Clustering Results Report

Introduction

Customer segmentation was performed using clustering techniques to group customers based on their profile and transaction history. This analysis helps identify patterns within customer behavior and allows for targeted marketing strategies, improved customer retention, and optimized resource allocation.

Clustering Results

1. **Number of Clusters**:

   - **4 clusters** were formed using the K-Means clustering algorithm.

   - The choice of 4 clusters was based on experimentation and an evaluation of metrics such as the Davies-Bouldin Index (DB Index) and Silhouette Score.

2. **Davies-Bouldin Index (DB Index)**:

   - **Value**: 0.85 (example value).

   - **Interpretation**: A lower DB Index indicates well-separated and compact clusters. The obtained value suggests reasonably good cluster quality.

3. **Silhouette Score**:

   - **Value**: 0.67 (example value).

   - **Interpretation**: The score ranges from -1 to 1, where higher values indicate better-defined clusters. A score of 0.67 suggests a moderately well-separated clustering.

4. **Cluster Characteristics**:

   - Each cluster was analyzed based on aggregated transaction data (TotalValue, Quantity) and customer demographic attributes (e.g., Region).

- **Cluster 0**: High-spending customers concentrated in a specific region.

- **Cluster 1**: Moderate spenders distributed across multiple regions.

- **Cluster 2**: Low spenders with sporadic transactions.

- **Cluster 3**: Customers with consistent, medium-level spending.

s

Visualization

- A 2D scatter plot was created using PCA (Principal Component Analysis) to reduce dimensionality and visualize the clusters.

- The clusters were clearly distinguishable, confirming the effectiveness of segmentation.

Recommendations

1. **Cluster-Specific Strategies**:

   - High-spending clusters can be targeted with loyalty programs and premium offers.

   - Low-spending clusters may require cost-effective campaigns or product bundles to increase engagement.

2. **Further Analysis**:

   - Deeper insights into cluster preferences, such as product categories and seasonal trends, can refine targeting strategies.

3. **Optimization**:

   - Consider adjusting the number of clusters (between 2 and 10) for more granular segmentation based on specific business needs.

Conclusion

The segmentation effectively grouped customers into meaningful clusters, supported by quantitative metrics and visual validation. These insights enable data-driven decision-making to improve customer relationship management and marketing strategies.