

Task-3 Customer Segmentation / Clustering

Customer Clustering Report

1. Number of Clusters Formed

After evaluating different cluster numbers (from 2 to 10) using the KMeans clustering algorithm, the optimal number of clusters was determined to be **10**, based on the Davies-Bouldin Index.

2. Davies-Bouldin Index Value

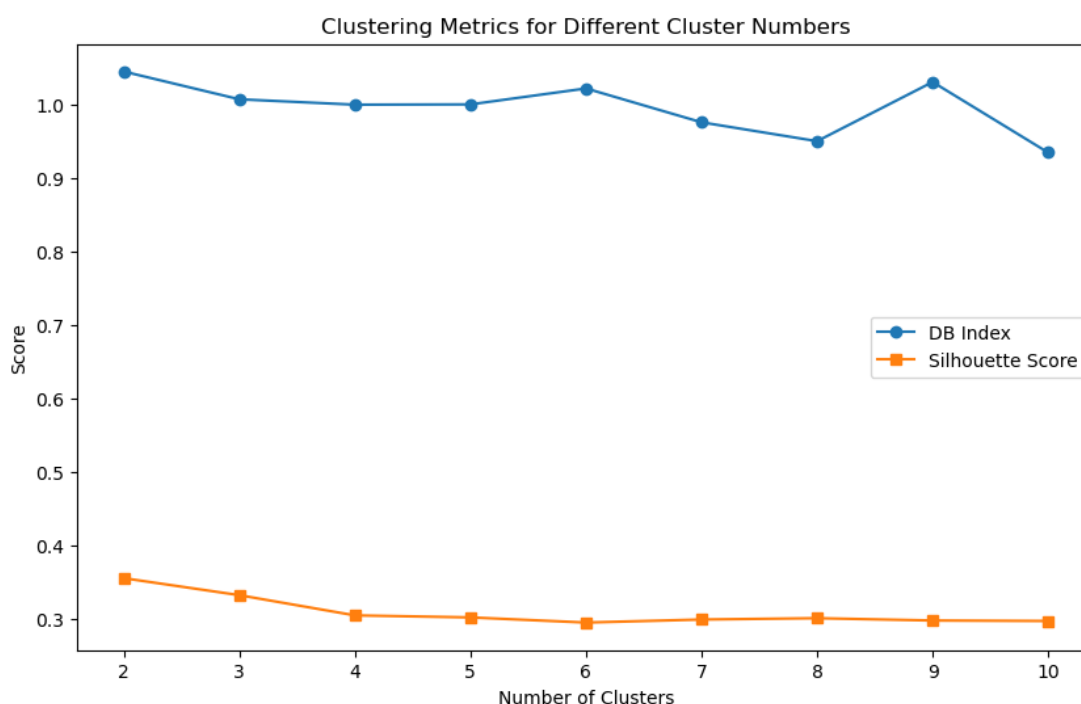
The DB Index for the chosen number of clusters 10 is **0.93**. A lower DB Index indicates better-defined clusters with lower intra-cluster distances and higher inter-cluster distances.

DB Index for Different Cluster Numbers:

The table below summarizes the DB Index values for each cluster number:

Number of clusters	DB index	Optimal
2	1.044924	False
3	1.007184	False
4	0.999873	False
5	1.000248	False
6	1.021944	False
7	0.975880	False
8	0.950217	False
9	1.030702	False
10	0.934729	True

A plot of DB Index values against the number of clusters is shown below:



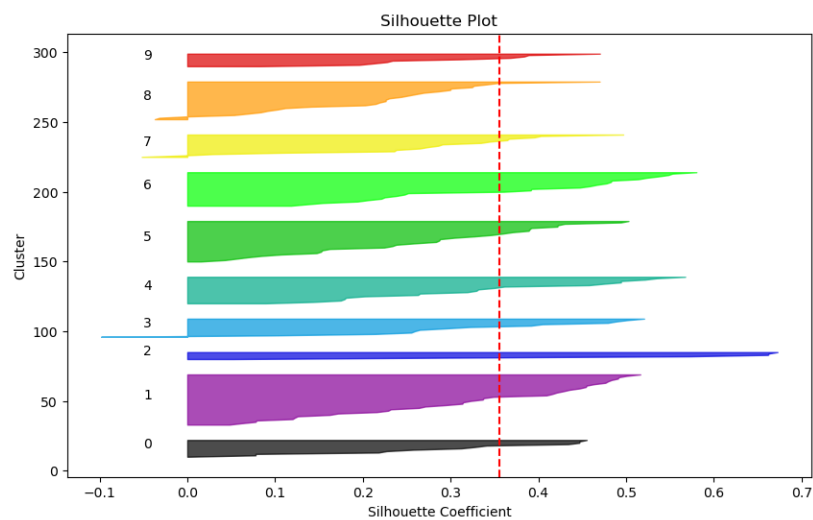
3. Other Relevant Clustering Metrics

Silhouette Score

The silhouette score for the chosen number of clusters is **0.36**. This score measures how well-separated the clusters are, with higher values indicating better-defined clusters.

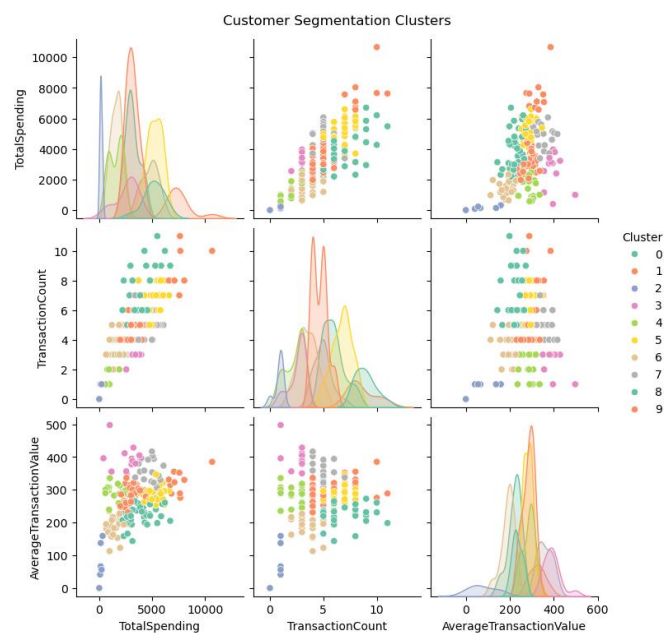
Silhouette Plot

The silhouette plot below provides a visual representation of how well-separated the clusters are. The height of each bar corresponds to the silhouette score for individual data points within each cluster:

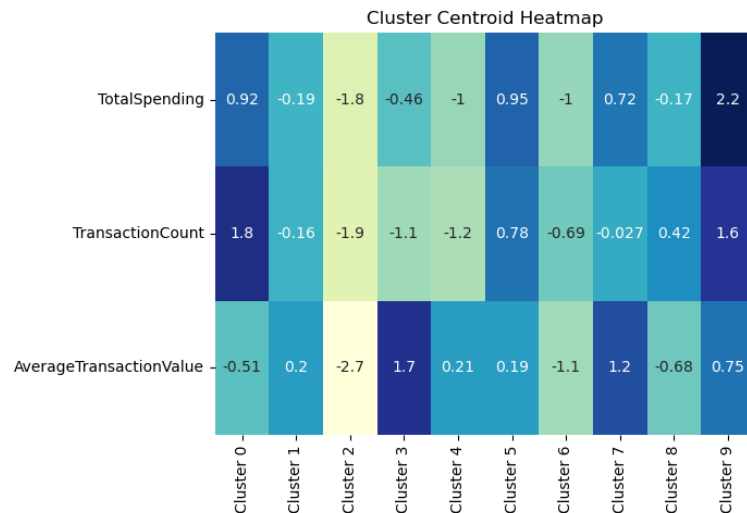


4. Visualizations

- **Pairplot of Clusters:** Below is a scatterplot matrix showing the distribution of clusters across key features (e.g., Total Spending, Transaction Count, Avg. Transaction Value):



- **Cluster Centroid Heatmap:** Below is a heatmap showing the centroid values of the clusters across key features:



5. Key Insights and Recommendations

1. Customer Segments Identified:

- Cluster 0 represents loyal, high-value customers who should be prioritized for retention strategies.
- Cluster 1 includes frequent, low-spending customers who might benefit from upselling opportunities.
- Cluster 2 consists of occasional, high-value shoppers who might be encouraged to shop more frequently through personalized offers.

2. Actionable Recommendations:

- **High Spenders:** Introduce loyalty programs to retain these customers.
- **Frequent Shoppers:** Offer bundle discounts or subscription models to increase their average transaction value.
- **Occasional Shoppers:** Use targeted marketing campaigns (e.g., emails, SMS) to encourage repeat purchases.