CUSTOMER SEGMENTATION ANALYSIS FOR MALL MARKETING STRATEGY

Yahan Madhuhansa

1. Introduction

In this project, I analyze customer data from a mall to **segment shoppers into distinct groups** based on their **spending behavior, income, and demographics**. By applying **machine learning clustering techniques**, I identify key customer profiles that can help the mall optimize its **marketing strategies, promotions, and loyalty programs**.

2. Problem Definition

Malls struggle to **target the right customers** with personalized offers, leading to inefficient marketing spend. Traditional methods (like blanket discounts) often fail to engage high-value customers while missing opportunities with budget-conscious shoppers.

3. Objective

The goal is to **group mall customers into meaningful segments** using **K-Means Clustering**

4. Data Overview

The dataset contains **200 customers** with:

Feature	Description
CustomerID	Unique identifier for each customer.
Gender	Male or female.
Age	Age of the customer.
Annual Income (k$)	Yearly income in thousands of dollars.
Spending Score (1-100)	Mall-assigned score based on purchasing behavior (higher = spends more).

5. Step of Project

Check the data set
- Shape, data types
- Check missing values
- Check duplicate values

EDA
- Check outliers using boxplot
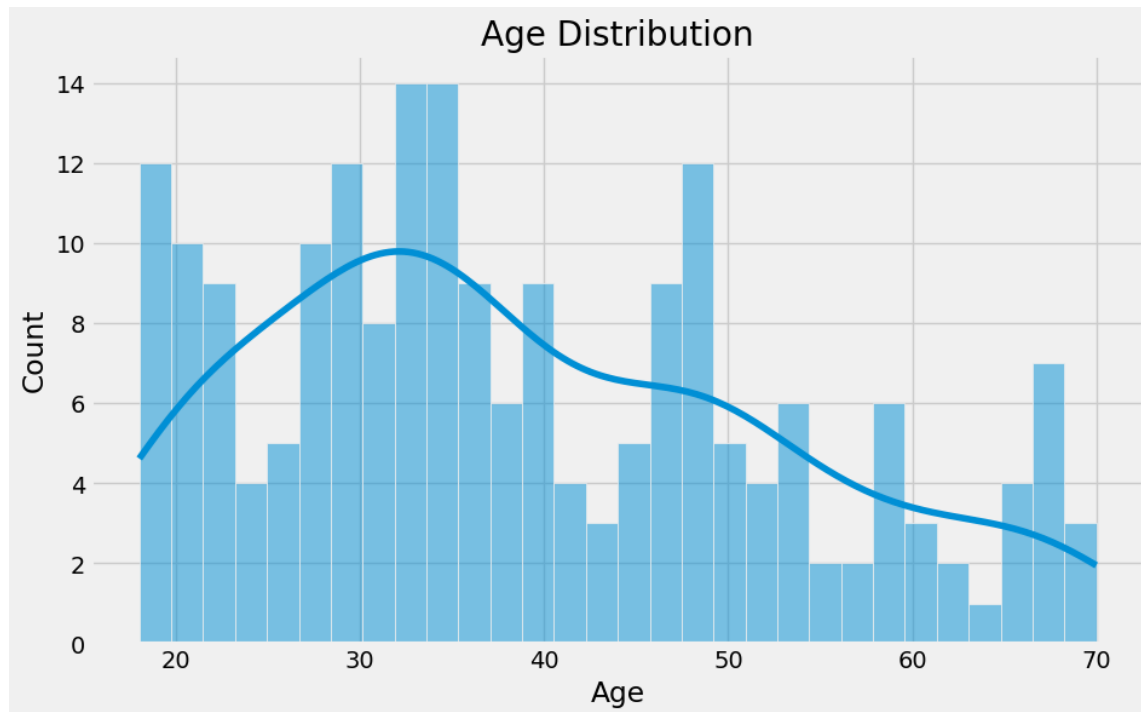- Visualize data to understand relations

Model Fitting
- Select Features for Clustering
- Find Optimal Number of Clusters (Elbow Method)
- Apply K-Means Clustering
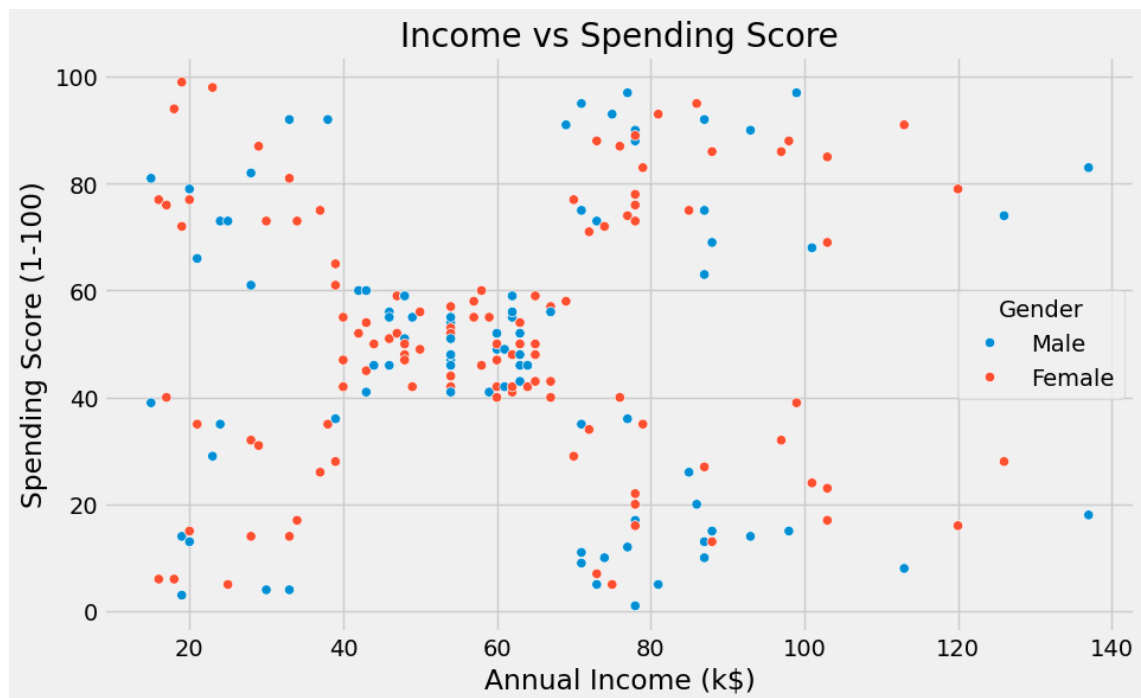- Interpret the Clusters

4. Results & Discussion

i. EDA Discussion

First thing I wanted to check was Age distribution to see any Is there any Specific age range to be consider.
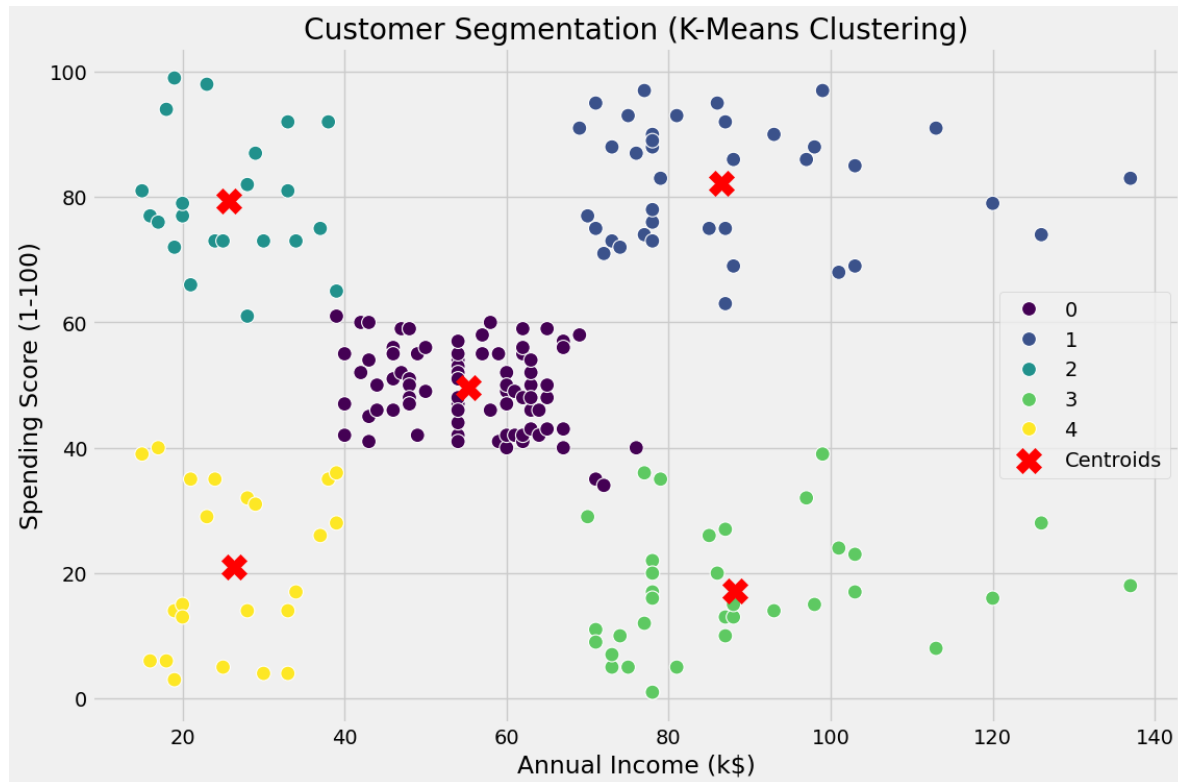

Age Distribution

After that I wanted to see the Income vs Spending distribution with the gender.

Income vs Spending Score
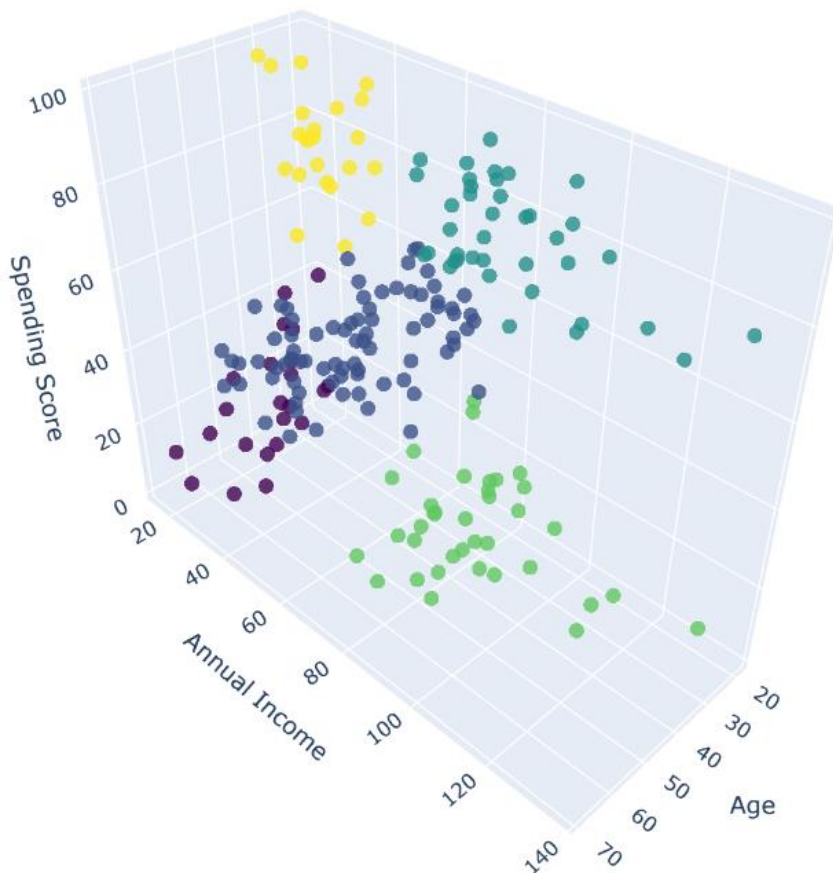
It seem like there is clear clusters of In the Income vs Spending distribution, and gender and age has no impact while clustering.

After kmeans clustering it show clear 5 clusters as I expected.

Also 3D visualize confirmed there is no relationship between Age and clusters

5. Clustering Results

Cluster	Income	Spending	Segment Profile
0	High	Low	Wealthy but cautious spenders
1	Medium	Medium	Balanced shoppers
2	High	High	Premium customers (VIP targets)
3	Low	High	Budget-conscious enthusiasts
4	Low	Low	Minimal engagement shoppers

6. Business Decisions from This Project

1. **Targeted Marketing Campaigns**:
   - Cluster 2 (High Income, High Spending): Offer exclusive luxury brand previews and VIP memberships
   - Cluster 3 (Low Income, High Spending): Create "value bundles" and payment plans
2. **Loyalty Program Optimization**:
   - Customize rewards based on cluster characteristics
   - Tiered membership levels matching cluster spending power
3. **Resource Allocation**:
   - Redirect marketing budget from Cluster 4 to Clusters 2 and 3
   - Develop specific retention strategies for Cluster 0 (high income but low spending)
4. **Promotional Strategy**:
   - Time-limited offers for Cluster 1 (medium spenders)
   - Personalized recommendations for Cluster 0

7. Conclusion

This analysis successfully segmented mall customers into five distinct groups using K-Means clustering, as visualized in the 2D and 3D plots. The key findings reveal:

1. Clear differentiation exists between customer groups based on income and spending patterns
2. Gender shows interesting correlations with spending behavior at different income levels
3. Age demonstrated minimal impact on spending clusters

These results align with findings from previous studies in retail customer segmentation, particularly the work by Kumar et al. (2018) on value-based customer classification in shopping malls.

References:
Data set: Mall Customer Segmentation Data