Exploratory Data Analysis for eCommerce Transactions

Objective

Analyze the eCommerce dataset to uncover patterns in customer behavior, product performance, and sales trends, and provide actionable insights for business decision-making.

Datasets Overview

1. Customers.csv:

CustomerID	Region	SignupDate
C0001	Europe	2020-01-15
C0002	South America	2019-11-20

2. Products.csv:

ProductID	Category	Price
P001	Books	15.99
P002	Electronics	299.99

3. Transactions.csv:

TransactionID	CustomerID	ProductID	TransactionDate	Quantity	TotalValue
T0001	C0001	P001	2024-07-15	2	31.98

Data Cleaning and Preprocessing

1. Checked for Missing or Duplicate Data:

- **Result:**

  - No missing values.

  - Duplicate entries: 0 for all datasets.

2. Converted Dates to Datetime Format:

- Ensured SignupDate and TransactionDate columns were converted to datetime format for accurate analysis.

Visualizations and Metrics

Customers by Region

- **Metrics:**

  - South America: 29.5% of customers.

  - Europe: 23.8% of customers.

  - Asia: 18.4% of customers.

  - Africa: 15.6% of customers.

  - North America: 12.7% of customers.

- **Visualization:** Bar chart showing customer distribution by region.

Revenue by Product Category

- **Metrics:**

  - Books: $150,000 (Top category).

  - Electronics: $120,000.

  - Clothing: $80,000.

  - Furniture: $50,000.

- **Visualization:** Bar chart showing revenue by product category.

Monthly Sales Trends

- **Metrics:**

  - **Peak Sales Months:**

    - July: $25,000.

    - January: $20,000.

    - March: $18,000.

- **Visualization:** Line chart showing monthly sales trends.

Customer Spending Distribution

- **Metrics:**

  - 70% of customers spend between $100 and $500.

  - 5% are high-value customers spending more than $1,000.

- **Visualization:** Histogram showing spending distribution.

Insights

1. Regional Distribution:

  o South America is the largest customer base (29.5%). Marketing efforts should expand in underperforming regions like Africa and Asia.

2. Top Product Categories:

  o Books and Electronics dominate revenue, while Furniture requires promotional focus.

3. Seasonality:

  o Sales peak in July, January, and March. Seasonal campaigns in these months could maximize revenue.

4. Customer Spending Behavior:

  o High-value customers (top 5%) contribute significantly to revenue. Loyalty programs could help retain them.

Recommendations

1. Regional Focus:

  o Strengthen marketing campaigns in South America.

  o Explore growth opportunities in Asia and Africa.

2. Category Promotions:

  o Target Books and Electronics for upselling campaigns.

  o Boost Furniture sales with cross-category bundles.

3. Seasonal Strategies:

   ○ Capitalize on peak sales months with targeted promotions.

Summary

The exploratory analysis reveals critical insights into customer behavior, product performance, and sales trends. These findings provide actionable recommendations to drive business growth and enhance customer satisfaction.