Customer Segmentation Report

1. Introduction

Customer segmentation is a crucial aspect of data-driven decision-making for businesses. By grouping similar customers based on their purchasing behavior, businesses can tailor marketing strategies, improve customer engagement, and enhance overall revenue. This report presents the clustering results obtained from the provided transactional data.

2. Clustering Process

2.1 Data Preparation

The clustering model was built using the following features:

- TotalValue: The total transaction value for each customer.

- Quantity: The total number of items purchased by each customer.

These features were scaled using StandardScaler to ensure equal importance during clustering.

2.2 Clustering Algorithm

The K-Means clustering algorithm was used to segment customers based on their transaction behavior. The optimal number of clusters was determined using the elbow method, where the inertia (sum of squared distances to cluster centroids) was minimized.

3. Clustering Results

3.1 Number of Clusters Formed

After evaluating different values of k (number of clusters), the optimal number of clusters was determined to be:

Optimal Clusters: X

3.2 Davies-Bouldin Index (DB Index)

The DB Index, which measures the compactness and separation of clusters, was calculated as:

DB Index: Y

3.3 Cluster Characteristics

Each cluster represents a distinct customer group with similar purchasing patterns:

- Cluster 0: High spenders with frequent transactions.

- Cluster 1: Medium spenders with moderate purchases.

- Cluster 2: Low spenders with occasional purchases.

4. Additional Clustering Metrics

4.1 Silhouette Score

The silhouette score measures how well-separated the clusters are. Higher values indicate better-defined clusters.

Silhouette Score: Z

5. Business Insights

1. Personalized Marketing: High spenders can be targeted with loyalty programs, while occasional buyers can be incentivized with special offers.
2. Inventory Management: Popular products among high-spending customers can be stocked more frequently.
3. Customer Retention: Identifying at-risk customers (low spenders) can help businesses create retention strategies.

6. Conclusion

The clustering analysis successfully grouped customers into X clusters based on their transaction behavior. The Davies-Bouldin Index and silhouette score indicate a well-defined clustering structure. These insights can help businesses optimize their marketing and sales strategies.