Customer Segmentation using K-means clustering

Importing the Dependencies

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.cluster import KMeans
```

Data Collection and Analysis

```
# loading the data from csv file to a Pandas DataFrame
customer_data = pd.read_csv('/content/Mall_Customers.csv')
```

```
# first 5 rows in the dataframe
customer_data.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

Next steps: Generate code with customer_data | View recommended plots | New interactive sheet

```
# finding the number of rows and columns
customer_data.shape
```

```
(200, 5)
```

```
# getting some informations about the dataset
customer_data.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
```

```
# checking for missing values
customer_data.isnull().sum()
```

	0
CustomerID	0
Gender	0
Age	0
Annual Income (k$)	0
Spending Score (1-100)	0

Choosing the Annual Income Column & Spending Score column

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

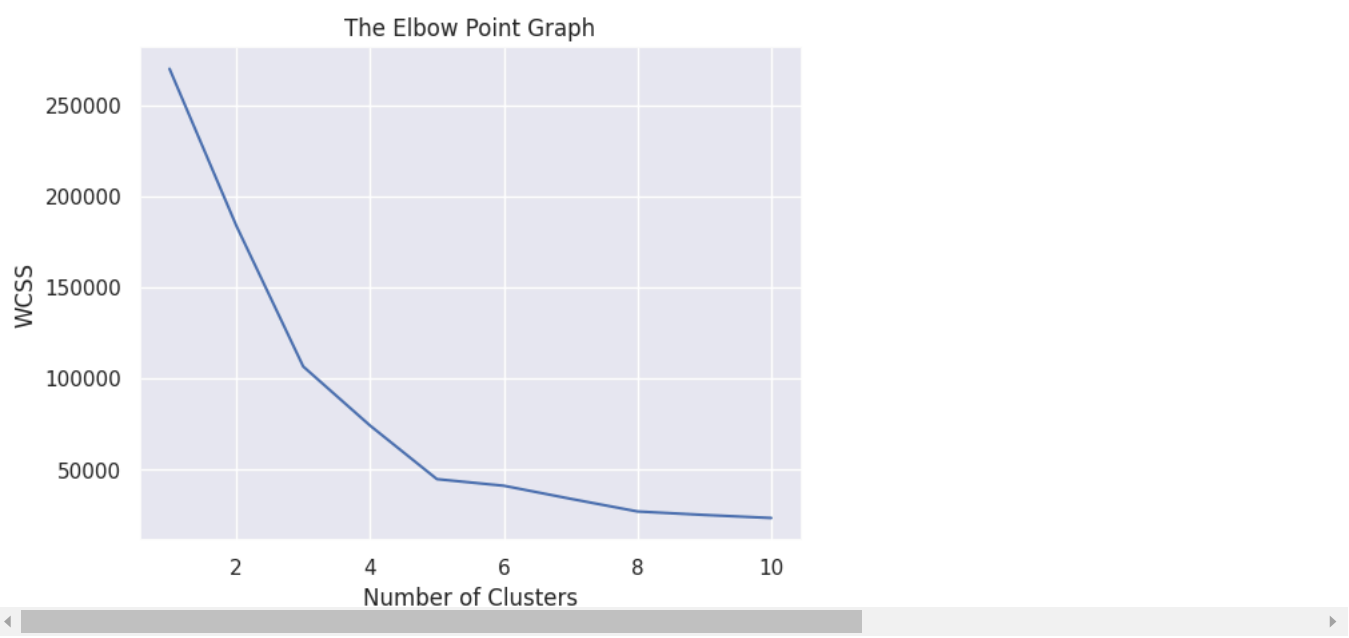
```
print(X)
```

Show hidden output

Choosing the number of clusters

```
# finding wcss value for different number of clusters

wcss = []

for i in range(1,11):
  kmeans = KMeans(n_clusters=i, init='k-means++', random_state=42)
  kmeans.fit(X)

  wcss.append(kmeans.inertia_)
```

```
# plot an elbow graph

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



Conclusion: Optimum numbers of clusters = 5

Training the k-Means Clustering Model

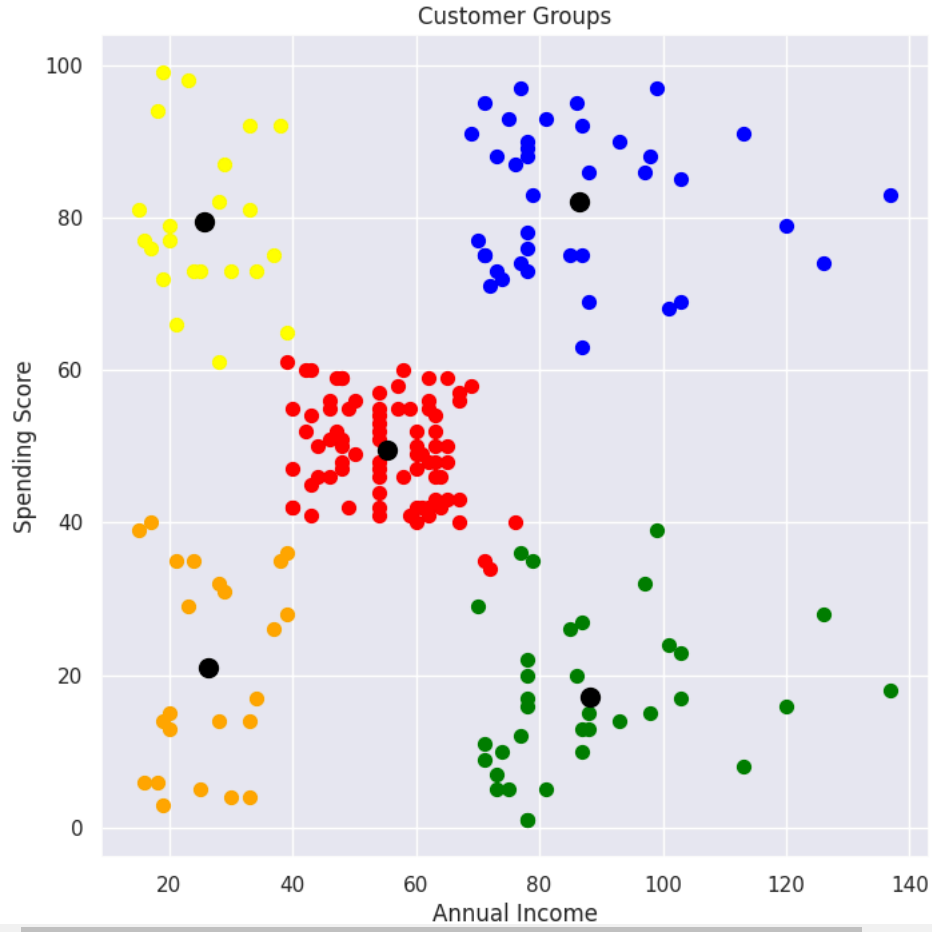
```
kmeans = KMeans(n_clusters=5, init='k-means++', random_state=0)

# return a label for each data point based on their cluster
Y = kmeans.fit_predict(X)

print(Y)
```

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

Visualizing all the Clusters

```
# 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='red', label='Cluster 1')
plt.scatter(X[Y==1,0], X[Y==1,1], s=50, c='blue', label='Cluster 2')
plt.scatter(X[Y==2,0], X[Y==2,1], s=50, c='green', label='Cluster 3')
```

```
plt.scatter(X[Y==3,0], X[Y==3,1], s=50, c='orange', label='Cluster 4')
plt.scatter(X[Y==4,0], X[Y==4,1], s=50, c='yellow', label='Cluster 5')

# plot the centroids
plt.scatter(kmeans.cluster_centers_[:,0], kmeans.cluster_centers_[:,1], s=100, c='black', label='Centroids')

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



Key Insights:

1. Five distinct customer segments were identified, each showcasing unique purchasing behaviors and characteristics.
2. High-value customers (Cluster yellow and blue) can be prioritized for premium services, while low-engagement customers (Cluster orange and green) require targeted campaigns to improve retention.
3. The segmentation enables data-driven marketing strategies, optimizing resource allocation and enhancing customer satisfaction.

```
Start coding or generate with AI.
```