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Div: ***A***

Roll No: ***15***

Moodle ID: ***20102152***

Machine Learning Experiment No: ***8***

```
import numpy as np
import pandas as pd

df = pd.read_csv('/content/Cgpa_iq.csv')

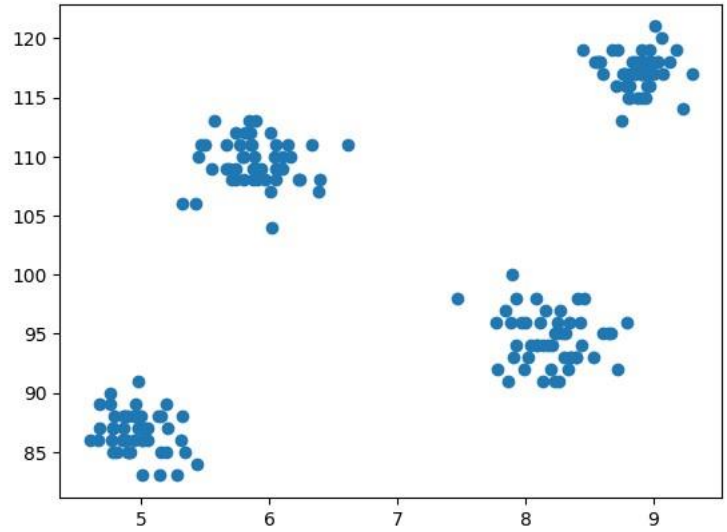
print("The shape of data is",df.shape)
df.head()
```

```
The shape of data is (200, 2)
```

	cgpa	iq
0	5.13	88
1	5.90	113
2	8.36	93
3	8.27	97
4	5.45	110

```
import matplotlib.pyplot as plt
plt.scatter(df['cgpa'],df['iq'])
```

```
<matplotlib.collections.PathCollection at 0x7c43cc695ff0>
```




```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
from sklearn.cluster import KMeans

wcss = []

for i in range(1,11):
    km = KMeans(n_clusters=i)
km.fit_predict(df)
wcss.append(km.inertia_)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change fro
warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change fro
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warnings.warn(
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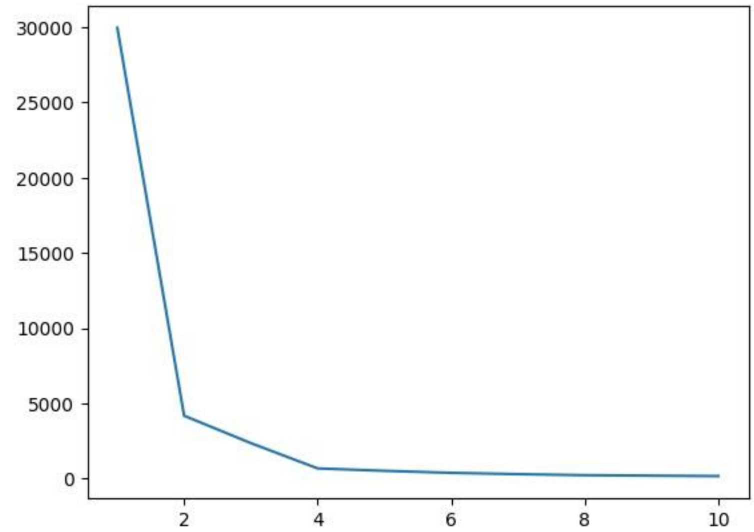
warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change fro
warnings.warn(
```

```
wcss
```

```
[29957.898288000004,
 4184.141270000001,
 2362.713349,
 681.9696600000003,
 523.7131894763967,
 388.85240268759804,
 302.653499358208,
 233.54082485509014,
 201.0572208812339,
 173.07040109676714]
```

```
plt.plot(range(1,11),wcss)
```

```
[<matplotlib.lines.Line2D at 0x7c43bd3907c0>]
```




```
X = df.iloc[:,:].values km
= KMeans(n_clusters=4)
y_means =
km.fit_predict(X)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change fro
warnings.warn(
```

```
y_means
```

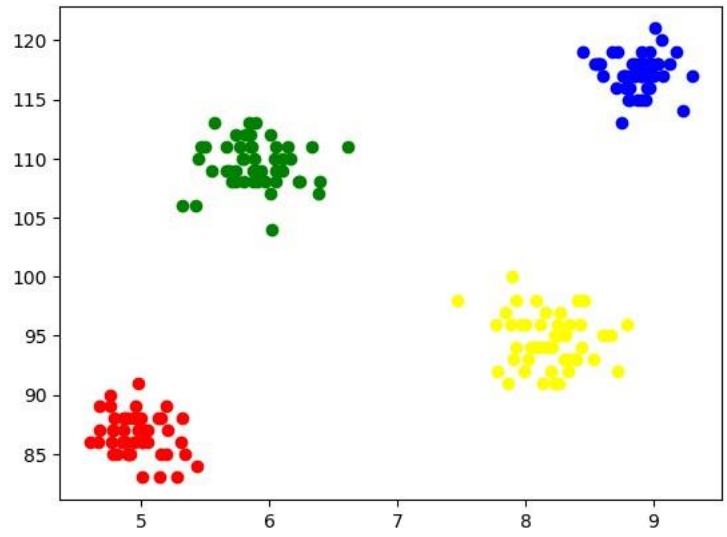
```
array([1, 2, 3, 3, 2, 2, 3, 0, 2, 3, 1, 2, 3, 1, 2, 3, 2, 3, 2, 2, 3, 1,
3, 1, 1, 3, 1, 0, 3, 2, 0, 2, 0, 2, 3, 3, 0, 2, 1, 2, 1, 3, 3, 1,
       0, 0, 3, 2, 0, 2, 1, 1, 0, 3, 0, 2, 2, 0, 2, 0, 2, 3, 3, 0, 1, 0,
       3, 1, 2, 3, 2, 0, 3, 1, 2, 0, 2, 0, 1, 3, 3, 0, 2, 1, 0, 1, 0, 2,
       0, 2, 0, 0, 3, 1, 3, 3, 0, 3, 1, 0, 2, 1, 1, 0, 1, 1, 3, 1, 0, 0,
       3, 0, 2, 2, 3, 0, 3, 2, 0, 1, 1, 2, 3, 0, 3, 1, 3, 2, 1, 3, 3, 2,
       1, 1, 2, 0, 2, 1, 3, 3, 3, 1, 2, 1, 1, 0, 1, 0, 2, 1, 0, 1, 0, 0,
       1, 3, 2, 0, 2, 3, 1, 0, 2, 3, 0, 1, 2, 1, 1, 0, 0, 2, 0, 1, 1, 3,
       0, 2, 1, 0, 0, 2, 2, 2, 3, 1, 3, 3, 0, 2, 3, 3, 1, 1, 3, 1, 0, 2,
       2, 0], dtype=int32)
```

```
X[y_means == 3,1]
```

```
array([ 93.,  97.,  98.,  94.,  97.,  95.,  91.,  98.,  92.,  98.,  94.,
96.,  96.,  96.,  93.,  94.,  96.,  96.,  95.,  93.,  95.,  94.,
92.,  91.,  92.,  95.,  94.,  95.,  92.,  94.,  91.,  95.,  93.,
        97.,  98.,  96.,  93., 100.,  96.,  94.,  95.,  93.,  92.,  98.,
        96.,  93.,  91.,  93.,  94.,  96.])
```

```
plt.scatter(X[y_means == 0,0],X[y_means == 0,1],color='blue')
plt.scatter(X[y_means == 1,0],X[y_means == 1,1],color='red')
plt.scatter(X[y_means == 2,0],X[y_means == 2,1],color='green')
plt.scatter(X[y_means == 3,0],X[y_means == 3,1],color='yellow')
```

```
<matplotlib.collections.PathCollection at 0x7c43ba9e7520>
```




```
from sklearn.datasets import make_blobs


centroids = [(-5, -5, 5), (5, 5, -5), (3.5, -2.5, 4), (-2.5, 2.5, -4)]

cluster_std = [1, 1, 1, 1]


X, y = make_blobs(
n_samples=200,
cluster_std=cluster_std,
centers=centroids,
n_features=3,
random_state=1
)

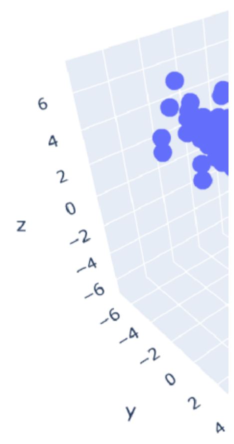

X
```

```
array([[ 4.33424548,  3.32580419, -4.17497018],        [-3.32246719,
3.22171129, -4.625342  ],
       [-6.07296862, -4.13459237,  2.6984613 ],
       [ 6.90465871,  6.1110567 , -4.3409502 ],
       [-2.60839207,  2.95015551, -2.2346649 ],
       [ 5.88490881,  4.12271848, -5.86778722],
       [-4.68484061, -4.15383935,  4.14048406],
       [-1.82542929,  3.96089238, -3.4075272 ],
       [-5.34385368, -4.95640314,  4.37999916],
       [ 4.91549197,  4.70263812, -4.582698  ],
       [-3.80108212, -4.81484358,  4.62471505],
       [ 4.6735005 ,  3.65732421, -3.88561702],
       [-6.23005814, -4.4494625 ,  5.79280687],
       [-3.90232915,  2.95112294, -4.6949209 ],
       [ 3.72744124,  5.31354772, -4.49681519],
       [-3.3088472 ,  3.05743945, -3.81896126],
       [ 2.70273021, -2.21732429,  3.17390257],
       [ 4.06438286, -0.36217193,  3.214466  ],
       [ 4.69268607, -2.73794194,  5.15528789],
       [ 4.1210827 , -1.5438783 ,  3.29415949],
       [-6.61577235, -3.87858229,  5.40890054],
       [ 3.05777072, -2.17647265,  3.89000851],
       [-1.48617753,  0.27288737, -5.6993336 ],
       [-5.3224172 , -5.38405435,  6.13376944],
       [-5.26621851, -4.96738545,  3.62688268],
       [ 5.20183018,  5.66102029, -3.20784179],
       [-2.9189379 ,  2.02081508, -5.95210529],
       [ 3.30977897, -2.94873803,  3.32755196],
       [ 5.12910158,  6.6169496 , -4.49725912],
       [-2.46505641,  3.95391758, -3.33831892],
       [ 1.46279877, -4.44258918,  1.49355935],
       [ 3.87798127,  4.48290554, -5.99702683],
       [ 4.10944442,  3.8808846 , -3.0439211 ],
       [-6.09989127, -5.17242821,  4.12214158],
       [-3.03223402,  3.6181334 , -3.3256039 ],
       [ 7.44936865,  4.45422583, -5.19883786],
```

```
       [-4.47053468, -4.86229879,  5.07782113],
       [-1.46701622,  2.27758597, -2.52983966],
```

```
            [ 3.0208429 , -2.14983284,  4.01716473],
            [ 3.82427424, -2.47813716,  3.53132618],
            [-5.74715829, -3.3075454 ,  5.05080775],
            [-1.51364782,  2.03384514, -2.61500866],
            [-4.80170028, -4.88099135,  4.32933771],
            [ 6.55880554,  5.1094027 , -6.2197444 ],
            [-1.48879294,  1.02343734, -4.14319575],
            [ 4.30884436, -0.71024532,  4.45128402],
            [ 3.58646441, -4.64246673,  3.16983114],
            [ 3.37256166,  5.60231928, -4.5797178 ],
            [-1.39282455,  3.94287693, -4.53968156],
            [-4.64945402, -6.31228341,  4.96130449],
            [ 3.88352998,  5.0809271 , -5.18657899],
            [ 3.32454103, -3.43391466,  3.46697967],
            [ 3.45029742, -2.03335673,  5.03368687],
            [-2.95994283,  3.14435367, -3.62832971],
            [-3.03289825, -6.85798186,  6.23616403],
            [-4.13665468, -5.1809203 ,  4.39607937],
            [-3.6134361 ,  2.43258998, -2.83856002],
            [ 2.07344458, -0.73204005,  3.52462712],
```

```
import plotly.express as px
fig = px.scatter_3d(x=X[:,0], y=X[:,1], z=X[:,2])
fig.show()
```




```
wcss = []
for i in range(1,21):
    km = KMeans(n_clusters=i)
    km.fit_predict(X)
    wcss.append(km.inertia_)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning

/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning

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```

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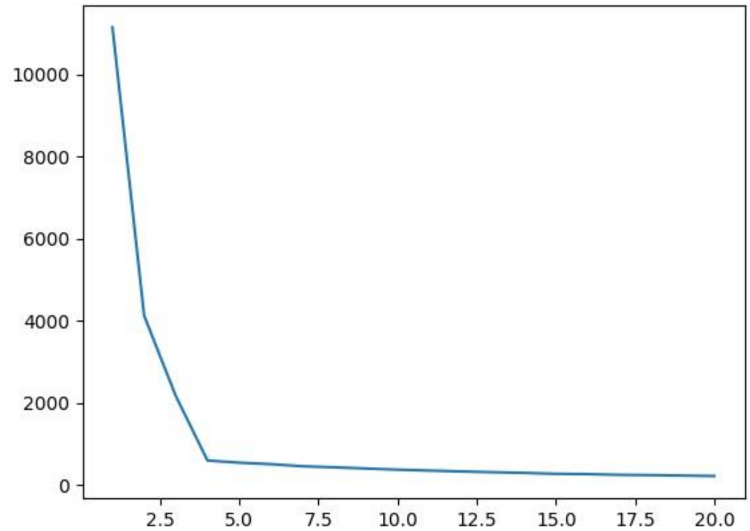
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:
```

```
plt.plot(range(1,21),wcss)
```

```
[<matplotlib.lines.Line2D at 0x7c43b90f4b50>]
```




```
km = KMeans(n_clusters=4)
y_pred = km.fit_predict(X)
```

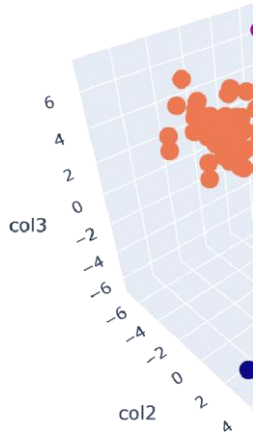
```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
```

```
df = pd.DataFrame()

df['col1'] = X[:,0]
df['col2'] = X[:,1]
df['col3'] = X[:,2]
df['label'] = y_pred
```

```
fig = px.scatter_3d(df,x='col1', y='col2', z='col3',color='label')
fig.show()
```


6
4
2
0
−2
−4
−6
col3
−6
−4
−2
0
2
4
col2