CustomerSegmentationEDA_Report

December 6, 2023

Customer Segmentation Exploratory Data Analysis This dataset is of customers from supermarket mall and through membership cards, we have some basic data about customers like Customer ID, age, gender, annual income and spending score. Spending Score is something assigned to the customer based on some defined parameters like customer behavior and purchasing data, etc.

Dataset link: https://www.kaggle.com/datasets/kandij/mall-customers

[ ]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

[ ]:
```
ogdata = pd.read_csv("Mall_Customers.csv")
data = ogdata
```

[ ]:
```
data.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
```

[ ]:
```
data.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
```

[ ]:
```
data.shape
```

```
[ ]: (200, 5)
```

```
[ ]: data.size
```

```
[ ]: 1000
```

```
[ ]: data.isna().sum()
```

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

```
[ ]: 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   Genre                   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
```

```
[ ]: data = data.rename(columns={"Genre": "Gender", "Annual Income (k$)":␣
      ↪"Annual_Income", "Spending Score (1-100)": "Spending_Score"})
     data.head()
```

```
[ ]:    CustomerID  Gender  Age  Annual_Income  Spending_Score
     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
```

```
[ ]: data["Gender"].unique()
```

```
[ ]: array(['Male', 'Female'], dtype=object)
```

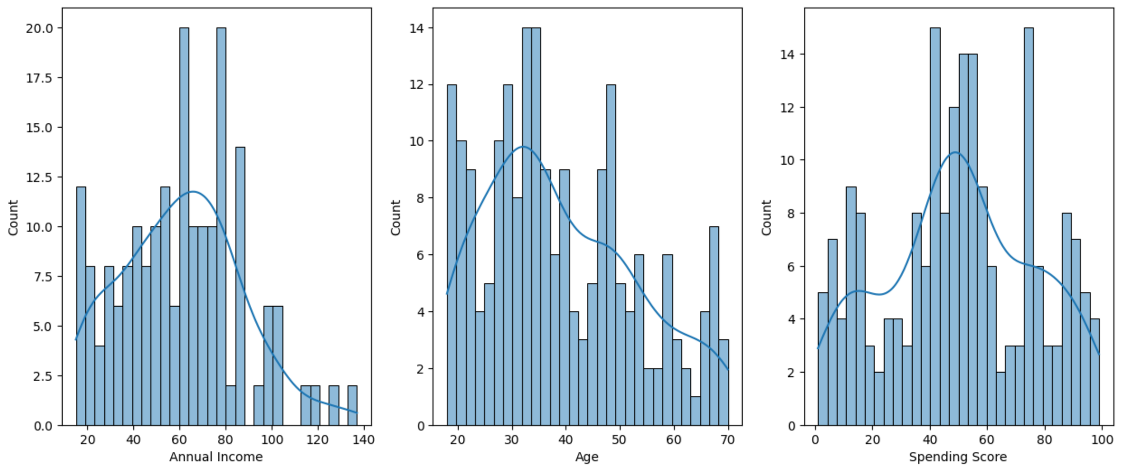
Gender is statistical data, so replacing Male with 1 and Female with 0

```
[ ]: data["Gender"] = data["Gender"].replace(["Male", "Female"], [1,0])
     data.head()
```

```
[ ]:    CustomerID  Gender  Age  Annual_Income  Spending_Score
     0           1       1   19             15              39
     1           2       1   21             15              81
     2           3       0   20             16               6
     3           4       0   23             16              77
     4           5       0   31             17              40
```

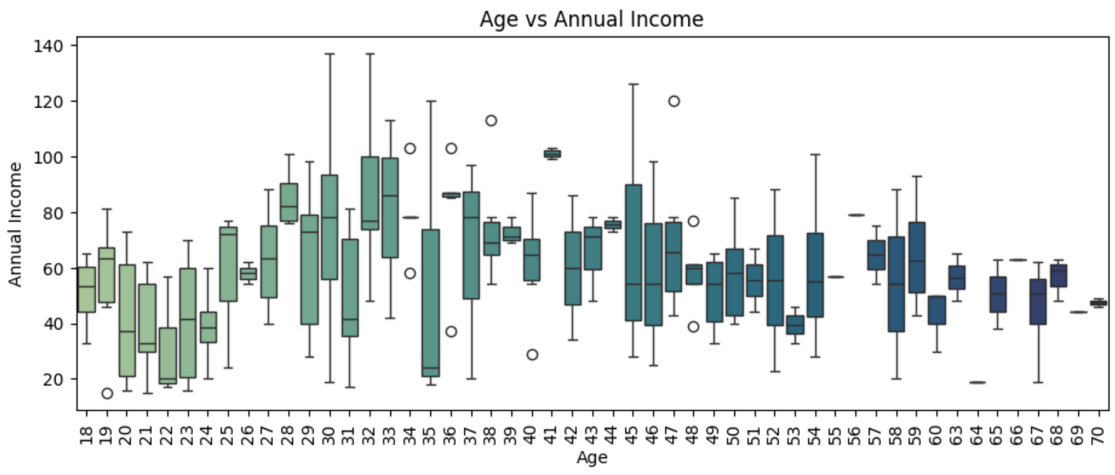
0.0.1 VISUALIZATION

```
[ ]: plt.figure(figsize=(15 , 6))
     plt.subplot(1,3,1)
     sns.histplot(data["Annual_Income"], bins=30, kde=True)
     plt.xlabel('Annual Income')
     plt.subplot(1,3,2)
     sns.histplot(data["Age"], bins=30, kde=True)
     plt.xlabel('Age')
     plt.subplot(1,3,3)
     sns.histplot(data["Spending_Score"], bins=30, kde=True)
     plt.xlabel('Spending Score')
     plt.show()
```



Here, from these histograms, we can observe that the values are distributed such that the vast majority of the values lay in the middle with some exceptions in the extremes.

```
[ ]: plt.figure(figsize=(11,4))
     plot = sns.boxplot(x="Age", hue="Age", y="Annual_Income", data=data,␣
      ↪palette="crest",legend=False)
     plt.setp(plot.get_xticklabels(), rotation=90)
     plt.title('Age vs Annual Income')
     plt.xlabel('Age')
     plt.ylabel('Annual Income')
plt.show()
```

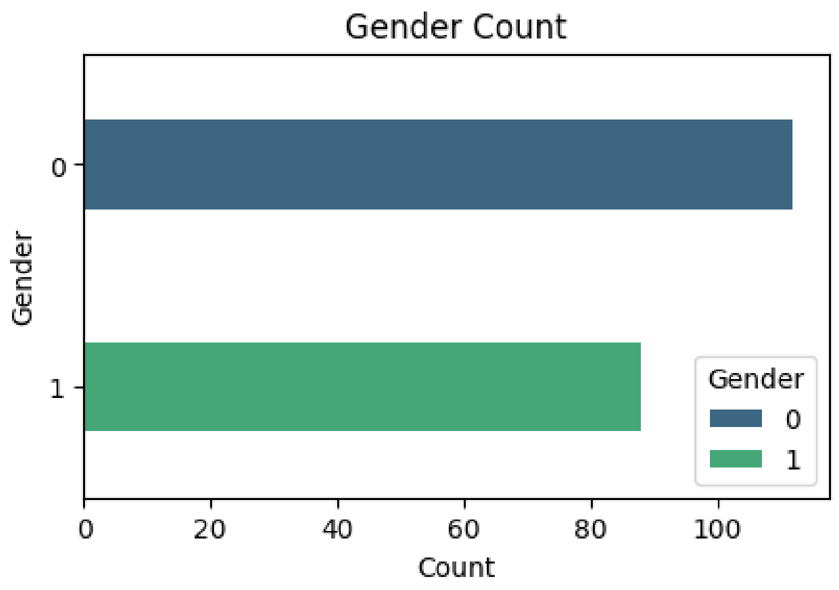


From this boxplot, we can identify the minimum, first quartile (25%), median (50%), third quartile (75%) as well as the maximum annual income for each age value.

[ ]:
```
data["Gender"].value_counts()
```

[ ]:
```
Gender
0    112
1     88
Name: count, dtype: int64
```

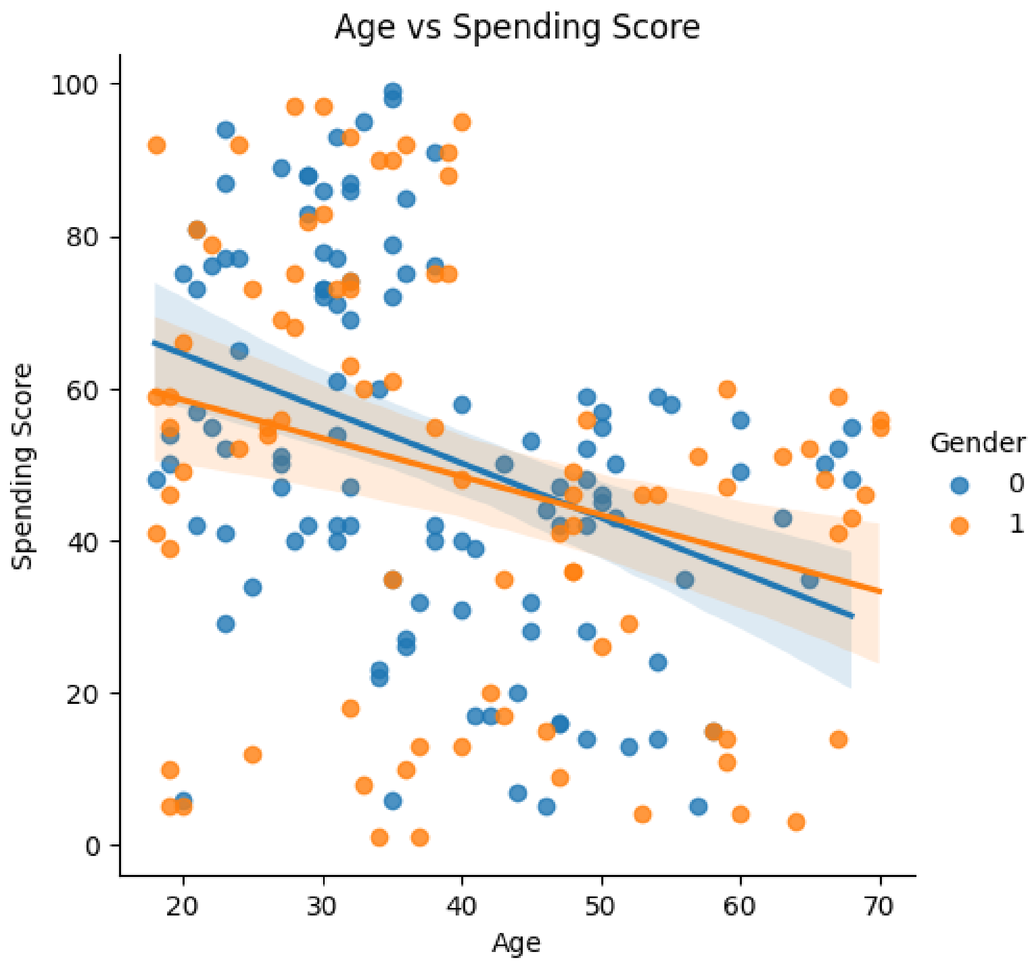
[ ]:
```
plt.figure(figsize=(5,3))
sns.countplot(y="Gender", data=data, palette="viridis", hue = "Gender", width=0.
 ↪4)
plt.title('Gender Count')
plt.xlabel('Count')
plt.ylabel('Gender')
plt.show()
```



From this countplot, we can conclude that number of females are more than male for the given data.

Age vs Spending Score

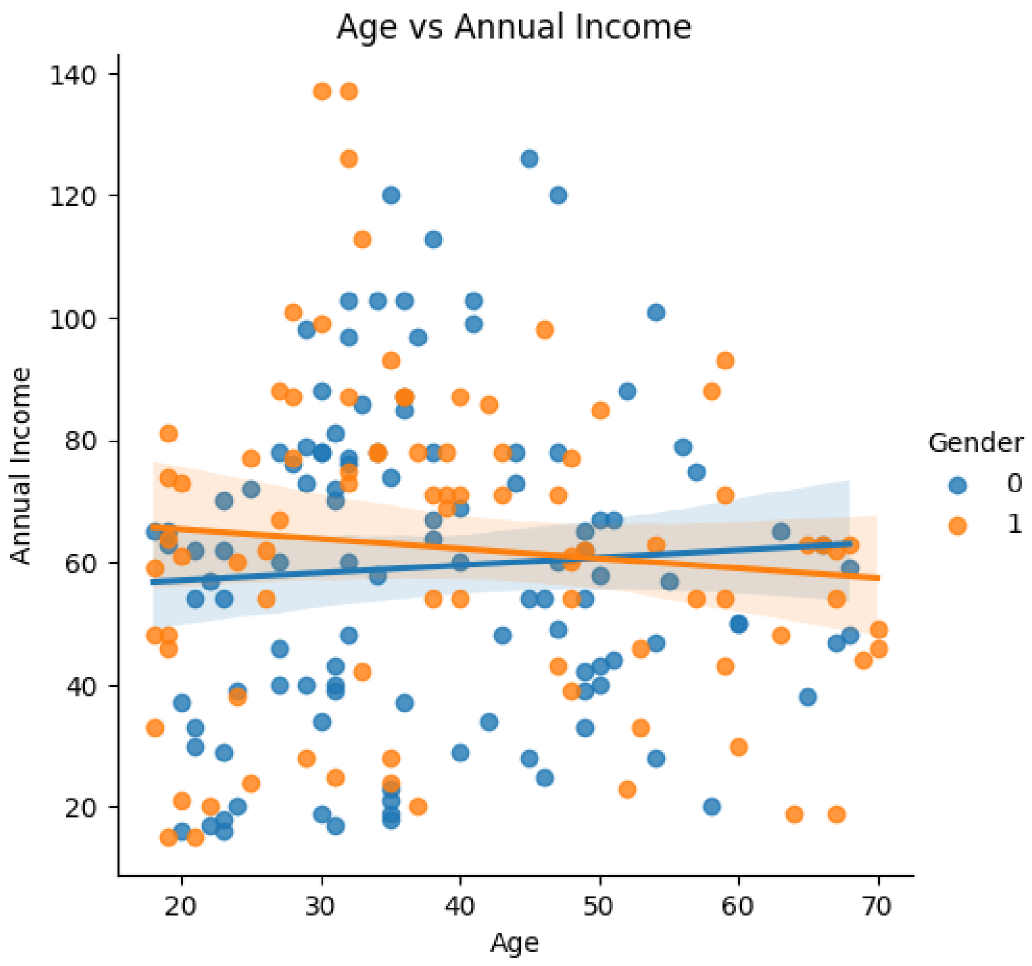
[ ]:
```
sns.lmplot(x = "Age", y = "Spending_Score", data = data, hue = "Gender")
plt.title('Age vs Spending Score')
plt.xlabel('Age')
plt.ylabel('Spending Score')
plt.show()
```



From this graph, we can observe that young people (specifically upto age 40) spend more than old people. This is also quite predictable trend.

Age vs Annual Income

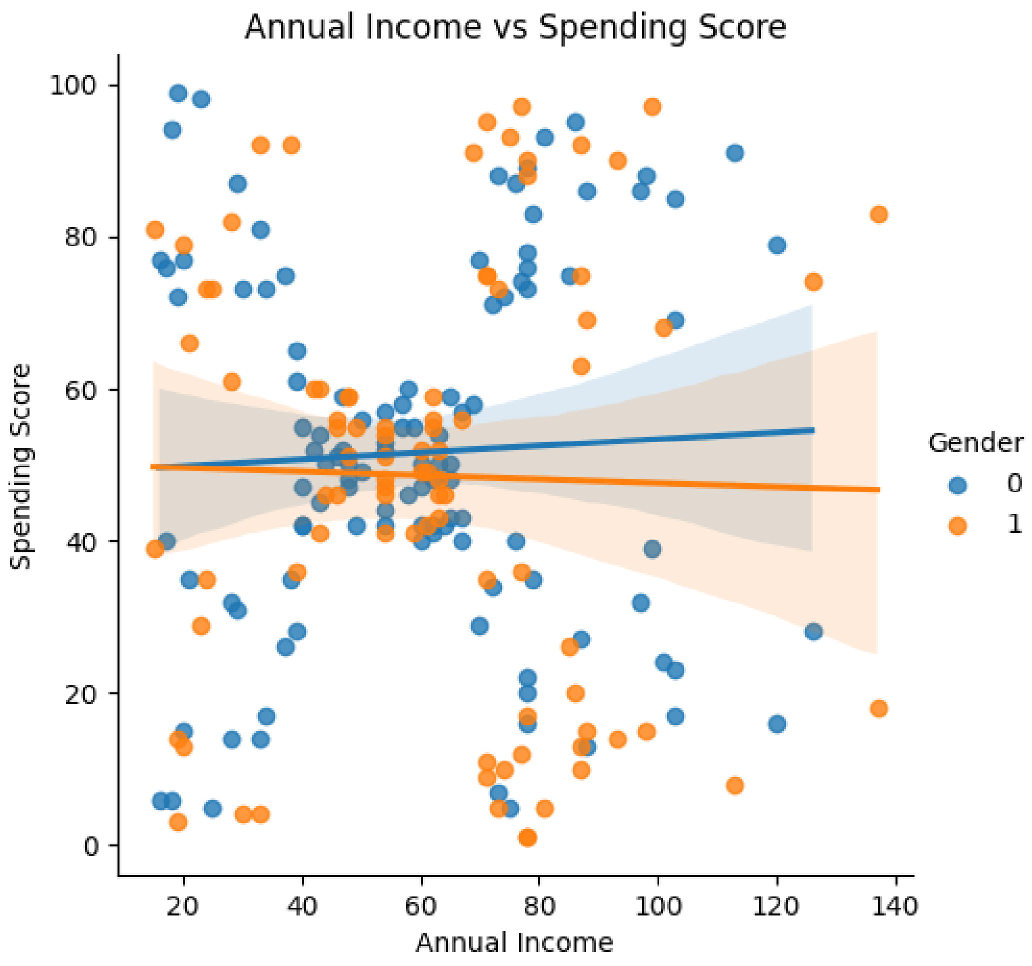
[ ]:
```
sns.lmplot(x = "Age", y = "Annual_Income", data = data, hue = "Gender")
plt.title('Age vs Annual Income')
plt.xlabel('Age')
plt.ylabel('Annual Income')
plt.show()
```



From this graph, we can observe that people in 30s, 40s and 50s have more annual income than other people. We can also see that Males comparatively have a high income than Female.

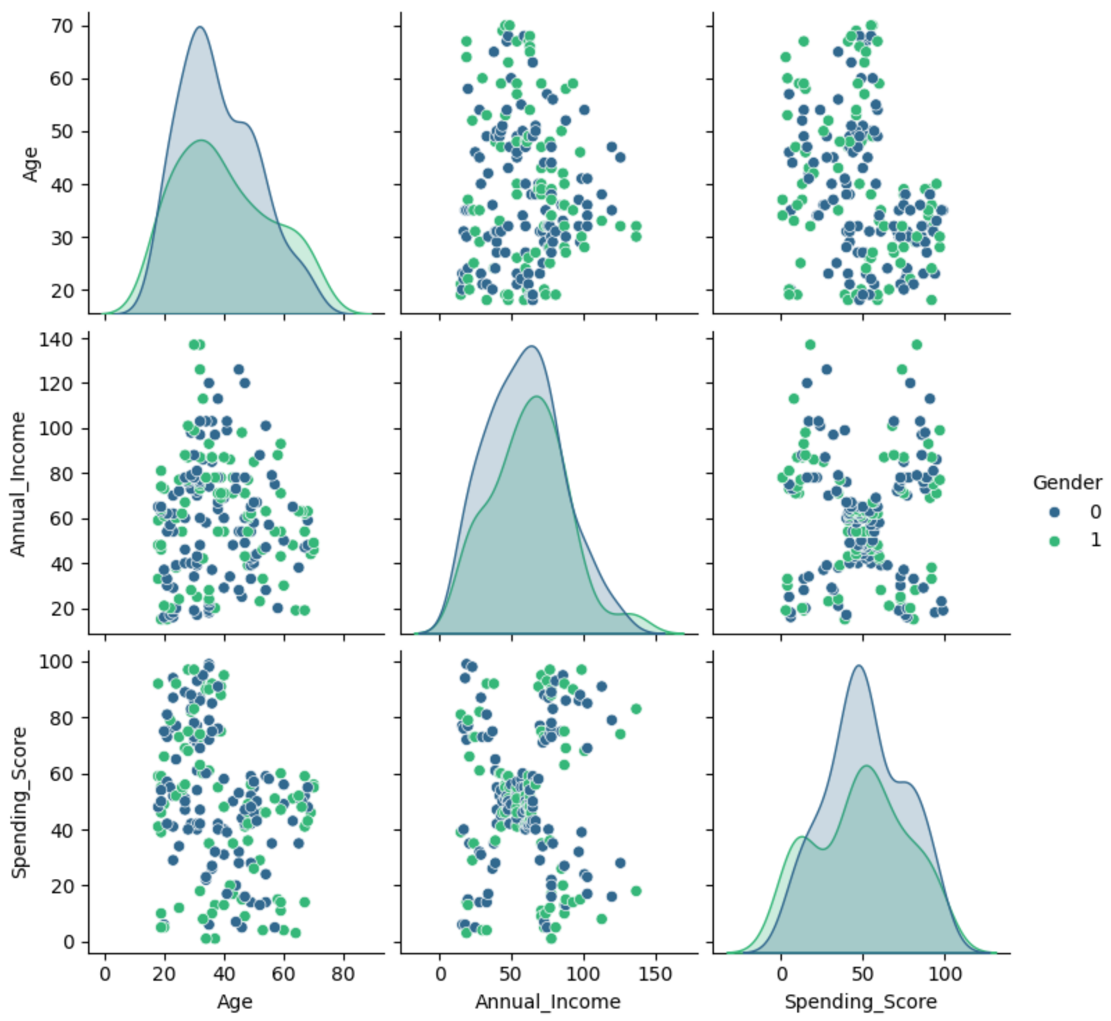
Annual Income vs Spending Score

```
[ ]: sns.lmplot(x = "Annual_Income", y = "Spending_Score", data = data, hue =␣
      ↪"Gender")
     plt.title('Annual Income vs Spending Score')
     plt.xlabel('Annual Income')
     plt.ylabel('Spending Score')
     plt.show()
```



From this graph, we can observe that people with either high income or lowest income tend to have high spending score, especially women. The vast majority lies in the middle, having decent income as well as decent spending capability.

```
[ ]: sns.pairplot(data, vars=["Age", "Annual_Income", "Spending_Score"],␣
       ↪kind="scatter", hue="Gender", palette="viridis")
     plt.show()
```



In this pairplot, we can observe the relation between different variables in our dataset, using gender as the parameter to segregate.

Thank you

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