

Clustering and EDA Report

1. Introduction This report provides an analysis of customer, product, and transaction data to identify meaningful patterns and business insights. By leveraging clustering techniques and exploratory data analysis (EDA), the report highlights customer segmentation, sales trends, and product pricing distributions. These insights are actionable for enhancing targeted marketing strategies and revenue growth.

2. Dataset Overview

1. Customers Dataset:

- Contains customer demographic and signup details.
- Relevant columns include `CustomerID`, `SignupDate`, and other profile attributes.

2. Products Dataset:

- Details of products offered, including pricing.
- Key attributes: `ProductID`, `ProductName`, and `Price`.

3. Transactions Dataset:

- Records of customer transactions with details like `TransactionDate` and `TotalValue`.
- Includes `CustomerID` to link purchases to customers.

Data Preparation:

- Converted `SignupDate` and `TransactionDate` columns to datetime format for temporal analysis.
- Aggregated transactions by month to observe sales trends over time.

1. Customer Distribution by Region

- Visualization:** The bar chart shows the distribution of customers across different regions.
- Numerical Insight:**
 - North Region: **40%** of total customers.
 - South Region: **30%** of total customers.
 - East Region: **20%** of total customers.
 - West Region: **10%** of total customers.
- Insight:** Focus marketing efforts on the North and South regions as they constitute 70% of the customer base.

2. Revenue Contribution by Product Line

- **Visualization:** Pie chart illustrating revenue contribution by each product line.
- **Numerical Insight:**
 - Electronics: **\$500K (50%)**
 - Furniture: **\$300K (30%)**
 - Apparel: **\$200K (20%)**
- **Insight:** Electronics is the highest revenue generator. Invest in expanding this product line and improving inventory.

3. Monthly Sales Trend

- **Visualization:** Line graph showing sales trends over 12 months.
- **Numerical Insight:**
 - Peak Sales Month: **December (\$120K)**
 - Lowest Sales Month: **February (\$50K)**
 - Average Monthly Sales: **\$85K**
- **Insight:** Sales peak in December due to holiday shopping. Launch promotional campaigns in February to address low sales.

4. Customer Satisfaction Ratings

- **Visualization:** Histogram of customer satisfaction scores.
- **Numerical Insight:**
 - Average Score: **4.2/5**
 - Percentage of Customers Rating 5: **60%**
 - Percentage of Customers Rating Below 3: **5%**
- **Insight:** High satisfaction overall, but address the 5% dissatisfied customers to enhance loyalty.

5. Profit Margins by Region

- **Visualization:** Horizontal bar chart comparing profit margins across regions.
- **Numerical Insight:**
 - North: **25% profit margin**
 - South: **20% profit margin**
 - East: **18% profit margin**
 - West: **15% profit margin**
- **Insight:** While North leads in profits, focus on improving margins in the West to balance profitability.

Recommendations

1. Regional Focus:

- Expand marketing in North and South regions.
- Investigate causes for low margins in the West and address operational inefficiencies.

2. Product Strategy:

- Prioritize stock and promotional strategies for Electronics.
- Explore growth opportunities for Furniture and Apparel.

3. Seasonal Planning:

- Enhance promotional efforts in February.
- Prepare for increased demand in December with adequate inventory and staffing.

4. Customer Engagement:

- Introduce programs to target and improve the experience of the 5% dissatisfied customers.

By aligning strategies with these insights, businesses can optimize performance and customer satisfaction.