

Week 5 Report: Customer Segmentation Analysis

1. Project Goal:

The objective of this analysis was to use **Unsupervised Learning** to group mall customers into distinct segments based on their **Annual Income** and **Spending Score**. This allows for a data-driven marketing strategy rather than a "one-size-fits-all" approach.

2. Methodology:

- **Data Cleaning:** The dataset was checked for missing values and standardized using `StandardScaler` to ensure income and spending scores were on the same scale.
- **The Elbow Method:** I ran the K-Means algorithm for 1 to 10 clusters and identified that **5 clusters** provided the optimal balance between detail and simplicity.
- **PCA (Principal Component Analysis):** Since it is difficult to visualize high-dimensional data, I used PCA to reduce the features into two main components, allowing the clusters to be plotted clearly on a 2D map.

3. Customer Segment Traits:

Based on the clustering results, the customer base is divided into five groups:

- **The "Stars" (Cluster 1):** High income and high spending. These are the primary targets for luxury brand loyalty programs.
- **The "Careful" (Cluster 2):** High income but low spending. These customers may respond well to premium discounts or high-value investment offers.
- **The "Standard" (Cluster 3):** Average income and average spending. They form the consistent backbone of mall revenue.
- **The "Impulsive" (Cluster 4):** Low income but high spending. These are often younger shoppers who respond well to flash sales and social media trends.
- **The "Sensible" (Cluster 5):** Low income and low spending. These customers are highly price-sensitive and prioritize essential items and deep discounts.

4. Business Strategy Recommendations:

By identifying these clusters, the mall management can:

1. **Direct Marketing:** Send exclusive "VIP event" invites only to the "Stars" (Cluster 1).
2. **Conversion Campaigns:** Offer "limited-time vouchers" to the "Careful" group (Cluster 2) to encourage them to spend more.
3. **Budget Promotions:** Focus seasonal clearance sales on the "Sensible" group (Cluster 5) to move old inventory.