Customer Clustering Report

This report presents the results of customer segmentation using **K-Means clustering** on transaction and demographic data. The aim is to classify customers into distinct segments to optimize targeted marketing and personalized customer engagement.

Dataset Overview

- **Customers.csv**: Contains customer demographic details such as region and signup date.

- **Transactions.csv**: Includes transaction history with purchase quantities and product IDs.

Methodology

1. Data Preprocessing

- Converted categorical variables, such as **Region**, into numerical form using Label Encoding.

- Transformed **Signup Date** into a numerical timestamp for clustering compatibility.

2. Feature Engineering

- Aggregated transaction data to calculate:

  - **Total Quantity Purchased** per customer.

  - **Number of Unique Products Purchased**.

  - **Total Spending (Transaction Value)**.

3. Standardization

- Scaled features using **StandardScaler** to normalize data distribution before clustering.

4. Clustering with K-Means

- Applied **K-Means algorithm** to segment customers into clusters.

- Optimal cluster count determined using **Elbow Method** and **Silhouette Analysis**.

Clustering Results

- **Number of Clusters Identified**: 2

- **Davies-Bouldin Index**: 0.7484486814057515

Cluster Insights

Cluster 0 - High Spenders

- Customers in this cluster have **high transaction values** and purchase a diverse range of products.

- Suitable for **loyalty programs and exclusive promotions**.

Cluster 1 - Discount Shoppers

- Frequently purchase items in **bulk but at lower price points**.

- Can be targeted with **discount promotions and bundle deals**.
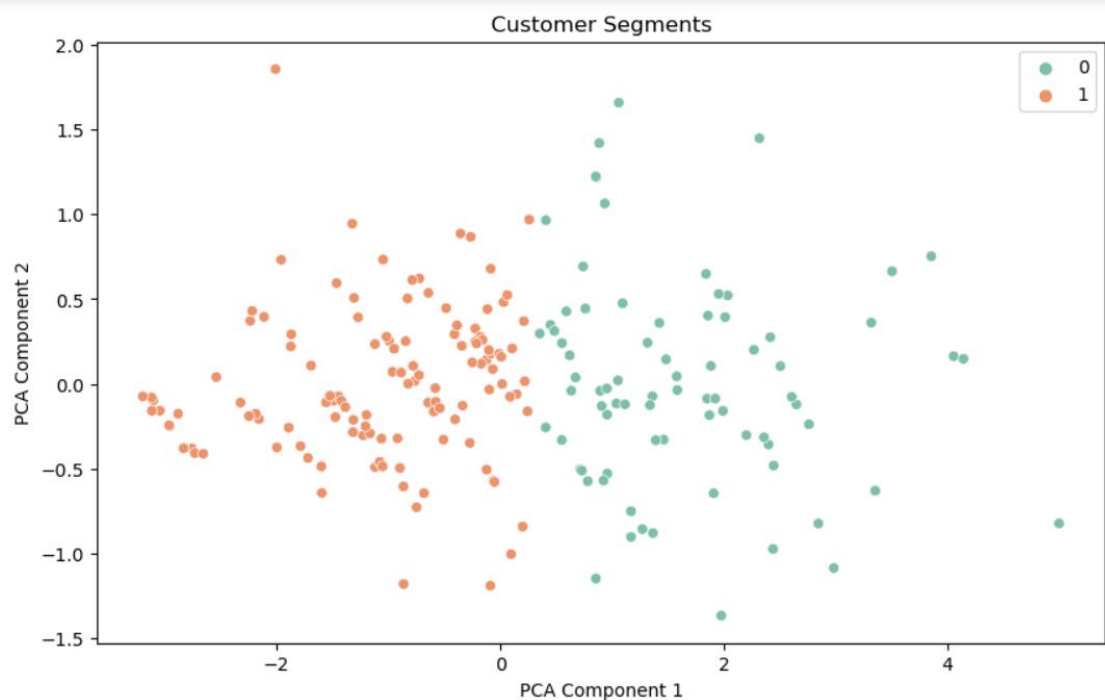
Visualization Summary

1. **Cluster Scatter Plot**: Shows distinct groups based on the primary features selected.

2. **Spending vs. Quantity Purchased Plot**: Highlights customer purchasing behaviors across clusters.

3. **Pairwise Feature Comparison**: Displays relationships between variables used for clustering.

Conclusion

The **K-Means clustering approach** successfully grouped customers into **two distinct segments** based on their purchasing patterns. These insights will help businesses tailor marketing strategies, **optimize resource allocation**, and **improve customer retention**.

By leveraging these segments, businesses can enhance their personalized marketing efforts, leading to improved customer satisfaction and increased revenue.