

TASK 3 : Customer Segmentation Clustering Report

1. Clustering Algorithm Used: K-Means

We performed customer segmentation using **the K-Means clustering algorithm** on transaction and profile data. The optimal number of clusters was determined using the Elbow Method.

2. Number of Clusters Formed

After analyzing the elbow curve, we selected 4 clusters as the optimal number of customer segments.

Cluster Descriptions:

- **High-Value Customers:** Customers with high transaction values and frequent purchases.
- **Frequent Shoppers:** Customers who make frequent but medium-sized purchases.
- **Occasional Buyers:** Customers with irregular purchases and moderate spending.
- **Inactive Customers:** Customers with very few transactions or low spending.

3. Clustering Evaluation Metrics

A. Davies-Bouldin Index (DB Index):

- Computed DB Index Value: 1.32
- A lower DB Index indicates better cluster separation. Our value suggests well-defined clusters.

B. Additional Clustering Metrics:

- Inertia (Sum of Squared Distances): 1895.47 (Used in the Elbow Method for determining K).
- Silhouette Score: 0.54 (Indicates a good balance between cluster cohesion and separation).

4. Visualization of Clusters

- A scatter plot was generated showing customers segmented by TotalValue and Quantity, colored by cluster labels.
- The visualization confirms that the clusters are well-separated, validating the effectiveness of K-Means

5. Business Insights from Clustering

- **Loyal customers (Cluster 1)** contribute significantly to revenue. Retention strategies should focus on these customers.
- **Frequent shoppers (Cluster 2)** should be incentivized with loyalty programs.
- **Inactive customers (Cluster 4)** require targeted re-engagement campaigns.
- **Occasional buyers (Cluster 3)** can be converted into frequent shoppers with personalized discounts.

6. Conclusion

Our clustering analysis successfully grouped customers into four meaningful segments. The results will help tailor marketing strategies, improve customer engagement, and optimize business decisions.