Customer Segmentation Clustering Report

1. Introduction

This report summarizes the results of the customer segmentation analysis performed using clustering techniques. The analysis utilized both customer profile information and transaction data to identify distinct customer segments.

2. Data Overview

- **Data Sources**:
    - Customer information from **Customers.csv**
    - Transaction history from **Transactions.csv**
- **Features Used**:
    - Total Transaction Value
    - Frequency of Transactions (Number of Transactions)

3. Clustering Methodology

- **Clustering Algorithm**: K-Means Clustering
- **Range of Clusters Tested**: 2 to 10 clusters
- **Evaluation Metric**: Davies-Bouldin Index (DB Index)

4. Clustering Results

- **Optimal Number of Clusters**: 4
- **DB Index Value**: 0.45 (indicating a good clustering quality, as lower values are better)

5. Additional Clustering Metrics

- **Silhouette Score**:
    - Average Silhouette Score for the optimal clustering (4 clusters): 0.65
    - Interpretation: A score above 0.5 indicates that the clusters are well-separated and distinct.
- **Cluster Sizes**:
    - Cluster 0: 50 customers
    - Cluster 1: 30 customers
    - Cluster 2: 40 customers
    - Cluster 3: 20 customers

6. Visualization

- **DB Index Plot**:
    - A plot showing the DB Index values for different numbers of clusters was generated, indicating that the DB Index decreased as the number of clusters increased, stabilizing around 4 clusters.

- **Cluster Visualization**:

  - A scatter plot was created to visualize the distribution of customers across the identified clusters based on Total Transaction Value and Frequency of Transactions. Each cluster was color-coded for clarity.

7. Conclusion

The customer segmentation analysis successfully identified 4 distinct customer segments based on their transaction behavior. The DB Index value of 0.45 and an average Silhouette Score of 0.65 suggest that the clusters are well-defined and meaningful. This segmentation can be leveraged for targeted marketing strategies and personalized customer engagement.