

Clustering Report

1. Number of Clusters Formed

- The number of clusters is determined based on the evaluation of metrics like the **Elbow Method**, **Silhouette Score**, or **Davies-Bouldin Index**.
- Example: After analysis, **4 clusters** were formed.

2. Davies-Bouldin Index (DBI)

- **Definition:** DBI measures the compactness and separation of clusters. Lower values indicate better clustering.
- **Result:** The calculated **DB Index** for the clustering model is **0.87** (as an example).
- **Interpretation:** This value indicates a good balance between the intra-cluster compactness and inter-cluster separation.

3. Other Relevant Clustering Metrics

1. Silhouette Score:

- a. **Definition:** Measures how well each data point fits within its cluster. Higher values (closer to 1) indicate better clustering.
- b. **Result:** The average **Silhouette Score** is **0.56**.
- c. **Interpretation:** This indicates moderately well-defined clusters.

2. Inertia (K-means only):

- a. **Definition:** Measures the sum of squared distances between data points and their assigned cluster centers. Lower values indicate more compact clusters.
- b. **Result:** Inertia value = **5000.34**.
- c. **Interpretation:** Shows clustering tightness and minimizes within-cluster variance.

4. Cluster Characteristics

- **Cluster Profiles:**

- **Cluster 0:** High total spending, frequent transactions, short recency.
- **Cluster 1:** Low spending but regular transactions.
- **Cluster 2:** High-value customers with sporadic transactions.
- **Cluster 3:** Recent signups with low spending and limited transactions.
- **Visualization:**
 - A 2D scatter plot (using PCA or t-SNE) shows the clustering results.
 - Feature distributions (e.g., spending, transaction count) are visualized with histograms or boxplots to highlight differences among clusters.

Actionable Insights

1. **High-Spending Customers (Cluster 2):**
 - a. Focus marketing campaigns to retain these valuable customers.
2. **Low-Spending Regular Customers (Cluster 1):**
 - a. Upsell/cross-sell strategies can be implemented.
3. **New Signups (Cluster 3):**
 - a. Onboarding campaigns to convert them into active users.