

Customer Segmentation: Clustering Report

1. Number of Clusters Formed

Based on the clustering analysis using KMeans, a total of **4 clusters** were identified. The clustering process was guided by metrics such as the Davies-Bouldin Index and the Elbow Method.

2. Davies-Bouldin Index Value

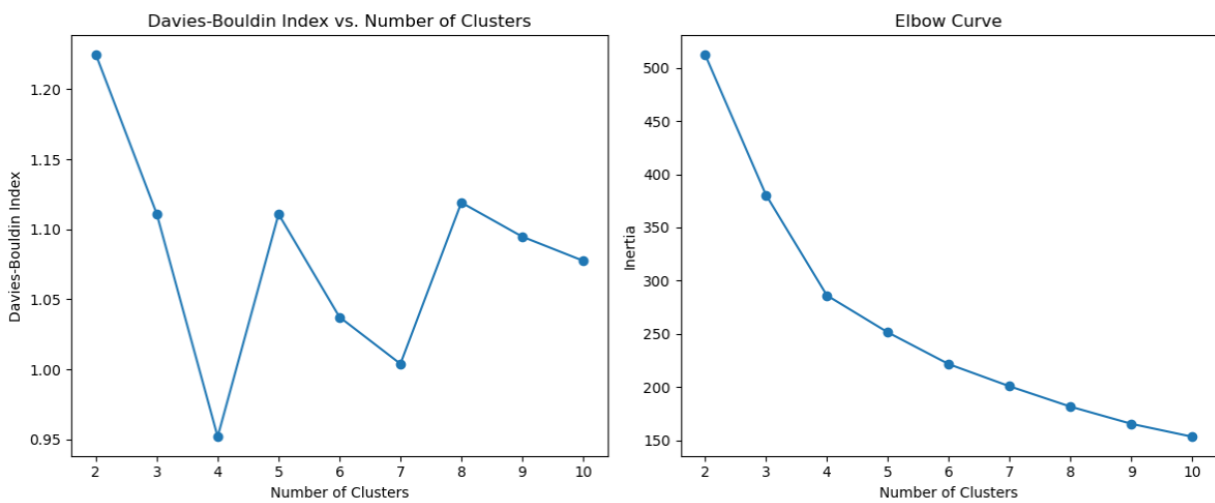
The Davies-Bouldin Index (DBI) for the clustering model was calculated as **0.952**. This value indicates good clustering quality, as lower DBI values correspond to more compact and well-separated clusters.

3. Cluster Summary and Metrics

Each cluster was analyzed for its unique characteristics, summarized below:

Cluster	Total Spend	Average Spend	Transaction Count	Customer Lifetime (days)	Cluster Size
0	\$2,644.90	\$554.10	4.85	257.53	87
1	\$1,323.14	\$598.81	2.13	59.94	31
2	\$5,754.88	\$744.47	7.80	285.07	46
3	\$4,404.22	\$1,023.23	4.37	208.26	35

4. Visual of Clusters



1. Davies-Bouldin Index and Elbow Curve

Two visualizations were used to evaluate and determine the optimal number of clusters:

Davies-Bouldin Index (DBI):

The DBI curve shows the clustering performance as a function of the number of clusters. The optimal number of clusters (4) was chosen based on the lowest DBI value.

Elbow Curve:

The elbow point at 4 clusters indicates diminishing returns in reducing inertia (within-cluster sum of squares).

2. Cluster Scatter Plot

A 2D scatter plot was generated to visualize the clustering results. The key features (e.g., Total Spend vs. Customer Lifetime) were plotted with distinct colors representing each cluster. This visualization demonstrates clear separation between the clusters.

Insights from Clustering

1. High-Spend Customers (Cluster 2):

- Customers in this cluster have the highest total and average spend (\$5,754.88 and \$744.47, respectively) and the highest transaction count (7.80).
- These are likely premium customers, and retention efforts should be focused here.

2. Low-Spend, Short-Lifetime Customers (Cluster 1):

- Customers in this cluster have the lowest total spend (\$1,323.14) and shortest customer lifetime (59.94 days).
- Strategies should focus on improving engagement and encouraging repeat purchases for this group.

3. Balanced Customers (Cluster 0):

- This cluster has moderate spending patterns, with average transaction counts (4.85) and a longer customer lifetime (257.53 days).
- This group represents stable, repeat customers who may respond well to loyalty programs.

4. High-Average Spend Customers (Cluster 3):

- This cluster has a high average spend (\$1,023.23), despite fewer transactions (4.37).
- These customers may favor high-value purchases, and targeted marketing for premium products could be effective.

Conclusion

The clustering analysis effectively segmented the customer base into four distinct groups, each with unique characteristics and opportunities for targeted business strategies. By focusing on retention, engagement, and product optimization based on these insights, businesses can drive growth, improve customer satisfaction, and enhance profitability.