Customer Clustering Analysis Report

1. Overview

The purpose of this report is to analyze customer behavior using clustering techniques. This segmentation process helps identify distinct groups of customers who share similar spending patterns, purchasing behaviors, and engagement levels with the company. By understanding these clusters, the business can better tailor its marketing strategies, personalize product offerings, and ultimately enhance customer satisfaction.

2. Features Used for Clustering

To perform clustering, we utilized a combination of customer transaction data and profile attributes:

1. **TotalSpend**: The cumulative amount of money a customer has spent.
2. **AvgTransactionValue**: The average value per transaction for each customer.
3. **TransactionCount**: The total number of transactions recorded for a customer.
4. **TransactionFrequency**: How often customers make purchases.
5. **UniqueProductsBought**: The variety of products purchased by a customer.
6. **TotalQuantity**: The total number of items bought.

These features provide a comprehensive view of customer behavior, enabling us to segment them effectively.

3. Methodology

The clustering process involved the following steps:

1. **Data Preparation**: Transaction data was aggregated for each customer to derive the features listed above. Additionally, the data was cleaned and standardized to ensure uniform scaling of numerical features.
2. **Feature Engineering**: Key attributes, such as spending patterns and purchase diversity, were derived from the data.
3. **Clustering**: We used the K-Means algorithm to identify clusters of customers. The optimal number of clusters was determined using two techniques:

    - The Elbow Method: Helps identify where the within-cluster variance stops decreasing significantly.

    - Davies-Bouldin Index: Measures cluster compactness and separation, where a lower value

indicates better clustering.

4. **Cluster Evaluation**: After selecting the optimal number of clusters, we evaluated the results and interpreted the characteristics of each group.

4. Results

The clustering analysis identified distinct customer segments. Each segment represents a unique group with shared traits and behaviors. The final clustering solution achieved a strong Davies-Bouldin Index score, indicating strong separation and compactness of the clusters.

5. Cluster Characteristics

Each cluster is summarized below:

1. **High-Value Customers**: This group is characterized by high total spending and high average transaction values. These customers are typically frequent purchasers who are highly engaged and buy premium products.

2. **Bargain Seekers**: These customers have high transaction counts but lower average transaction values. They prefer purchasing multiple lower-priced items and are likely responsive to discounts and promotions.

3. **One-Time Buyers**: This segment represents customers with low transaction counts and spending. These customers might have engaged with the business for a one-off purchase or are new customers.

4. **Diverse Shoppers**: This group consists of customers who purchase a wide variety of products. They tend to buy in smaller quantities but from a range of categories, reflecting diverse shopping habits.

6. Insights and Recommendations

Based on the clustering results, the following actionable insights can be derived:

1. **Target High-Value Customers**: Invest in personalized marketing campaigns, loyalty programs, and premium product offerings to retain and grow this segment.

2. **Engage Bargain Seekers**: Launch seasonal discounts, bundle offers, and flash sales to appeal to this cost-conscious group.

3. **Convert One-Time Buyers**: Implement email campaigns, product recommendations, and

incentives to encourage repeat purchases.

4. **Leverage Diverse Shoppers**: Cross-sell and up-sell products across categories to increase their spending while meeting their diverse needs.

These recommendations, tailored to each customer segment, can help the business maximize revenue and improve customer relationships.