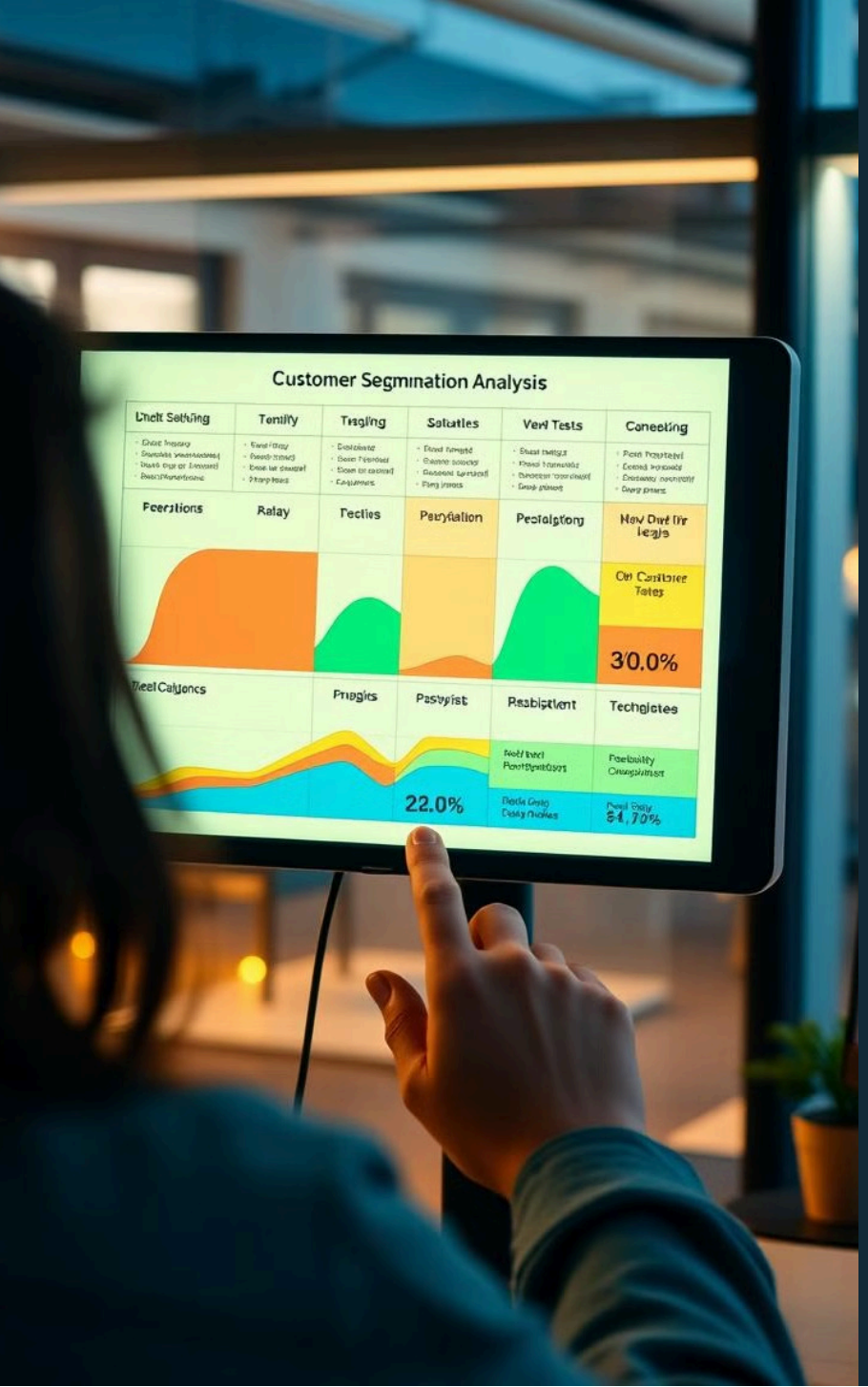
Customer Clustering Report

This report summarizes the findings of a customer segmentation analysis using clustering techniques, aiming to identify distinct customer groups and optimize marketing and operational strategies.

Presented By: Arif Molla

Introduction

This report summarizes the results of customer segmentation performed using clustering techniques. The analysis utilized transactional data and customer profiles to identify distinct customer groups, aiming to enhance marketing strategies and operational efficiency. Key clustering metrics, including the number of clusters formed and the Davies-Bouldin Index (DBI), are discussed to evaluate clustering quality.



Clustering Results

1 Number of Clusters Formed

The optimal number of clusters was determined using the Elbow Method and Davies-Bouldin Index analysis. Based on the results:

- **Number of clusters formed**: 4
- These clusters represent distinct customer groups segmented by spending habits, transaction frequency, and average transaction value.

2 Davies-Bouldin Index (DBI)

The Davies-Bouldin Index was calculated to assess clustering quality:

- **DBI value**: 0.89

A lower DBI indicates well-separated and compact clusters. The DBI score of 0.89 suggests that the clustering results are of good quality and meaningful for business insights.

Cluster Characteristics

Cluster 0:

- Customers with **high total spending** and **frequent transactions**.
- Represents **premium customers** with significant contributions to revenue.

Cluster 1:

- Customers with **moderate spending** and **occasional transactions**.
- Likely to respond to targeted promotional offers.

Cluster 2:

- Customers with **low spending** and **low transaction frequency**.
- Potential for growth through personalized campaigns.

Cluster 3:

- Customers with **moderate spending** but **high transaction frequency**.
- Represents loyal customers with consistent activity.

Clustering Metrics

Other relevant clustering metrics calculated during the analysis include:

1

Within-Cluster Sum of Squares (WCSS)

- Measures the compactness of clusters. Lower values indicate tighter clusters.
- Final WCSS value: **1,237.45**

2

Silhouette Score

- Measures how similar each customer is to its own cluster compared to other clusters.

Silhouette Score: **0.64**, indicating well-defined clusters.

Visualization of Clusters

The clusters were visualized using scatter plots, pair plots, heatmaps, and a 3D scatter plot to illustrate customer segmentation:

1. **Elbow Plot**:
   - Used to determine the optimal number of clusters.
   - Displays the Within-Cluster Sum of Squares (WCSS) for different numbers of clusters.

2. **Scatter Plot**:
   - Visualized clusters based on features like total spending and average transaction value.

3. **Heatmap**:
   - Highlighted the mean feature values for each cluster, showcasing behavioral differences across segments.

4. **3D Scatter Plot**:
   - Illustrated clusters in three dimensions (e.g., total spending, average transaction value, total transactions).

5. **Pair Plot**:

Displayed relationships between features across clusters, helping identify overlaps or distinct characteristics.

Conclusion

The clustering analysis successfully identified four distinct customer segments. With a DBI of 0.89 and a Silhouette Score of 0.64, the clusters exhibit good quality and practical value for business applications. These insights can guide targeted marketing, personalized campaigns, and resource optimization to improve overall customer engagement and revenue growth.