

```
#Adithya Vardhan
#21BAI1535
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

```
from sklearn.cluster import KMeans
```

```
df=pd.read_csv('/content/Mall_Customers.csv')
```

```
df.head()
```

	CustomerID	Gender	Age	Annual Income (k\$)	Spending Score (1-100)
0	1	Male	19	15	39
1	2	Male	21	15	81
2	3	Female	20	16	6
3	4	Female	23	16	77
4	5	Female	31	17	40

```
df.shape
```

(200, 5)

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 5 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   CustomerID                            200 non-null   int64
1   Gender                                200 non-null   object
2   Age                                    200 non-null   int64
3   Annual Income (k$)                    200 non-null   int64
4   Spending Score (1-100)                 200 non-null   int64
dtypes: int64(4), object(1)
memory usage: 7.9+ KB
```

```
df.isnull().sum()
```

```
CustomerID      0
Gender          0
Age             0
Annual Income (k$)  0
Spending Score (1-100)  0
dtype: int64
```

```
X=df.iloc[:,[3,4]].values
```

```
print(X)
```

```
[[ 15  39]
 [ 15  81]
 [ 16   6]
 [ 16  77]
 [ 17  40]
 [ 17  76]
 [ 18   6]
 [ 18  94]
 [ 19   3]
 [ 19  72]
 [ 19  14]
 [ 19  99]
 [ 20  15]
 [ 20  77]
 [ 20  13]
 [ 20  79]
 [ 21  35]
 [ 21  66]
 [ 23  29]
 [ 23  98]
 [ 24  35]
 [ 24  73]
 [ 25   5]
```

Hi! Here some our recommendations to get the best out BLACKBOX:

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End the question in what language you want answer to be, e.g: 'connect to mongodb in py

or you can just **Go to Blackbo**

Here are some suggestion (choos

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Ask any coding question

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```
[ 25 73]
[ 28 14]
[ 28 82]
[ 28 32]
[ 28 61]
[ 29 31]
[ 29 87]
[ 30  4]
[ 30 73]
[ 33  4]
[ 33 92]
[ 33 14]
[ 33 81]
[ 34 17]
[ 34 73]
[ 37 26]
[ 37 75]
[ 38 35]
[ 38 92]
[ 39 36]
[ 39 61]
[ 39 28]
[ 39 65]
[ 40 55]
[ 40 47]
[ 40 42]
[ 40 42]
[ 42 52]
[ 42 60]
[ 43 54]
[ 43 60]
[ 43 45]
[ 43 41]
[ 44 50]
[ 44 45]
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BLACKBOX AI

Within Clusters Sum of Squares

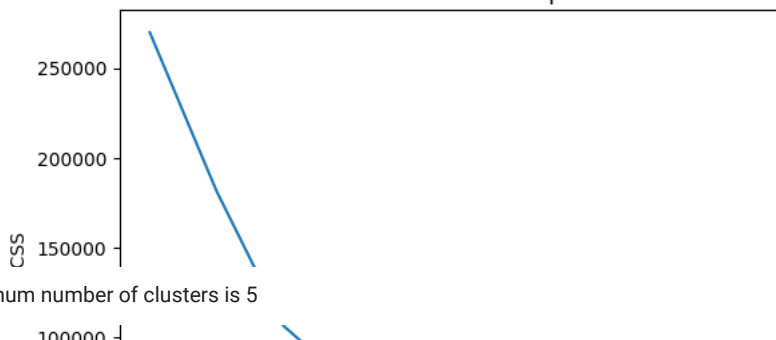
```
wcss=[]
for i in range(1,11):
    kmeans=KMeans(n_clusters=i,init='k-means++',random_state=43)
    kmeans.fit(X)

    wcss.append(kmeans.inertia_)

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

plt.plot(range(1,11),wcss)
plt.title('The Elbow Point Graph')
plt.xlabel('Number of clusters')
plt.ylabel('WCSS')
plt.show()
```

The Elbow Point Graph



Optimum number of clusters is 5

```
kmeans=KMeans(n_clusters=5,init='k-means++',random_state=0)
Y=kmeans.fit_predict(X)
print(Y)
```

```
[4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4
 3 4 3 4 3 4 1 4 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 2 0 2 1 2 0 2 0 2 1 2 0 2 0 2 0 2 1 2 0 2 0 2
 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0
 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2]
```

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

```
# plotting all the clusters and their Centroids
```

```
plt.figure(figsize=(8,8))
plt.scatter(X[Y==0,0], X[Y==0,1], s=50, c='green', label='Cluster 1')
plt.scatter(X[Y==1,0], X[Y==1,1], s=50, c='red', label='Cluster 2')
plt.scatter(X[Y==2,0], X[Y==2,1], s=50, c='yellow', label='Cluster 3')
plt.scatter(X[Y==3,0], X[Y==3,1], s=50, c='violet', label='Cluster 4')
plt.scatter(X[Y==4,0], X[Y==4,1], s=50, c='blue', label='Cluster 5')
```

```
# plot the centroids
```

```
plt.scatter(kmeans.cluster_centers[:,0], kmeans.cluster_centers[:,1], s=100, c='cyan', label='Centroids')
```

```
plt.title('Customer Groups')
plt.xlabel('Annual Income')
plt.ylabel('Spending Score')
plt.show()
```

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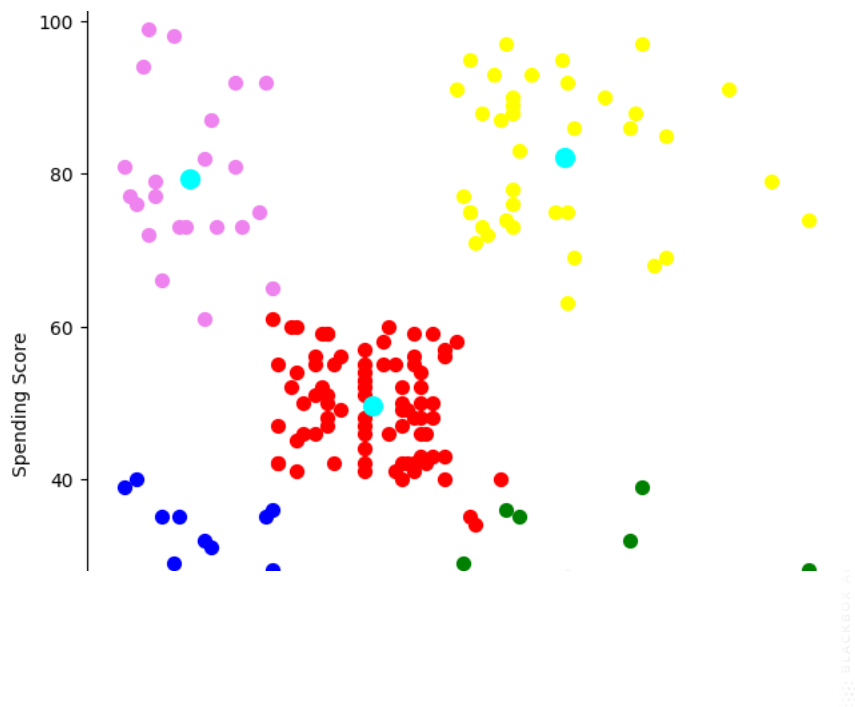
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