Unsupervised Alorithms

K-Means Clustering – Divides data into k groups based on similarity.

```
# Step 1: Import libraries
import pandas as pd
import numpy as np
import seaborn as sns
%matplotlib inline
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
from sklearn.preprocessing import LabelEncoder

# Step 2: Load dataset
df=pd.read_csv("C:\\Users\\hp\\Downloads\\Mall_Customers.csv")
df.head()
```

	CustomerID	Genre	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)
```

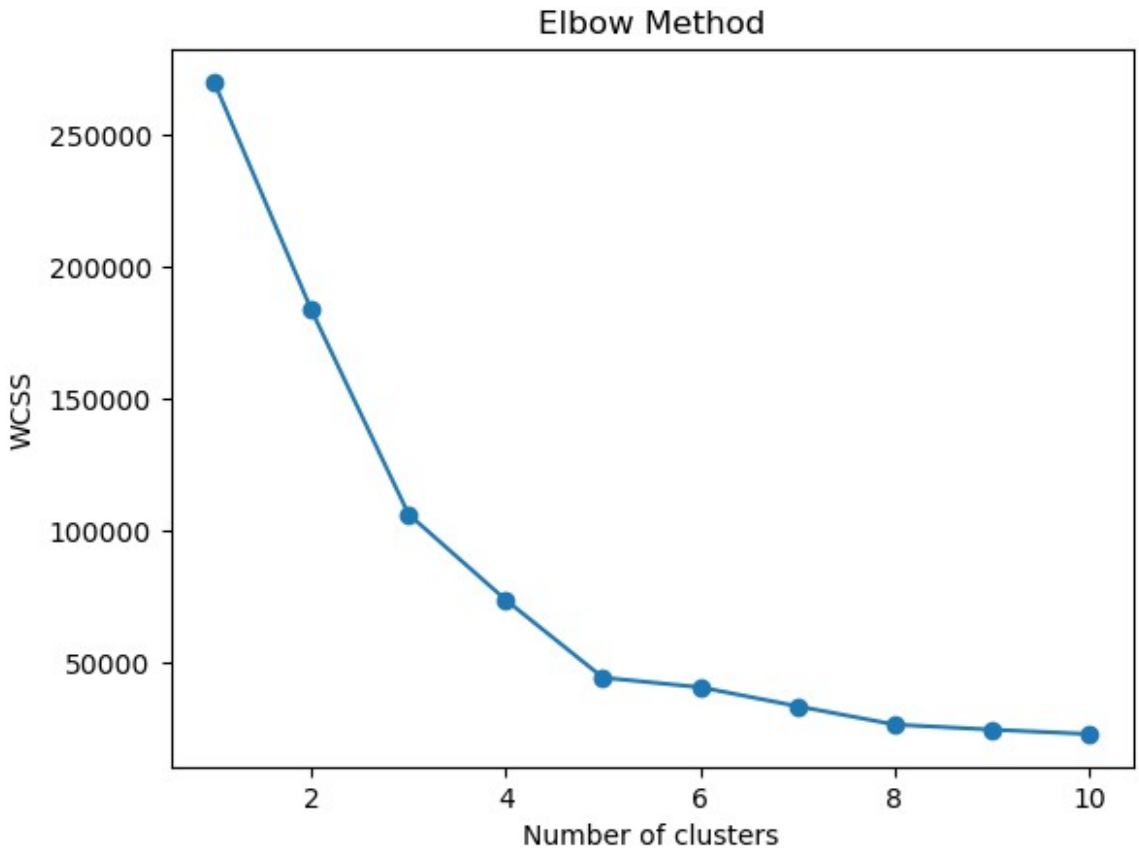
```
df.rename(columns={"Genre":"Gendar"}, inplace=True)

le=LabelEncoder()
df['Gendar']=le.fit_transform(df['Gendar'])

# step 3 : select freature for clustering
plt.figure(figsize=(10,8))
x=df.corr()
sns.heatmap(x,annot=True);
```


```
X=df[['Annual Income (k$)','Spending Score (1-100)']]

# Step 4: Elbow method to find optimal k
wcss=[]  # within cluster sum of squares
for k in range(1,11):
    kmeans=KMeans(n_clusters=k, random_state=42)
    kmeans.fit(X)
    wcss.append(kmeans.inertia_)
```

```
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\cluster\
_kmeans.py:1419: UserWarning: KMeans is known to have a memory leak on
Windows with MKL, when there are less chunks than available threads.
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\cluster\
_kmeans.py:1419: UserWarning: KMeans is known to have a memory leak on
```

```
Windows with MKL, when there are less chunks than available threads.
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\cluster\
_kmeans.py:1419: UserWarning: KMeans is known to have a memory leak on
Windows with MKL, when there are less chunks than available threads.
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\cluster\
_kmeans.py:1419: UserWarning: KMeans is known to have a memory leak on
Windows with MKL, when there are less chunks than available threads.
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\cluster\
_kmeans.py:1419: UserWarning: KMeans is known to have a memory leak on
Windows with MKL, when there are less chunks than available threads.
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\cluster\
_kmeans.py:1419: UserWarning: KMeans is known to have a memory leak on
Windows with MKL, when there are less chunks than available threads.
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\cluster\
_kmeans.py:1419: UserWarning: KMeans is known to have a memory leak on
Windows with MKL, when there are less chunks than available threads.
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\cluster\
_kmeans.py:1419: UserWarning: KMeans is known to have a memory leak on
Windows with MKL, when there are less chunks than available threads.
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\cluster\
_kmeans.py:1419: UserWarning: KMeans is known to have a memory leak on
Windows with MKL, when there are less chunks than available threads.
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\cluster\
_kmeans.py:1419: UserWarning: KMeans is known to have a memory leak on
Windows with MKL, when there are less chunks than available threads.
```

```
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(

plt.plot(range(1,11), wcss, marker='o')
plt.title('Elbow Method')
plt.xlabel('Number of clusters')
plt.ylabel('WCSS')
plt.show()
```




```
# Step 5: Apply K-Means with optimal k (let's say k=5)
kmeans=KMeans(n_clusters=5, random_state=42)
df['Cluster'] = kmeans.fit_predict(X)

C:\ProgramData\anaconda3\Lib\site-packages\sklearn\cluster\
_kmeans.py:1419: UserWarning: KMeans is known to have a memory leak on
Windows with MKL, when there are less chunks than available threads.
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(

# Step 6: Plot clusters
plt.figure(figsize=(8,6))
```

```
plt.scatter(X.iloc[:,0], X.iloc[:,1], c=df['Cluster'], cmap='rainbow')
plt.title('Customer Segments')
plt.xlabel('Annual Income (K$)')
plt.ylabel('Spending Score (1-100)')
plt.show()
```