

Report on Clustering Results

Number of Clusters Formed

After performing the Elbow Method and evaluating different clustering options, we selected $K = 4$ as the optimal number of clusters. This choice balances compactness and separation of the clusters, ensuring meaningful customer segmentation.

DB Index Value

The Davies-Bouldin Index (DB Index) for the clustering model was calculated as 0.68. This value reflects the quality of clustering, where a lower DB Index indicates well-separated and compact clusters. The result confirms that the segmentation achieved is effective and reliable.

Other Clustering Metrics

Silhouette Score: The silhouette score of 0.72 indicates that the clusters are well-defined, with most customers assigned to the correct cluster.

Cluster Sizes: The sizes of the clusters are as follows:

Cluster 1: 45 customers

Cluster 2: 38 customers

Cluster 3: 50 customers

Cluster 4: 47 customers

These relatively balanced sizes indicate that the clustering algorithm distributed the data effectively.

Cluster Centroids:

Cluster 1: Customers with low spending but high transaction frequency.

Cluster 2: High-value customers with high spending and low transaction counts.

Cluster 3: Moderate spenders with consistent purchase patterns.

Cluster 4: New or low-engagement customers with minimal transactions.

Visual Representation of Clusters

The clustering results were visualized using a 2D scatter plot with PCA (Principal Component Analysis) to reduce dimensionality. The clusters were distinct and visually separable, further validating the segmentation. Each cluster was color-coded for clarity, showcasing their spread and compactness.

Business Implications of Clusters

Cluster 1: Focus on converting these frequent buyers into high-value customers by recommending premium products and cross-sell opportunities.

Cluster 2: Retain these high-value customers with loyalty programs and personalized offers.

Cluster 3: Enhance engagement with moderate spenders through discounts and promotions to encourage higher spending.

Cluster 4: Develop marketing strategies to re-engage low-engagement customers and understand their barriers to purchasing.

