Customer Segmentation Report

1. Introduction

Customer segmentation helps in identifying distinct customer groups based on purchasing behavior and transaction history. Using clustering techniques, we can categorize customers into meaningful segments to enhance marketing and sales strategies.

2. Data Overview

- **Customers.csv**: Contains customer profile details.
- **Transactions.csv**: Contains transaction history.

Preprocessing Steps

- Merged both datasets on CustomerID.
- Engineered key features:
    - **TotalSpent**: Sum of transaction amounts per customer.
    - **PurchaseFreq**: Total number of transactions per customer.
- Standardized numerical features for better clustering results.

3. Clustering Methodology

- **Algorithm Used**: K-Means Clustering.
- **Cluster Selection**: Elbow Method determined the optimal cluster count.
- **Final Number of Clusters**: 4

Clustering Evaluation Metrics

- **Davies-Bouldin Index (DB Index)**: Lower values indicate well-separated clusters.
- **Silhouette Score**: Measures cluster cohesion.

4. Cluster Insights

Cluster 0: High spenders, frequent buyers → **Loyal Customers**

Cluster 1: Moderate spending, mid-level purchase frequency → **Potential Upsell Targets**

Cluster 2: Low spenders but frequent transactions → **Price-Sensitive Customers**

Cluster 3: Occasional buyers with low spending → **Inactive/Churn-Prone Customers**

6. Visualizations

- **Elbow Method Plot**: Confirms optimal cluster count.
- **PCA Scatter Plot**: Illustrates segmented customer groups.

7. Conclusion

The customer base was successfully segmented into four meaningful clusters. The segmentation was validated using the Davies-Bouldin Index and Silhouette Score, ensuring robust clustering. These insights can help tailor marketing strategies for improved customer engagement and business growth.