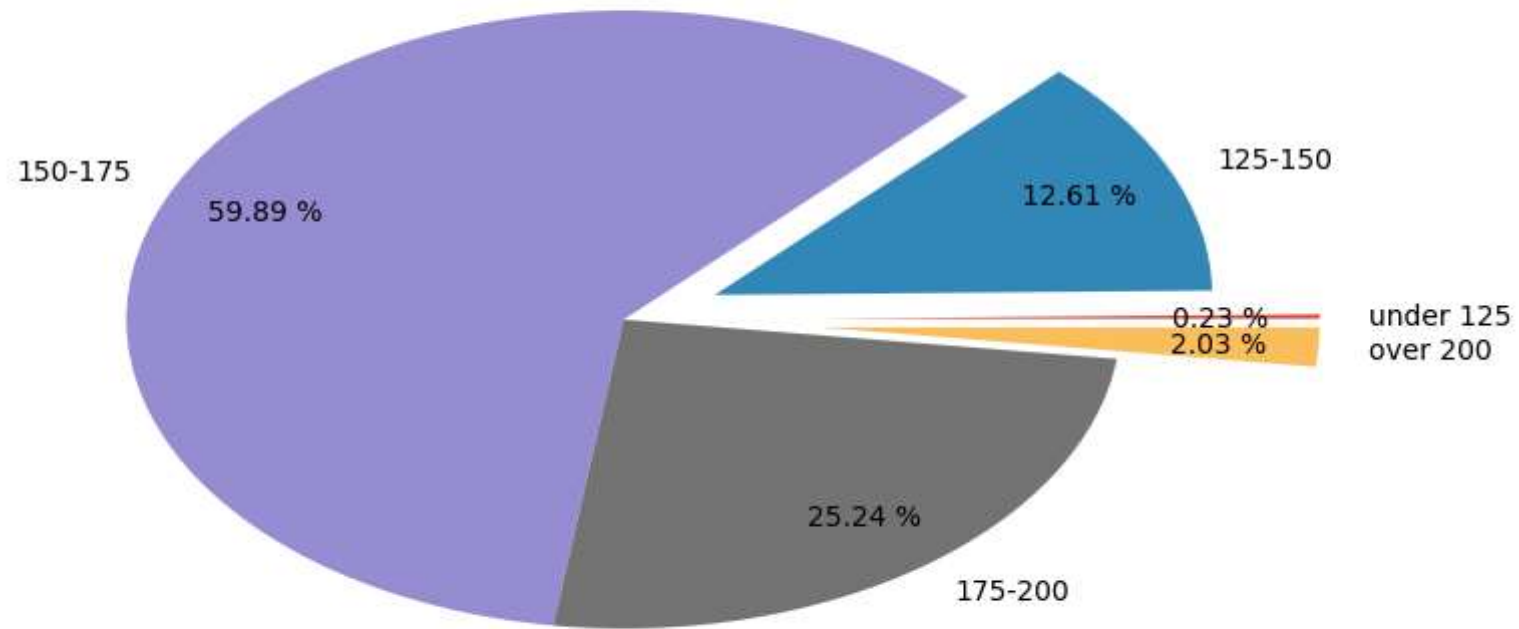
light = fifa.loc[fifa.Weight < 125].count()[0]
light_medium = fifa[(fifa.Weight >= 125) & (fifa.Weight < 150)].count()[0]
medium = fifa[(fifa.Weight >= 150) & (fifa.Weight < 175)].count()[0]
medium_heavy = fifa[(fifa.Weight >= 175) & (fifa.Weight < 200)].count()[0]
heavy = fifa[fifa.Weight >= 200].count()[0]

weights = [light, light_medium, medium, medium_heavy, heavy]
label = ['under 125', '125-150', '150-175', '175-200', 'over 200']
explode = (.4, .2, 0, 0, .4)

plt.title('Weight of Professional Soccer Players (lbs)')

plt.pie(weights, labels=label, explode=explode, pctdistance=0.8, autopct='%0.2f %%')
plt.show()
```

Weight of Professional Soccer Players (lbs)



Box and Whiskers Chart

```
In [12]: plt.figure(figsize=(5,8), dpi=100)

plt.style.use('default')

barcelona = fifa.loc[fifa.Club == "FC Barcelona"]['Overall']
madrid = fifa.loc[fifa.Club == "Real Madrid"]['Overall']
revs = fifa.loc[fifa.Club == "New England Revolution"]['Overall']

#bp = plt.boxplot([barcelona, madrid, revs], labels=['a','b','c'], boxprops=dict(facecolor='red'))
bp = plt.boxplot([barcelona, madrid, revs], labels=['FC Barcelona', 'Real Madrid', 'NE Revolution'], patch_artist=True, n

plt.title('Professional Soccer Team Comparison')
plt.ylabel('FIFA Overall Rating')

for box in bp['boxes']:
    # change outline color
    box.set(color='#4286f4', linewidth=2)
    # change fill color
    box.set(facecolor = '#e0e0e0' )
    # change hatch
    #box.set(hatch = '/')

plt.show()
```

Professional Soccer Team Comparison

