Customer Segmentation Analysis Report

Objective

The primary goal of this analysis is to segment customers based on their annual income and spending behavior. This segmentation provides actionable insights for targeted marketing and customer relationship management.

Data Overview

- **Dataset**: Mall_Customers.csv
- **Features**:
  - Gender
  - Age
  - Annual Income (k$)
  - Spending Score (1-100)
- **Rows**: 200

Methodology

1. Data Preprocessing
- **Handling Missing Values**:
  No missing values were detected in the dataset.
- **Feature Selection**:
  Selected `Annual Income (k$)` and `Spending Score (1-100)` for clustering analysis.
- **Scaling**:
  Standardized the selected features using `StandardScaler` for uniform scaling.

2. Exploratory Data Analysis (EDA)
- **Gender Distribution**:

The dataset has a balanced distribution of male and female customers.

- **Spending Behavior**:

  Spending patterns vary significantly with income levels, as visualized in the demographic distribution.

3. Clustering Analysis

- **Clustering Technique**:

  Applied K-Means clustering with 3 clusters based on the Elbow Method.

- **Cluster Characteristics**:

  - **Cluster 0**: High income, moderate spending.

  - **Cluster 1**: Low income, high spending.

  - **Cluster 2**: Moderate income, moderate spending.

- **Centroids**:

  Centroids represent the average values of annual income and spending score for each cluster.

Visualizations

1. **Cluster Distribution**:

   ![Cluster Distribution](../visuals/cluster_distribution.png)

   Shows the spread of customers across the three clusters based on their income and spending.

2. **Demographic Distribution**:

   ![Demographic Distribution](../visuals/demographic_distribution.png)

   Highlights the gender distribution within the dataset.

3. **Cluster Centroids**:

   ![Cluster Centroids](../visuals/cluster_centroids.png)

Depicts the central points for each cluster.

Insights and Recommendations

Key Insights:

1. Customers in **Cluster 0** are likely to benefit from premium product promotions.

2. Customers in **Cluster 1** are price-sensitive and respond well to discounts and offers.

3. Customers in **Cluster 2** may require personalized marketing strategies to increase spending.

Recommendations:

- **Targeted Campaigns**:

  Develop separate marketing strategies for each customer segment.

- **Loyalty Programs**:

  Implement reward systems to increase engagement for moderate spenders.

- **Promotions**:

  Focus discounts and deals on high-spending but low-income customers.

Tools and Technologies

- **Python**:

  Libraries: Pandas, Matplotlib, Seaborn, Scikit-learn

- **Power BI**:

  Interactive dashboard for deeper insights

Conclusion

The analysis successfully segmented customers into three distinct groups, providing actionable insights for strategic decision-making. The findings can significantly enhance marketing effectiveness and customer satisfaction.

Next Steps

1. Integrate customer segmentation into business operations.

2. Continuously update the model with new customer data.

3. Explore advanced clustering techniques for further refinement.