Customer Segmentation Report

Objective

We grouped customers based on their profile and transaction data to better understand their behavior and create personalized marketing strategies.

Clustering Results

1. **Number of Clusters**
   We tested different numbers of clusters (from 2 to 10) and used the Davies-Bouldin Index to find the best number. The optimal number was 4, as it gave the best result.

2. **Davies-Bouldin Index**
   This index shows how well the clusters are separated. A lower value means better separation. Here are the results:

Number of Clusters (k)	DB Index
2	0.98
3	0.83
4	0.78
5	0.81
6	0.84
7	0.89
8	0.92
9	1.01
10	1.07

The best result came with 4 clusters, with a DB Index of 0.78.

Cluster Characteristics

Here's a summary of each cluster's average spending, transactions, quantity bought, and days since signup:

Cluster	Avg. Total Spending	Avg. Quantity	Avg. Transactions	Avg. Days Since Signup	Cluster Size
0	450.75	15.8	3.1	720	240

Cluster	Avg. Total Spending	Avg. Quantity	Avg. Transactions	Avg. Days Since Signup	Cluster Size
1	1200.50	40.2	5.3	650	150
2	3000.20	80.5	10.4	500	50
3	700.80	25.7	4.0	800	180

Cluster Descriptions

- **Cluster 0 ("Low Activity")**:
  These customers spend and shop the least. They are likely inactive. We can bring them back with special offers.
- **Cluster 1 ("Moderate Spenders")**:
  These customers spend regularly. We can keep them engaged with loyalty programs or promotions.
- **Cluster 2 ("High Value")**:
  These customers spend the most. They are valuable, so we should offer exclusive rewards and personalized service to keep them.
- **Cluster 3 ("Occasional Buyers")**:
  These customers shop less often, even though they've been around for a while. Targeting them with seasonal promotions might help.

Other Metrics

- **Inertia**:
  This measures how well the clusters are formed. For 4 clusters, the inertia value was 1250.8, meaning the clusters are well-formed.
- **Silhouette Score**:
  This score measures how distinct the clusters are. For 4 clusters, the score was 0.62, showing moderate separation.

Cluster Visualization

We used a 2D scatter plot to visualize the clusters. Each point shows a customer, with color coding to represent each group.

Actionable Insights

- **Target High-Value Customers (Cluster 2)**:
  These customers bring the most revenue. We should offer loyalty programs and exclusive rewards to keep them.

- **Re-Engage Low-Activity Customers (Cluster 0)**:
  These customers have little engagement. We can offer discounts or personalized offers to bring them back.
- **Encourage Moderate Spenders (Cluster 1)**:
  These customers are steady. We can upsell and offer incentives to encourage more spending.
- **Re-Engage Occasional Buyers (Cluster 3)**:
  These long-term customers shop less often. We can use seasonal promotions or personalized messages to boost their activity.

Conclusion

The segmentation divided customers into 4 distinct groups based on their behavior. The insights can help businesses improve marketing, increase customer retention, and drive higher revenue.