matplotlib

- MATLAB Style Interface
- https://matplotlib.org
- https://matplotlib.org/stable/plot_types/index

```
import warnings
warnings.filterwarnings('ignore')
```

실습파일 구성

- PII.csv

- pandas Package

```
import pandas as pd
```

- .read_csv( )

```
url = 'https://raw.githubusercontent.com/rusita-ai/pyData/master/PII.csv'

DF = pd.read_csv(url)

DF.head()
```

	Name	Gender	Age	Grade	Picture	BloodType	Height	Weight
0	송태섭	남자	21	3	무	B	179.1	63.9
1	최유정	여자	23	1	유	A	177.1	54.9
2	이한나	여자	20	1	무	A	167.9	50.2
3	김소혜	여자	23	3	무	O	176.1	53.5
4	서태웅	남자	24	4	무	B	176.1	79.8

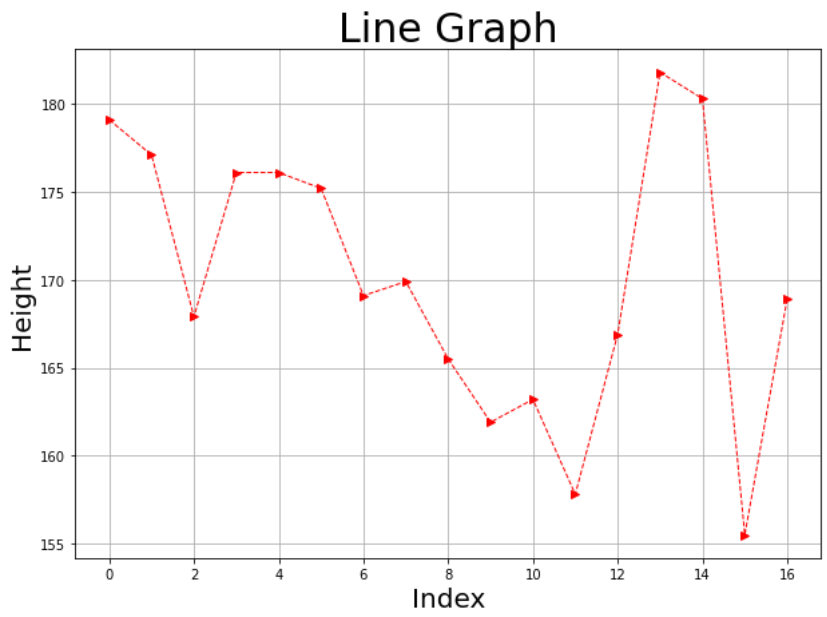
matplotlib Package

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

I. 선 그래프

- https://matplotlib.org/stable/api/_as_gen/matplotlib.axes.Axes.plot.html#matplotlib.axes.Axes.plot

```
plt.figure(figsize = (10, 7))
plt.plot(DF.Height,
         linewidth = 1,
         color = 'r',
         marker = '>',
         linestyle = '--')
plt.title('Line Graph', size = 30)
plt.xlabel('Index', size = 20)
plt.ylabel('Height', size = 20)
plt.grid(True)
plt.show()
```

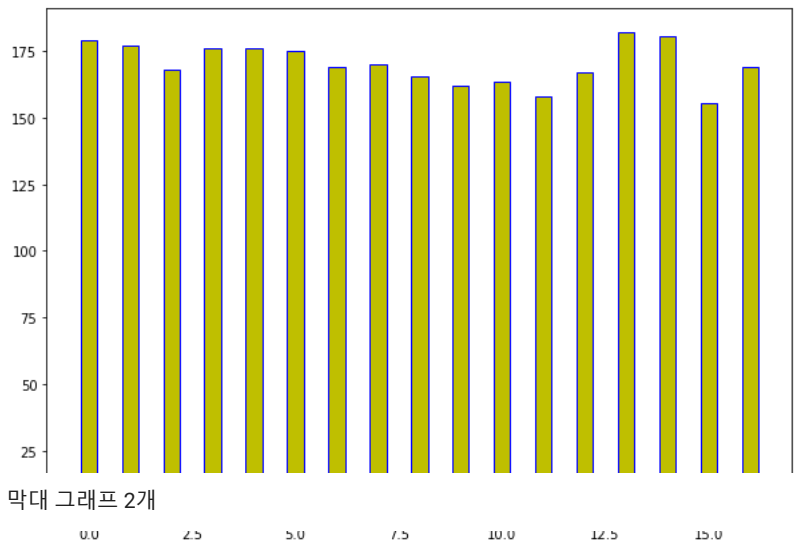


II. 막대 그래프

1) .bar( )

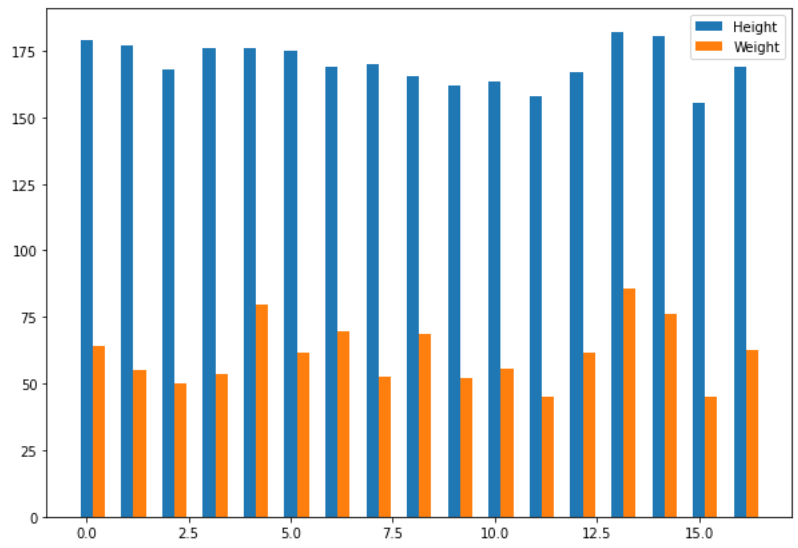
- https://matplotlib.org/stable/api/_as_gen/matplotlib.axes.Axes.bar.html#matplotlib.axes.Axes.bar

```
plt.figure(figsize = (10, 7))
plt.bar(DF.index,
        DF.Height,
        width = 0.4,
        color = 'y',
        edgecolor = 'b')
plt.show()
```



- 막대 그래프 2개

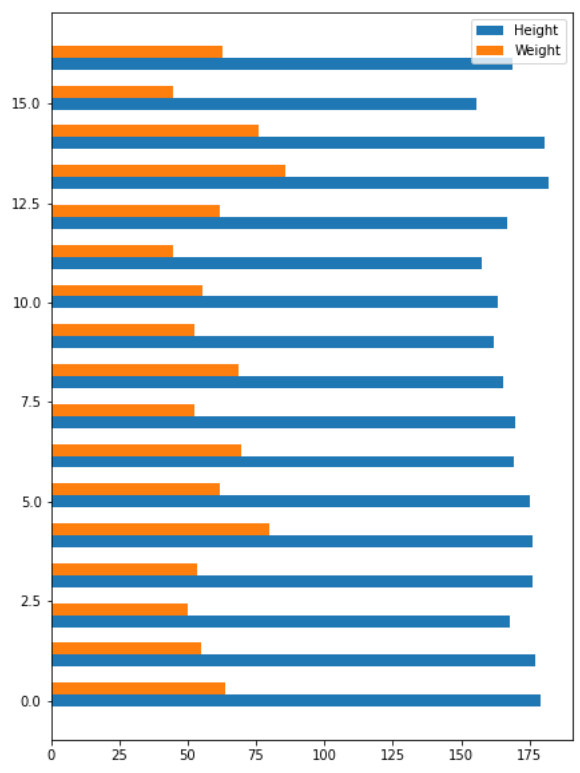
```
plt.figure(figsize = (10, 7))

plt.bar(DF.index, DF['Height'],
        width = 0.3, label = 'Height')
plt.bar(DF.index + 0.3, DF['Weight'],
        width = 0.3, label = 'Weight')

plt.legend()
plt.show()
```



2) .barh( )

- https://matplotlib.org/stable/api/_as_gen/matplotlib.axes.Axes.barh.html#matplotlib.axes.Axes.barh

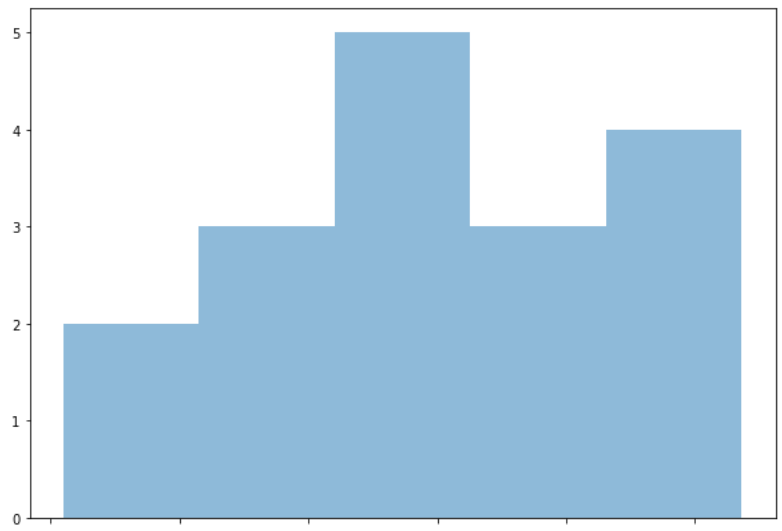
```
plt.figure(figsize = (7, 10))

plt.barh(DF.index,
         width = DF['Height'], height = 0.3,
         label = 'Height')
plt.barh(DF.index + 0.3,
         width = DF['Weight'], height = 0.3,
         label = 'Weight')

plt.legend()
plt.show()
```



III. 히스토그램

- https://matplotlib.org/stable/api/_as_gen/matplotlib.axes.Axes.hist.html#matplotlib.axes.Axes.hist

```
plt.figure(figsize = (10, 7))
plt.hist(DF.Height,
         bins = 5,
         alpha = 0.5, density = False)
plt.show()
```

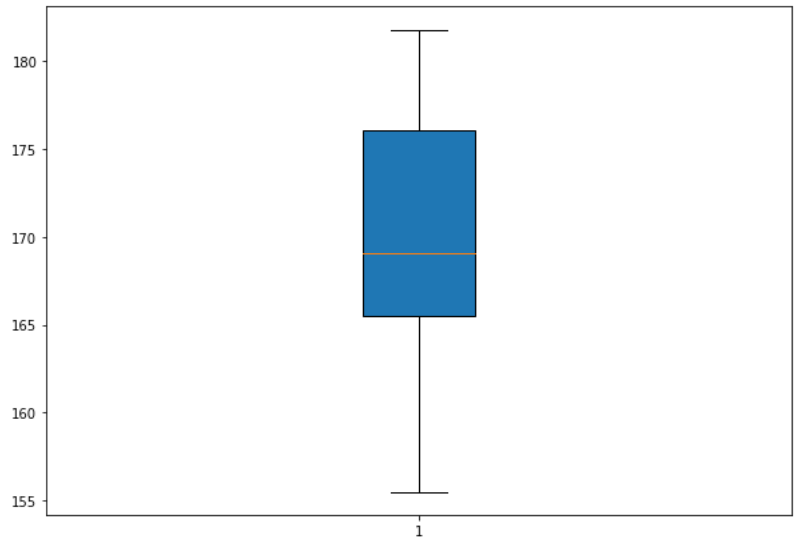


IV. 상자 그래프

- https://matplotlib.org/stable/api/_as_gen/matplotlib.axes.Axes.boxplot.html#matplotlib.axes.Axes.boxplot

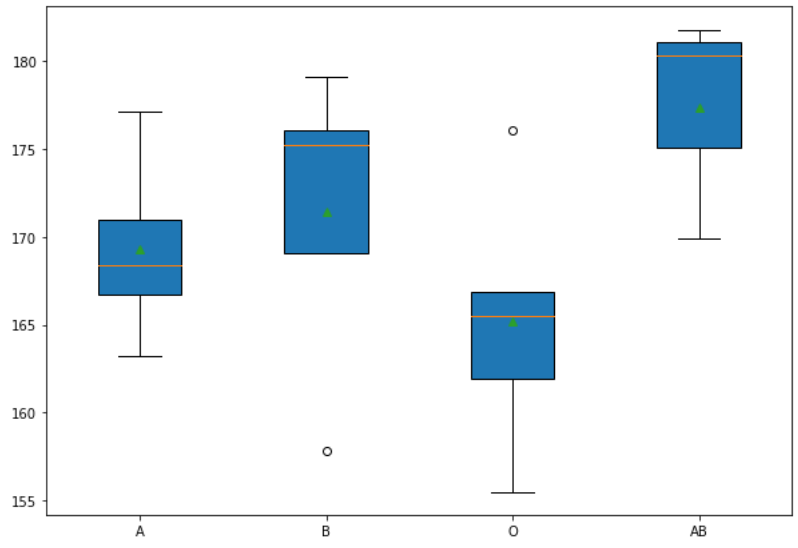
1) 전체 키 분포

```
plt.figure(figsize = (10, 7))
plt.boxplot(DF.Height,
            patch_artist = True)
plt.show()
```



2) 혈액형별 키분포

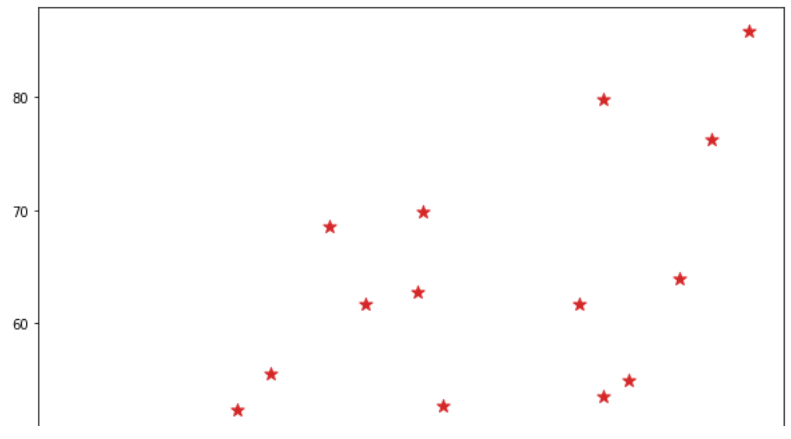
```
plt.figure(figsize = (10, 7))

plt.boxplot([DF.loc[DF['BloodType'] == 'A', 'Height'],
             DF.loc[DF['BloodType'] == 'B', 'Height'],
             DF.loc[DF['BloodType'] == 'O', 'Height'],
             DF.loc[DF['BloodType'] == 'AB', 'Height']],
             labels = ['A', 'B', 'O', 'AB'],
            patch_artist = True,
            showmeans = True)

plt.show()
```



V. 산점도

- https://matplotlib.org/stable/api/_as_gen/matplotlib.axes.Axes.scatter.html#matplotlib.axes.Axes.scatter

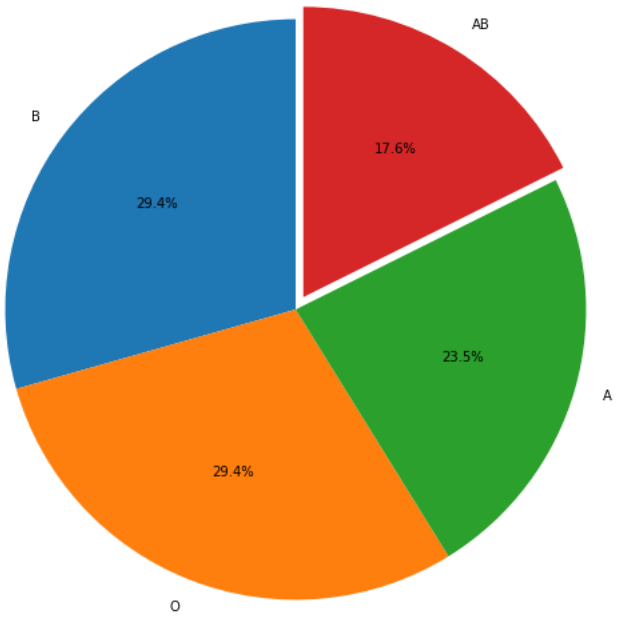
```
plt.figure(figsize = (10, 7))
plt.scatter(DF.Height,
            DF.Weight,
            marker='*',
            s = 100,
            c = '#d62728')
plt.show()
```



VI. 파이 그래프

- https://matplotlib.org/stable/api/_as_gen/matplotlib.axes.Axes.pie.html#matplotlib.axes.Axes.pie

```
plt.figure(figsize = (10, 10))
plt.pie(DF.BloodType.value_counts(),
        labels = DF.BloodType.value_counts().index,
        autopct = '%.1f%%',
        explode = [0.0, 0.0, 0.0, 0.05],
        startangle = 90)
plt.show()
```

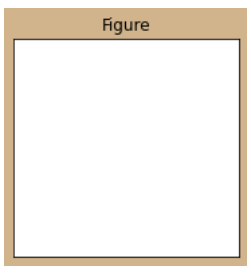


VII. plt.subplot( )

- https://matplotlib.org/stable/gallery/color/named_colors.html

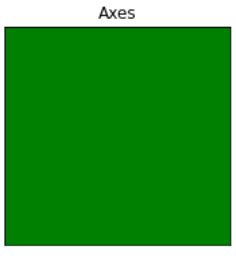
1) Figure

```
import matplotlib.pyplot as plt

plt.figure(figsize = (3, 3), facecolor = 'tan')
plt.title('Figure')
plt.xticks([])
plt.yticks([])
plt.plot()

plt.show()
```



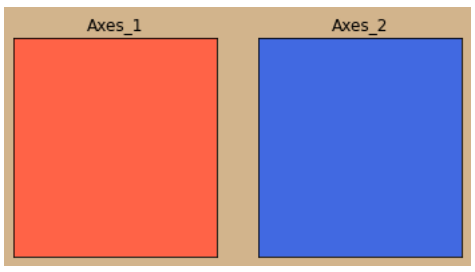
2) Axes

```
ax = plt.axes(facecolor = 'g')

ax.figure.set_size_inches(3, 3)
ax.set_title('Axes')
ax.set_xticks([])
ax.set_yticks([])

plt.show()
```



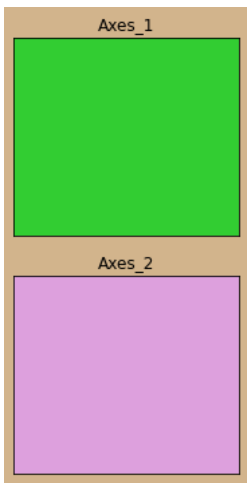
3) 1 x 2 Subplot

```
fig, ax = plt.subplots(nrows = 1, ncols = 2, figsize = (6, 3), facecolor = 'tan')

ax[0].plot()
ax[0].set_facecolor('tomato')
ax[0].set_title('Axes_1')
ax[0].set_xticks([])
ax[0].set_yticks([])

ax[1].plot()
ax[1].set_facecolor('royalblue')
ax[1].set_title('Axes_2')
ax[1].set_xticks([])
ax[1].set_yticks([])

plt.show()
```



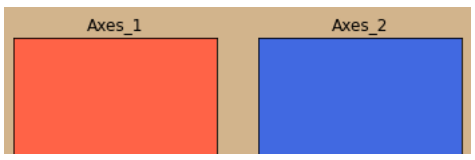
4) 2 x 1 Subplot

```
fig, ax = plt.subplots(nrows = 2, ncols = 1, figsize = (3, 6), facecolor = 'tan')

ax[0].plot()
ax[0].set_facecolor('limegreen')
ax[0].set_title('Axes_1')
ax[0].set_xticks([])
ax[0].set_yticks([])

ax[1].plot()
ax[1].set_facecolor('plum')
ax[1].set_title('Axes_2')
ax[1].set_xticks([])
ax[1].set_yticks([])

plt.show()
```



5) 2 x 2 Subplot

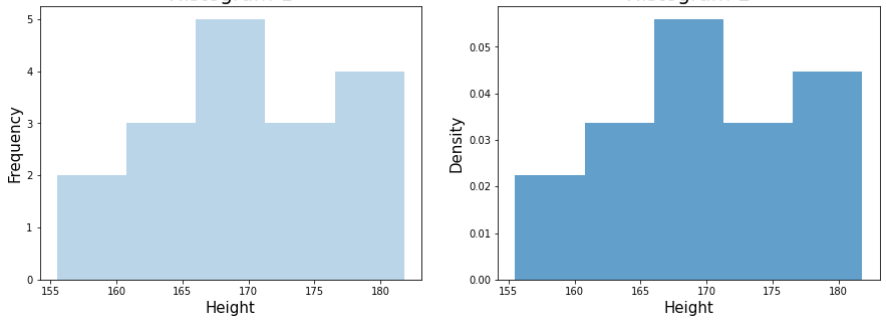
```
fig, ax = plt.subplots(nrows = 2, ncols = 2, figsize = (6, 6), facecolor = 'tan')

ax[0, 0].plot()
ax[0, 0].set_facecolor('tomato')
ax[0, 0].set_title('Axes_1')
ax[0, 0].set_xticks([])
ax[0, 0].set_yticks([])

ax[0, 1].plot()
ax[0, 1].set_facecolor('royalblue')
ax[0, 1].set_title('Axes_2')
ax[0, 1].set_xticks([])
ax[0, 1].set_yticks([])

ax[1, 0].plot()
ax[1, 0].set_facecolor('limegreen')
ax[1, 0].set_title('Axes_3')
ax[1, 0].set_xticks([])
ax[1, 0].set_yticks([])

ax[1, 1].plot()
ax[1, 1].set_facecolor('plum')
ax[1, 1].set_title('Axes_4')
ax[1, 1].set_xticks([])
ax[1, 1].set_yticks([])

plt.show()
```



VIII. Examples

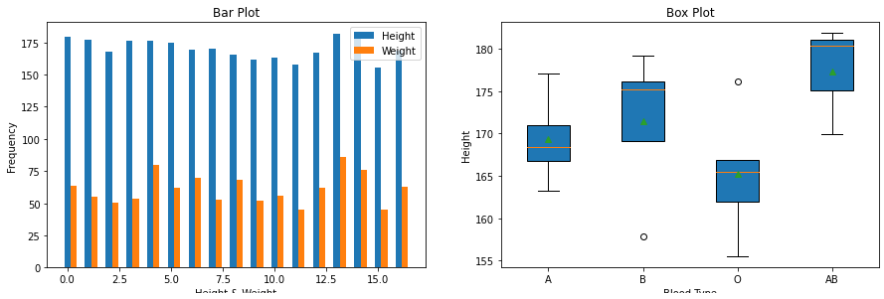
1) Histograms


```
fig, ax = plt.subplots(nrows = 1, ncols = 2, figsize = (15, 5))

ax[0].hist(DF.Height,
           bins = 5, alpha = 0.3,
           density = False)
ax[1].hist(DF.Height,
           bins = 5, alpha = 0.7,
           density = True)

ax[0].set_title('Histogram-1', size = 20)
ax[1].set_title('Histogram-2', size = 20)

ax[0].set_xlabel('Height', size = 15)
ax[1].set_xlabel('Height', size = 15)

ax[0].set_ylabel('Frequency', size = 15)
ax[1].set_ylabel('Density', size = 15)

plt.show()
```



2) Multiple Plots

```
fig, ax = plt.subplots(nrows = 2, ncols = 2, figsize = (15, 10))

ax[0, 0].bar(DF.index, DF['Height'], width = 0.3, label = 'Height')
ax[0, 0].bar(DF.index + 0.3, DF['Weight'], width = 0.3, label = 'Weight')

ax[0, 1].boxplot([DF.loc[DF['BloodType'] == 'A', 'Height'],
                  DF.loc[DF['BloodType'] == 'B', 'Height'],
                  DF.loc[DF['BloodType'] == 'O', 'Height'],
                  DF.loc[DF['BloodType'] == 'AB', 'Height']],
                  labels = ['A', 'B', 'O', 'AB'], patch_artist = True,
                 showmeans = True)

ax[1, 0].scatter(DF.Height, DF.Weight,
                 marker='*', s = 100, c = '#d62728')

ax[1, 1].pie(DF.BloodType.value_counts(),
             labels = DF.BloodType.value_counts().index,
             autopct = '%.1f%%', startangle = 90,
             explode = [0.0, 0.0, 0.0, 0.05])

ax[0, 0].legend()

ax[0, 0].set_title('Bar Plot')
ax[0, 1].set_title('Box Plot')
ax[1, 0].set_title('Scatter Plot')
ax[1, 1].set_title('Pie Plot')

ax[0, 0].set_xlabel('Height & Weight')
ax[0, 1].set_xlabel('Blood Type')
ax[1, 0].set_xlabel('Height')
ax[1, 1].set_xlabel('')

ax[0, 0].set_ylabel('Frequency')
ax[0, 1].set_ylabel('Height')
ax[1, 0].set_ylabel('Weight')
ax[1, 1].set_ylabel('')

plt.show()
```



#

#

#

The End

#

#

#