assignment-5-slack

October 19, 2023

ASSIGNMENT_5

Understand the data

[ ]:

```
#Load libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.cluster import KMeans
from sklearn.cluster import MeanShift, estimate_bandwidth ,SpectralClustering
from sklearn.metrics import silhouette_score
from sklearn.mixture import GaussianMixture
```

[ ]:

```
#for loading data
df = pd.read_csv(r"C:/Users/sonudr/Downloads/archive/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.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
```

2.Data Preprocessing

```
[ ]: #for checking the statical summary of data frame
     df.describe()
```

```
[ ]:        CustomerID         Age  Annual Income (k$)  Spending Score (1-100)
     count  200.000000  200.000000          200.000000              200.000000
     mean   100.500000   38.850000           60.560000               50.200000
     std     57.879185   13.969007           26.264721               25.823522
     min      1.000000   18.000000           15.000000                1.000000
     25%     50.750000   28.750000           41.500000               34.750000
     50%    100.500000   36.000000           61.500000               50.000000
     75%    150.250000   49.000000           78.000000               73.000000
     max    200.000000   70.000000          137.000000               99.000000
```

```
[ ]: #for checking nul values
     df.isnull().sum()
```

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

```
[ ]: #for checking duplicate values
     df.duplicated().sum()
```

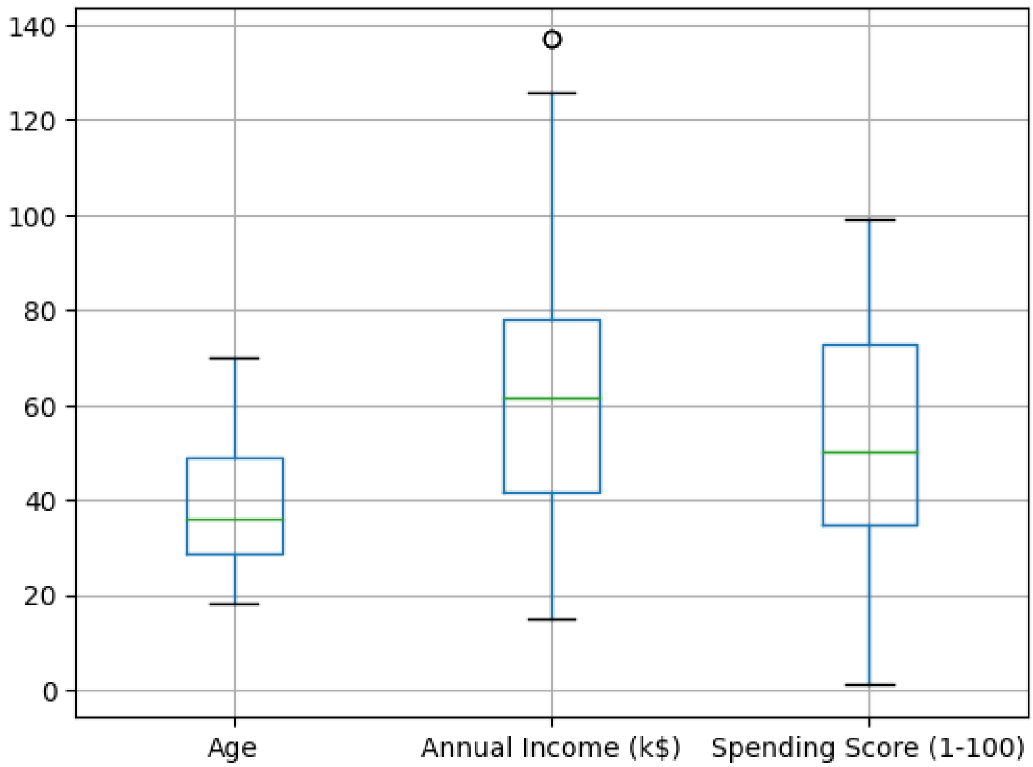
```
[ ]: 0
```

```
[ ]: #for checking unique values
     df.nunique()
```

```
[ ]: CustomerID                200
     Gender                      2
     Age                        51
     Annual Income (k$)         64
     Spending Score (1-100)     84
     dtype: int64
```

```
[ ]: column_to_drop = 'CustomerID'
     df.drop(column_to_drop, axis=1, inplace=True)
```

```
[ ]: df.boxplot()
     plt.show()
```



Model Building

[ ]:

```
X= df.iloc[:, [2,3]].values
```

[ ]:

```
wcss = []

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

```
c:\Python311\Lib\site-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(
c:\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning:
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value of `n_init` explicitly to suppress the warning
  warnings.warn(
```
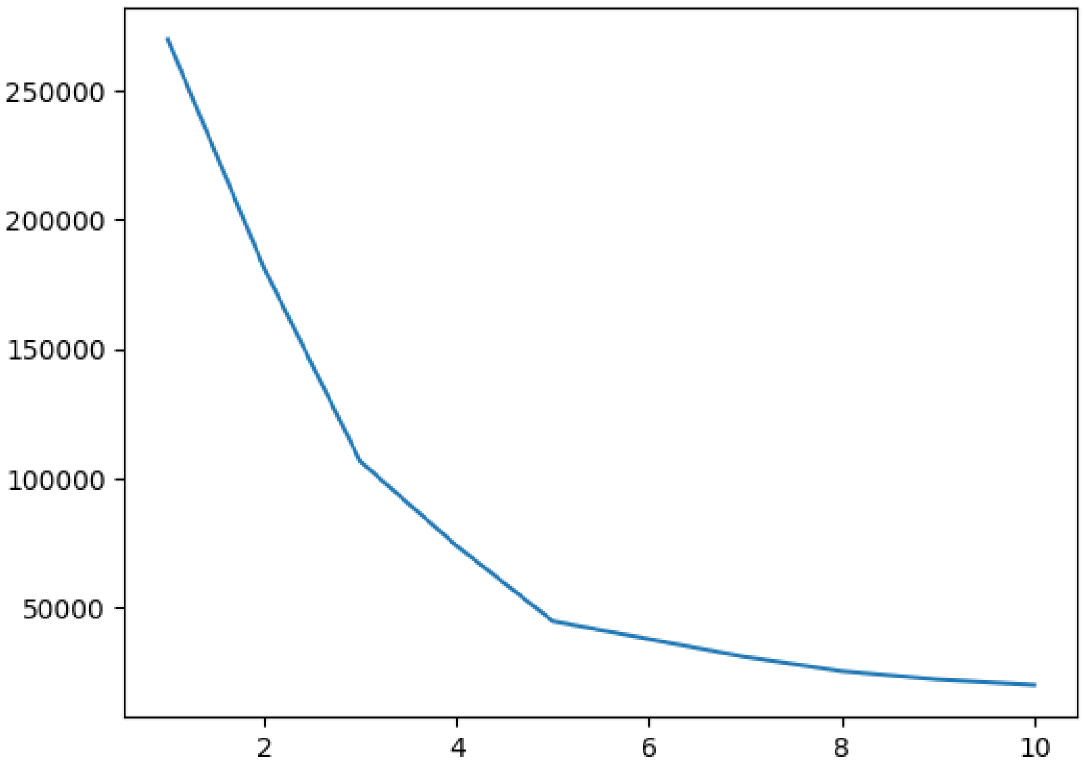

[ ]:

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

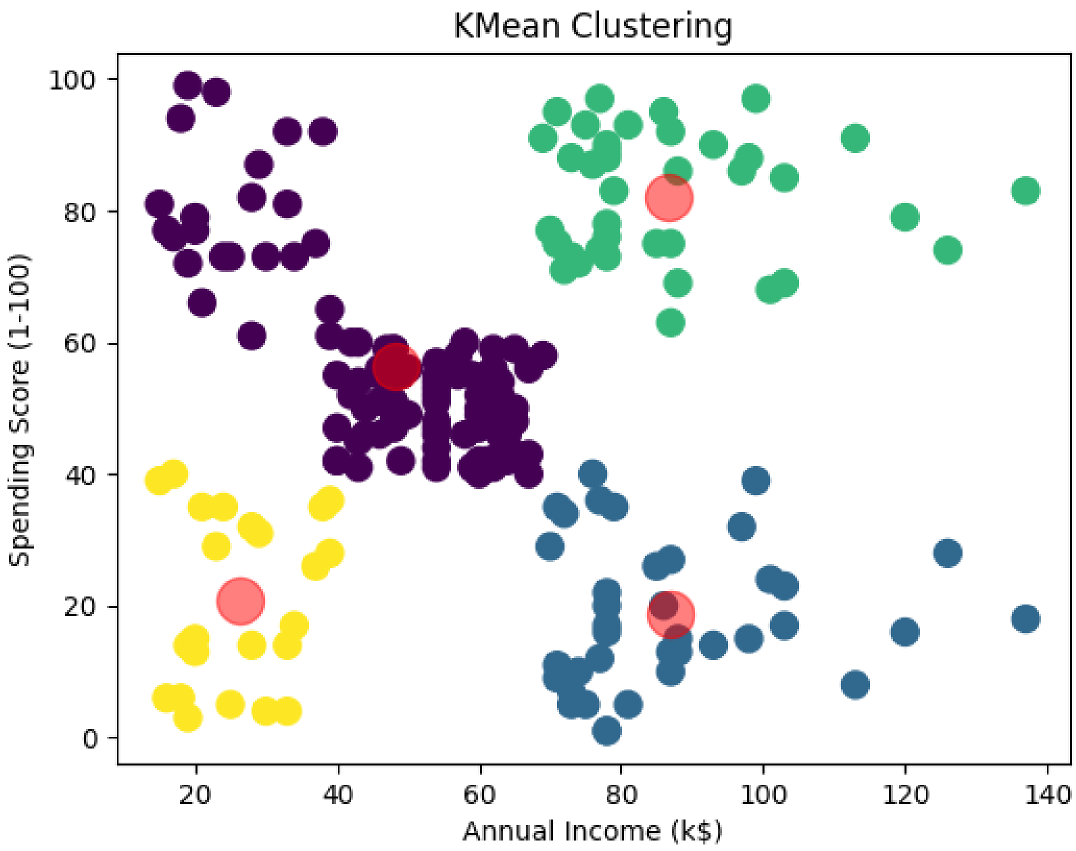


Machine Learning approach with clustering algorithm -K-Mean

```
[ ]: km = KMeans(n_clusters=4)
     y_means = km.fit_predict(X)
```

```
c:\Python311\Lib\site-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(
```

```
[ ]: labels_km4 = km.labels_

     # Get the cluster centroids
     centroids_km4 = km.cluster_centers_

     plt.scatter(x='Annual Income (k$)', y='Spending Score (1-100)', data=df,␣
      ↪c=labels_km4, s=100)
     plt.scatter(x=centroids_km4[:, 0], y=centroids_km4[:, 1], s=300, c='red',␣
      ↪alpha=0.5)
     plt.ylabel('Spending Score (1-100)')
     plt.xlabel('Annual Income (k$)')
     plt.title('KMean Clustering')
plt.show()
```



[ ]:

```
inertia_score = km.inertia_
print("inertia_score of 4 clucters:",inertia_score)
```

```
inertia_score of 4 clucters: 73679.78903948836
```

[ ]:

```
silhouette_km4 = silhouette_score(X, labels_km4)
print("Silhouette Score  of 4 clusters:", silhouette_km4)
```

```
Silhouette Score  of 4 clusters: 0.4931963109249047
```

[ ]:

```

```