[60]:
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
from sklearn.preprocessing import StandardScaler
import warnings
warnings.filterwarnings('ignore')
```

[61]:
```
df.head(4)
```

[61]:

	Age	Annual Income (k$)	Spending Score (1-100)
0	19	15	39
1	21	15	81
2	20	16	6
3	23	16	77

[62]:
```
# Load the dataset
df = pd.read_csv('mall_customers.csv')
df.drop(['CustomerID','Gender'],axis=1,inplace=True)
df.head(4)
```

[62]:

	Age	Annual Income (k$)	Spending Score (1-100)
0	19	15	39
1	21	15	81
2	20	16	6
3	23	16	77

[63]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 3 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
 0   Age                     200 non-null    int64
 1   Annual Income (k$)      200 non-null    int64
 2   Spending Score (1-100)  200 non-null    int64
dtypes: int64(3)
memory usage: 4.8 KB
```

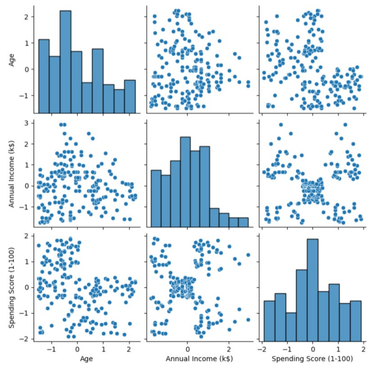
[64]:
```
# Scale the data
scaler = StandardScaler()
df_scaled = scaler.fit_transform(df)
# Convert the scaled data to a DataFrame
df1= pd.DataFrame(df_scaled,columns=df.columns)
df1
```

[64]:

	Age	Annual Income (k$)	Spending Score (1-100)
0	-1.424569	-1.738999	-0.434801
1	-1.281035	-1.738999	1.195704
2	-1.352802	-1.700830	-1.715913
3	-1.137502	-1.700830	1.040418
4	-0.563369	-1.662660	-0.395980
...	...	...	...
195	-0.276302	2.268791	1.118061
196	0.441365	2.497807	-0.861839
197	-0.491602	2.497807	0.923953
198	-0.491602	2.917671	-1.250054
199	-0.635135	2.917671	1.273347

200 rows × 3 columns

[65]:
```
sns.pairplot(data = df1)
plt.show()
```

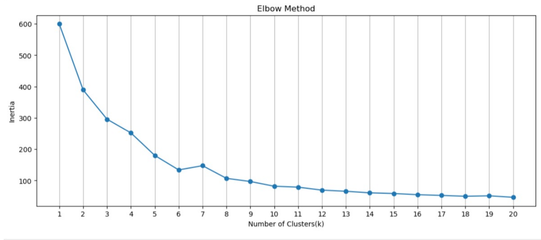


[66]:
```
# Perform K-means clustering for different values of k
k_values = range(1,21)  # Test 'k' from 1 to 20
intertias = []  # List to store the inertia values
```

[67]:
```
intertias = []
for k in k_values:
    kmeans = KMeans(n_clusters=k,init='k-means++')
    kmeans.fit(df1)
    intertias.append(kmeans.inertia_)
```

[78]:
```
# Plot the 'Elbow Curve'
plt.figure(figsize=(13,5))
plt.plot(k_values,intertias, marker='o')
plt.xlabel('Number of Clusters(k)')
plt.xticks(k_values)

plt.ylabel('Inertia')
plt.title('Elbow Method')
plt.grid(axis='x')
plt.show()
```



[75]:
```
# Create a KMeans model with 5 Clusters
kmeans = KMeans(n_clusters=5)
```

[70]:
```
# Fit the model to the data
kmeans.fit(df1)
```

[70]:
```
KMeans(n_clusters=5)
```

[71]:
```
# Predict the cluster labels for the data
y_pred = kmeans.predict(df1)
y_pred
```

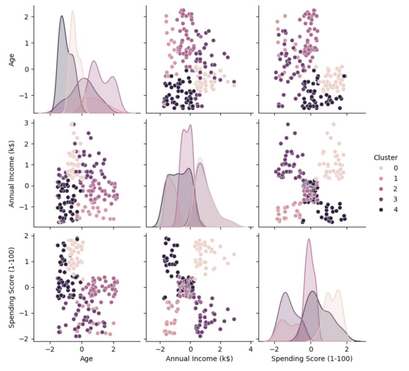
[71]:
```
array([4, 4, 1, 4, 4, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1,
       1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1,
       1, 4, 2, 4, 4, 4, 2, 4, 4, 2, 2, 2, 2, 2, 4, 2, 2, 4, 2, 2, 4,
       2, 2, 4, 4, 2, 2, 2, 2, 4, 2, 2, 4, 2, 2, 4, 4, 2, 2, 4, 2, 2,
       4, 2, 2, 4, 2, 2, 4, 4, 2, 4, 4, 4, 2, 2, 4, 4, 2, 2, 4, 2, 2,
       2, 4, 3, 4, 4, 4, 2, 2, 2, 2, 4, 3, 0, 0, 3, 0, 3, 0, 3, 0, 3,
       3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3,
       3, 0, 3, 0, 3, 0, 2, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3,
       3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3,
       3, 0])
```

[72]:
```
# Add the predicted cluster labels to the original dataset
df1['Cluster']= y_pred
df1.sample(5)
```

[72]:

	Age	Annual Income (k$)	Spending Score (1-100)	Cluster
77	0.082532	-0.250391	-0.085407	2
83	0.513132	-0.250391	-0.240694	2
36	0.226065	-1.013780	-1.288876	1
40	1.876699	-0.861102	-0.590088	2
150	0.297832	0.665675	-1.288876	3

[73]:
```
sns.pairplot(data = df1 , hue= 'Cluster')
plt.show()
```



CONCLUSION:-

Based on the K-Means clustering algorithm applied to the Mall Customers dataset,

Customer Segmentation:

The K-Means algorithm has successfully segmented the customers into 5 distinct clusters based on their annual income and spending score.

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[ ]:

[ ]: