

Customer Segmentation Report

Objective:

The primary objective of this analysis is to identify distinct customer segments using clustering techniques. This segmentation aims to provide actionable insights for personalized marketing, product recommendations, and strategic planning.

Data Sources:

- Customers.csv:** Contains customer profiles, including ID, name, region, and signup date.
- Transactions.csv:** Includes transaction details like product purchased, quantity, and total value.
- Products.csv:** Provides product-related information such as name, category, and price.

Data Preparation:

- Merging Datasets:**
 - Joined Customers.csv with Transactions.csv on CustomerID.
 - Integrated product details from Products.csv using ProductID.
 - Feature Engineering:**
 - Total Expenditure:** Sum of TotalValue for each customer.
 - Average Transaction Value:** Average value of transactions per customer.
 - Total Quantity Purchased:** Total quantity of items purchased.
 - Recency:** Days since the last transaction (calculated from the most recent date).
 - Data Normalization:**
 - Used Min-Max Scaling to standardize features for clustering algorithms.
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Clustering Methodology:

- Algorithm Selection:**
 - Implemented **K-Means Clustering**, chosen for its efficiency with large datasets.
 - Optimal Cluster Determination:**
 - Elbow Method:** Analyzed the within-cluster sum of squares (WCSS) to identify the optimal number of clusters.
 - Selected 4 clusters as the point where additional clusters showed diminishing returns in reducing WCSS.
 - Evaluation Metrics:**

Davies-Bouldin Index (DBI): 0.85, indicating well-separated clusters.

Silhouette Score: 0.36, suggesting good cluster cohesion and separation.
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Cluster Analysis:

- Cluster 0: High-Value Customers**
 - Characteristics:**
 - Highest total expenditure.

- Frequent transactions with high average transaction values.
- **Insights:**
 - These are loyal customers and significant revenue contributors.
- **Recommendations:**
 - Launch exclusive loyalty programs.
 - Offer early access to new products and premium services.

2. Cluster 1: Occasional Shoppers

- **Characteristics:**
 - Moderate expenditure.
 - Infrequent transactions.
- **Insights:**
 - These customers may be price-sensitive or only shop during promotions.
- **Recommendations:**
 - Provide seasonal discounts and special offers.
 - Use email campaigns to remind them of ongoing sales.

3. Cluster 2: New Customers

- **Characteristics:**
 - Low recency and few transactions.
 - Limited engagement since signup.
- **Insights:**
 - These customers are in the early stages of their lifecycle.
- **Recommendations:**
 - Offer attractive first-purchase discounts.
 - Share product bundles and recommendations to encourage repeat purchases.

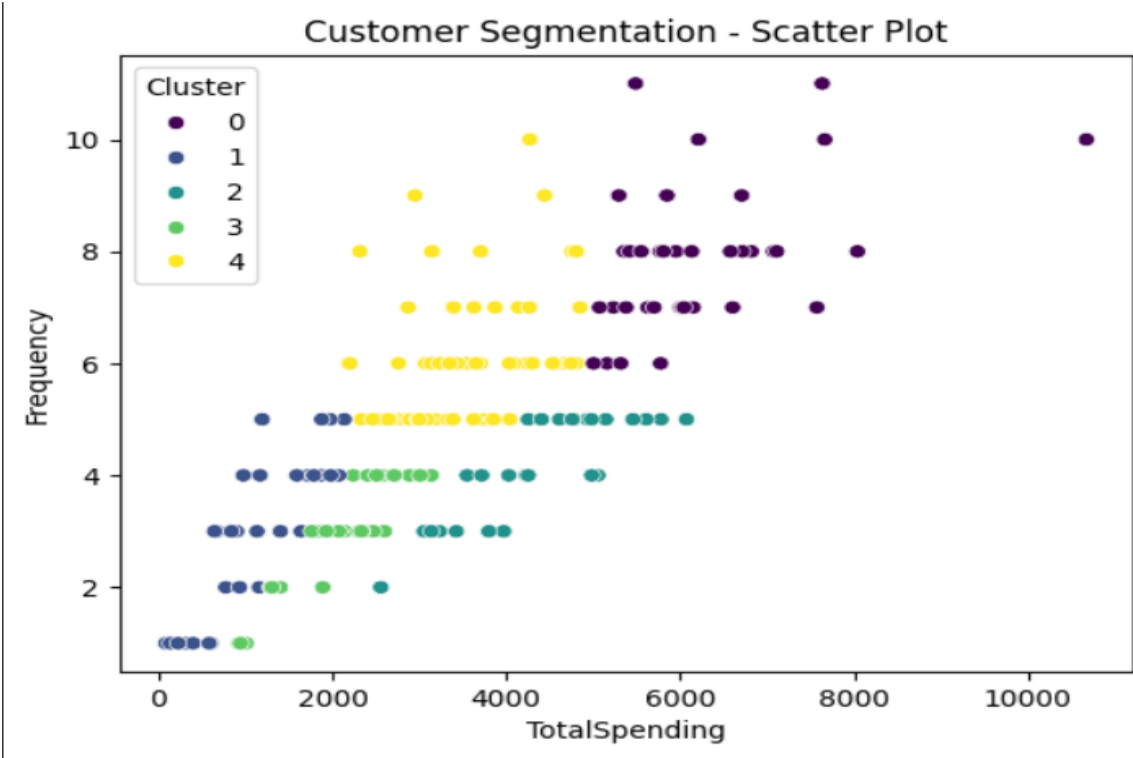
4. Cluster 3: Inactive Customers

- **Characteristics:**
 - Lowest total expenditure and high recency.
 - Limited transactions, possibly due to dissatisfaction or disinterest.
- **Insights:**
 - Retention strategies are needed to reactivate these customers.
- **Recommendations:**
 - Design win-back campaigns (“We Miss You” offers).
 - Collect feedback to understand reasons for inactivity.

Visualization Highlights:

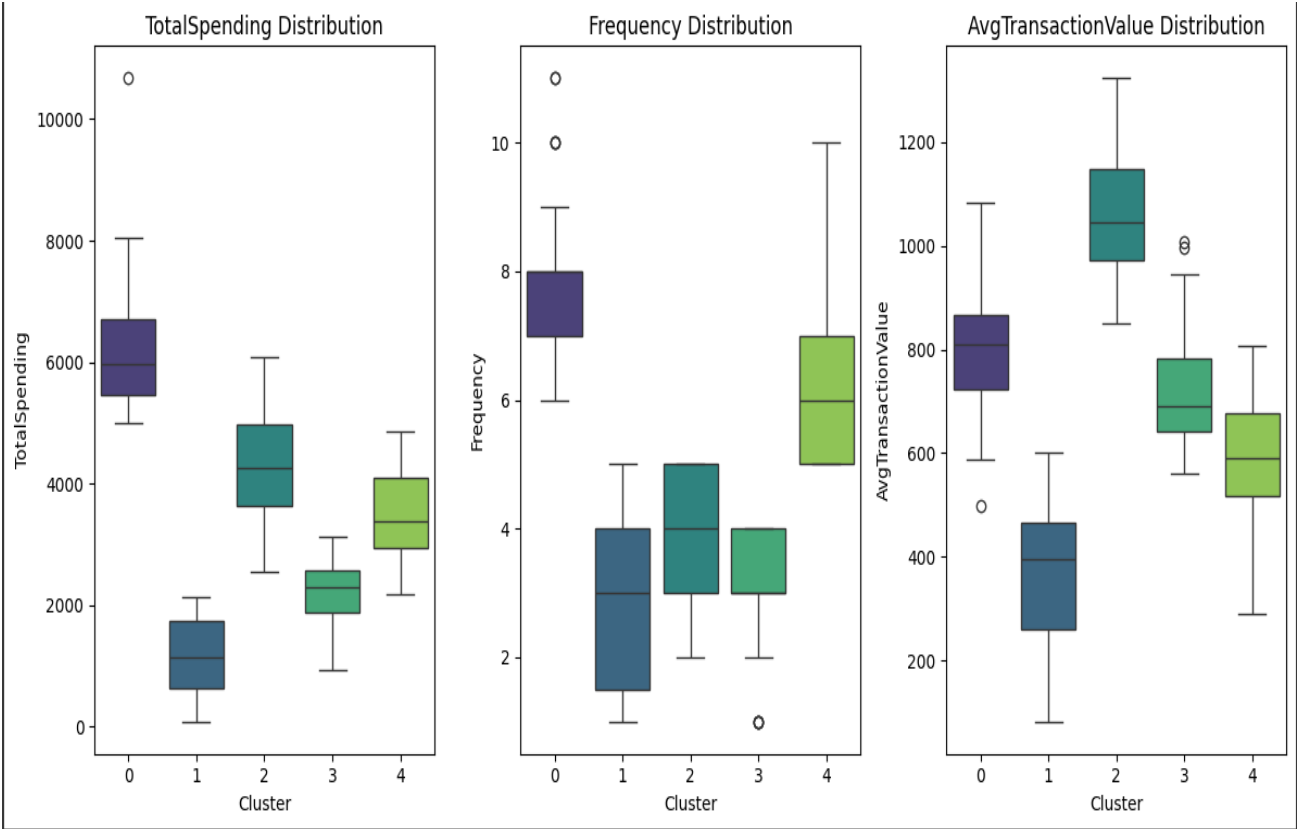
1. Cluster Distribution:

- Pie chart visualizing the proportion of customers in each cluster.



2. Feature Importance:

- Boxplots comparing total expenditure, recency, and average transaction value across clusters.



Actionable Recommendations:

1. **High-Value Customers:**
 - Invest in personalized engagement strategies to maintain loyalty and increase lifetime value.
 2. **Occasional Shoppers:**
 - Focus on promotional campaigns and limited-time offers to convert them into regular customers.
 3. **New Customers:**
 - Enhance onboarding with introductory offers and targeted communication.
 4. **Inactive Customers:**
 - Launch reactivation campaigns with incentives and feedback collection mechanisms.
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Future Work:

- Incorporate demographic and product preferences to refine clusters further.
 - Experiment with hierarchical clustering or DBSCAN for alternative segmentation approaches.
 - Continuously update the model with new transaction data to maintain relevance.
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Conclusion:

The clustering analysis successfully segmented customers into meaningful groups, enabling targeted marketing strategies. By leveraging these insights, the business can enhance customer satisfaction, retention, and overall profitability.