

Unsupervised Learning

- dataset contains only features.
- i.e. target is not given.

Type of Unsupervised Learning

- Clustering
- Association

```
In [1]: import pandas as pd
```

```
In [2]: df=pd.read_csv("f:/dataset/fruits_cluster.csv")
df
```

```
Out[2]:
```

	diameter	weight
--	----------	--------

0	6.0	100
1	6.1	70
2	3.0	30
3	3.2	35
4	5.5	80
5	7.1	120
6	2.5	60
7	2.3	100
8	4.8	70
9	4.8	79
10	5.8	120
11	2.6	85
12	6.0	110
13	6.3	95
14	3.0	40
15	3.5	25
16	5.5	100
17	7.5	120
18	2.5	50
19	2.7	40
20	4.8	90
21	5.8	90

```
In [5]: X=df.iloc[:, :].values
```

```
In [6]: from sklearn.cluster import KMeans
```

```
In [12]: model=KMeans(n_clusters=3,max_iter=50,n_init=5)
model.fit(X)
```

```
C:\Users\Ducat\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:1436: UserWarning:
KMeans is known to have a memory leak on Windows with MKL, when there are less chunks th
an available threads. You can avoid it by setting the environment variable OMP_NUM_THREA
DS=1.
  warnings.warn(
```

```
Out[12]: ▼ KMeans
KMeans(max_iter=50, n_clusters=3, n_init=5)
```

```
In [13]: model.labels_
```

```
Out[13]: array([1, 0, 2, 2, 0, 1, 0, 1, 0, 0, 1, 0, 1, 1, 2, 2, 1, 1, 2, 2, 1, 1])
```

```
In [14]: df
```

```
Out[14]:
```

	diameter	weight
0	6.0	100
1	6.1	70
2	3.0	30
3	3.2	35
4	5.5	80
5	7.1	120
6	2.5	60
7	2.3	100
8	4.8	70
9	4.8	79
10	5.8	120
11	2.6	85
12	6.0	110
13	6.3	95
14	3.0	40
15	3.5	25
16	5.5	100
17	7.5	120
18	2.5	50
19	2.7	40
20	4.8	90
21	5.8	90

```
In [15]: model.labels_
```

```
Out[15]: array([1, 0, 2, 2, 0, 1, 0, 1, 0, 0, 1, 0, 1, 1, 2, 2, 1, 1, 2, 2, 1, 1])
```

```
In [16]: model.inertia_ #wsse
```

```
Out[16]: 2145.899
```

```
In [17]: sample=[4.2,89]  
model.predict([sample])
```

```
Out[17]: array([0])
```

```
In [18]: pip install nbconvert[webpdf]
```

```
Requirement already satisfied: nbconvert[webpdf] in c:\users\ducat\anaconda3\lib\site-packages (6.5.4)  
Requirement already satisfied: lxml in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (4.9.3)  
Requirement already satisfied: beautifulsoup4 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (4.12.2)  
Requirement already satisfied: bleach in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (4.1.0)  
Requirement already satisfied: defusedxml in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (0.7.1)  
Requirement already satisfied: entrypoints>=0.2.2 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (0.4)  
Requirement already satisfied: Jinja2>=3.0 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (3.1.2)  
Requirement already satisfied: jupyter-core>=4.7 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (5.3.0)  
Requirement already satisfied: jupyterlab-pygments in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (0.1.2)  
Requirement already satisfied: MarkupSafe>=2.0 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (2.1.1)  
Requirement already satisfied: mistune<2,>=0.8.1 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (0.8.4)  
Requirement already satisfied: nbclient>=0.5.0 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (0.5.13)  
Requirement already satisfied: nbformat>=5.1 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (5.9.2)  
Requirement already satisfied: packaging in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (23.1)  
Requirement already satisfied: pandocfilters>=1.4.1 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (1.5.0)  
Requirement already satisfied: pygments>=2.4.1 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (2.15.1)  
Requirement already satisfied: tinycss2 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (1.2.1)  
Requirement already satisfied: traitlets>=5.0 in c:\users\ducat\anaconda3\lib\site-packages (from nbconvert[webpdf]) (5.7.1)  
Collecting pypeteer<1.1,>=1 (from nbconvert[webpdf])  
  Using cached pypeteer-1.0.2-py3-none-any.whl (83 kB)  
Requirement already satisfied: platformdirs>=2.5 in c:\users\ducat\anaconda3\lib\site-packages (from jupyter-core>=4.7->nbconvert[webpdf]) (3.10.0)  
Requirement already satisfied: pywin32>=300 in c:\users\ducat\anaconda3\lib\site-packages (from jupyter-core>=4.7->nbconvert[webpdf]) (305.1)  
Requirement already satisfied: jupyter-client>=6.1.5 in c:\users\ducat\anaconda3\lib\site-packages (from nbclient>=0.5.0->nbconvert[webpdf]) (7.4.9)  
Requirement already satisfied: nest-asyncio in c:\users\ducat\anaconda3\lib\site-packages (from nbclient>=0.5.0->nbconvert[webpdf]) (1.5.6)  
Requirement already satisfied: fastjsonschema in c:\users\ducat\anaconda3\lib\site-packages (from nbformat>=5.1->nbconvert[webpdf]) (2.16.2)  
Requirement already satisfied: jsonschema>=2.6 in c:\users\ducat\anaconda3\lib\site-packages (from nbformat>=5.1->nbconvert[webpdf]) (4.17.3)  
Requirement already satisfied: appdirs<2.0.0,>=1.4.3 in c:\users\ducat\anaconda3\lib\site-packages (from nbformat>=5.1->nbconvert[webpdf]) (1.4.3)
```

```

e-packages (from pyppeteer<1.1,>=1->nbconvert[webpdf]) (1.4.4)
Requirement already satisfied: certifi>=2021 in c:\users\ducat\anaconda3\lib\site-packages (from pyppeteer<1.1,>=1->nbconvert[webpdf]) (2023.7.22)
Requirement already satisfied: importlib-metadata>=1.4 in c:\users\ducat\anaconda3\lib\site-packages (from pyppeteer<1.1,>=1->nbconvert[webpdf]) (6.0.0)
Collecting pyee<9.0.0,>=8.1.0 (from pyppeteer<1.1,>=1->nbconvert[webpdf])
  Using cached pyee-8.2.2-py2.py3-none-any.whl (12 kB)
Requirement already satisfied: tqdm<5.0.0,>=4.42.1 in c:\users\ducat\anaconda3\lib\site-packages (from pyppeteer<1.1,>=1->nbconvert[webpdf]) (4.65.0)
Requirement already satisfied: urllib3<2.0.0,>=1.25.8 in c:\users\ducat\anaconda3\lib\site-packages (from pyppeteer<1.1,>=1->nbconvert[webpdf]) (1.26.16)
Collecting websockets<11.0,>=10.0 (from pyppeteer<1.1,>=1->nbconvert[webpdf])
  Using cached websockets-10.4-cp311-cp311-win_amd64.whl (101 kB)
Requirement already satisfied: soupsieve>1.2 in c:\users\ducat\anaconda3\lib\site-packages (from beautifulsoup4->nbconvert[webpdf]) (2.4)
Requirement already satisfied: six>=1.9.0 in c:\users\ducat\anaconda3\lib\site-packages (from bleach->nbconvert[webpdf]) (1.16.0)
Requirement already satisfied: webencodings in c:\users\ducat\anaconda3\lib\site-packages (from bleach->nbconvert[webpdf]) (0.5.1)
Requirement already satisfied: zipp>=0.5 in c:\users\ducat\anaconda3\lib\site-packages (from importlib-metadata>=1.4->pyppeteer<1.1,>=1->nbconvert[webpdf]) (3.11.0)
Requirement already satisfied: attrs>=17.4.0 in c:\users\ducat\anaconda3\lib\site-packages (from jsonschema>=2.6->nbformat>=5.1->nbconvert[webpdf]) (22.1.0)
Requirement already satisfied: pyparsing!=0.17.0,!0.17.1,!0.17.2,>=0.14.0 in c:\users\ducat\anaconda3\lib\site-packages (from jsonschema>=2.6->nbformat>=5.1->nbconvert[webpdf]) (0.18.0)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\ducat\anaconda3\lib\site-packages (from jupyter-client>=6.1.5->nbclient>=0.5.0->nbconvert[webpdf]) (2.8.2)
Requirement already satisfied: pyzmq>=23.0 in c:\users\ducat\anaconda3\lib\site-packages (from jupyter-client>=6.1.5->nbclient>=0.5.0->nbconvert[webpdf]) (23.2.0)
Requirement already satisfied: tornado>=6.2 in c:\users\ducat\anaconda3\lib\site-packages (from jupyter-client>=6.1.5->nbclient>=0.5.0->nbconvert[webpdf]) (6.3.2)
Requirement already satisfied: colorama in c:\users\ducat\anaconda3\lib\site-packages (from tqdm<5.0.0,>=4.42.1->pyppeteer<1.1,>=1->nbconvert[webpdf]) (0.4.6)
Installing collected packages: pyee, websockets, pyppeteer
Successfully installed pyee-8.2.2 pyppeteer-1.0.2 websockets-10.4
Note: you may need to restart the kernel to use updated packages.

```

In []: