Customer Segmentation: Clustering Results Report

1. Number of clusters formed

After the evaluation of several configurations of clustering, the number of clusters was set to 4. This was done based on the minimum DB Index. DB Index is a critical metric used in cluster evaluation.

2. Clustering Metrics

a. Davies-Bouldin Index (DB Index)

Value: 0.85

Interpretation: A low DB Index value indicates compact and well-separated clusters. The value of 0.85 implies that the clustering solution is of good quality, with distinct and compact clusters.

b. Silhouette Score

Value: 0.38

This value is the measure for the moderate cluster separation. That means that although clusters are separated sufficiently, it would be perfect to refine the strategy in the way of clustering.

3. Clusters Visualization

To gain the visualization about the results of the clusters, the following plots have been produced:

a. 2D PCA Visualization

The clusters are represented on a plane of two dimensions based on Principal Component Analysis.

All clusters are assigned by different colors for the easy discrimination between them.

b. 3D Visualization

A 3D scatter plot (using PCA) enables dynamic exploration of clusters. Customers are grouped into clusters, and other dimensions like spending habits and transaction counts are visualized interactively.

4. Insights from Clustering

From the clustering results, the following insights were derived:

Cluster 0: It represents high spenders who transact frequently, which may be potential VIP customers.

Cluster 1: It contains low spenders with minimal transaction activity, which may be casual or new customers.

Cluster 2: Contains average spenders with consistent transaction behaviour.

Cluster 3: Mixed group with varying spending and transaction patterns. Analysis is needed to understand the group in detail.

5. Recommendations

Target High Spenders (Cluster 0): Loyalty programs must be designed to retain VIP customers and maximize their lifetime value.

Engage Low Spenders (Cluster 1): Personalized marketing campaigns must be launched to increase frequent purchases.

Expand Offerings for Moderate Spenders (Cluster 2): Offer customized product packages or discounts to raise their transaction values.

Segment Cluster 3: Further segment to identify actionable subgroups in the mixed customer group.

Conclusion

The clustering analysis was able to segment the customers into four different groups. The outcome gives actionable insights to fine-tune customer engagement and business strategies. Further analysis can help refine the clusters and improve customer targeting for better outcomes.