assignment-5-1

October 8, 2023

[1]:
```
from google.colab import files
uploaded=files.upload()
```

```
<IPython.core.display.HTML object>
```

```
Saving Mall_Customers.csv to Mall_Customers.csv
```

[5]:
```
# Importing necessary libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
from sklearn.preprocessing import StandardScaler

# Step 1: Loading the dataset
df = pd.read_csv('Mall_Customers.csv')
df.head()
```

[5]:

	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

[6]:
```
# Data preprocessing
# Using only Annual Income and Spending Score for clustering
X = df.iloc[:, [3, 4]].values

# Standardizing the features
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)
```

[7]:
```
# Determining optimal number of clusters using the Elbow method
wcss = []
for i in range(1, 11):
    kmeans = KMeans(n_clusters=i, init='k-means++', random_state=42)
    kmeans.fit(X_scaled)
```

```
    wcss.append(kmeans.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
  warnings.warn(
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  warnings.warn(
```
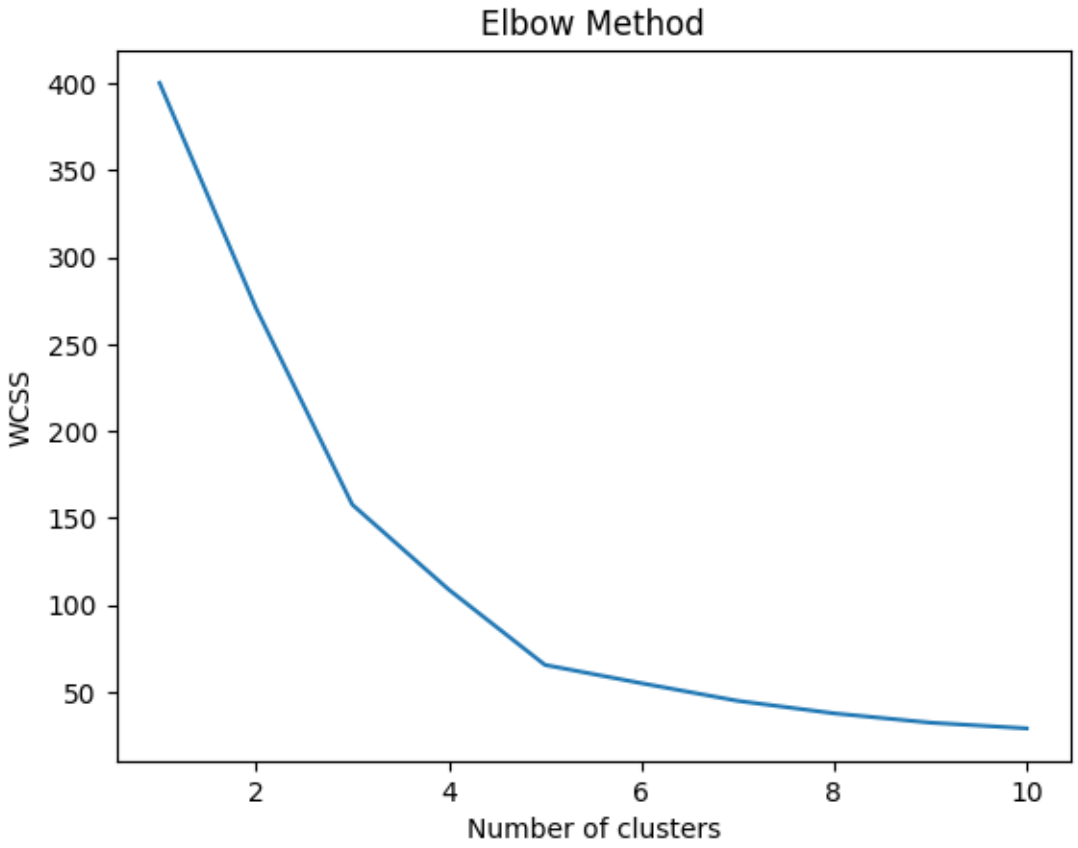

[8]:

```
# Plotting the Elbow method
plt.plot(range(1, 11), wcss)
plt.title('Elbow Method')
plt.xlabel('Number of clusters')
```

```
plt.ylabel('WCSS')  # Within-Cluster Sum of Squares
plt.show()
```



[11]:
```
# Choosing clusters, based on the Elbow method
num_clusters = 5

# Applying K-means clustering
kmeans = KMeans(n_clusters=num_clusters, init='k-means++', random_state=42)
kmeans.fit(X_scaled)

# Assigning clusters to the data points
df['Cluster'] = kmeans.labels_
```

```
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```
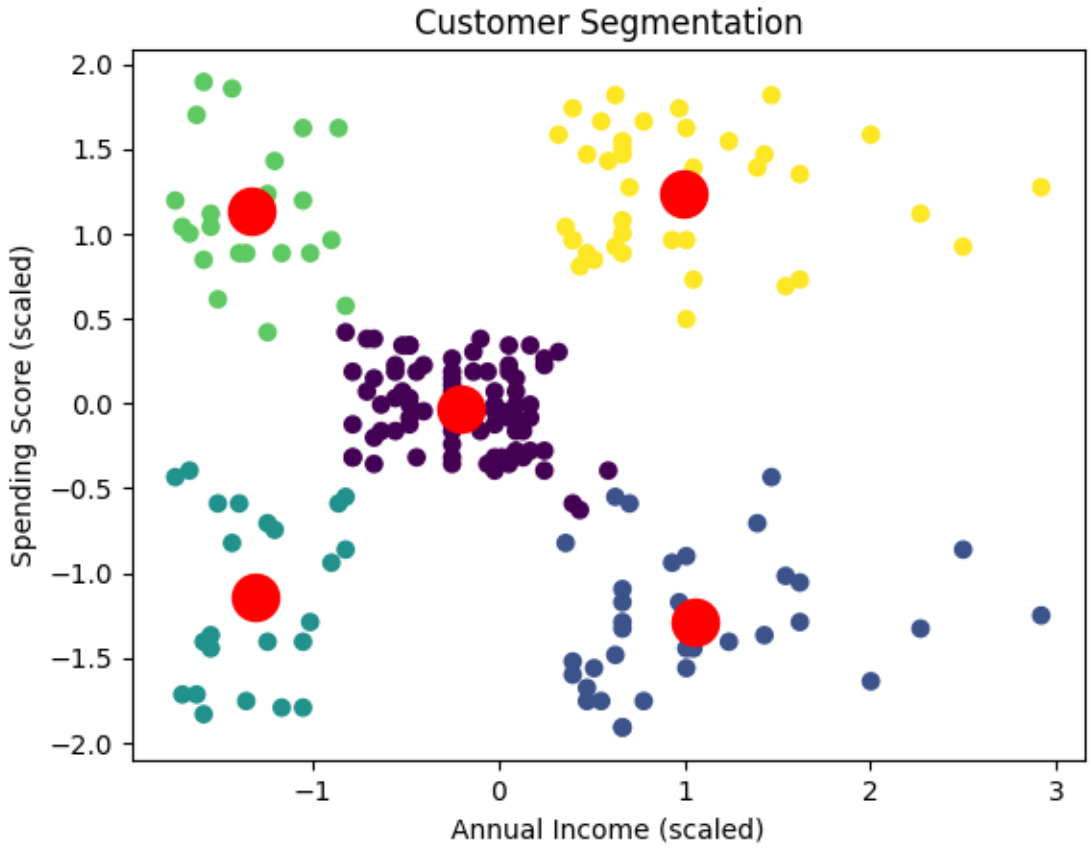

[12]:
```
# Visualizing the clusters
plt.scatter(X_scaled[:, 0], X_scaled[:, 1], c=kmeans.labels_, cmap='viridis')
```

```
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 1],␣
  ↪s=300, c='red')
plt.title('Customer Segmentation')
plt.xlabel('Annual Income (scaled)')
plt.ylabel('Spending Score (scaled)')
plt.show()
```



[13]:
```
# Viewing the cluster centers and their characteristics
cluster_centers = pd.DataFrame(kmeans.cluster_centers_, columns=['Annual Income␣
  ↪(scaled)', 'Spending Score (scaled)'])
print("Cluster Centers:")
print(cluster_centers)
```

```
Cluster Centers:
   Annual Income (scaled)  Spending Score (scaled)
0               -0.200913                -0.026456
1                1.055003                -1.284439
2               -1.307519                -1.136965
3               -1.329545                 1.132178
4                0.991583                 1.239503
```