Data Science Assignment: eCommerce Transactions Dataset

Task 1: Exploratory Data Analysis (EDA) and Business Insights

REPORT

Overview

This report presents key business insights derived from the exploratory data analysis (EDA) of the eCommerce transactions dataset. The analysis covers customer demographics, product analysis, transaction patterns, summary statistics, correlation analysis, and advanced visualizations, leading to actionable business recommendations.

Data Loading and Merging

The provided datasets (Customers.csv, Products.csv, and Transactions.csv) were loaded using Python's pandas library. The datasets were merged on CustomerID and ProductID to create a comprehensive DataFrame for analysis.

Exploratory Data Analysis (EDA)

Customer Demographics

- Customers per Region: Analysis revealed the distribution of customers across different regions, primarily North America and Europe.
- Customer Signup Dates: There was a noticeable spike in customer sign ups during the months of November and December.

Product Analysis

- Products per Category: Certain product categories, such as electronics and apparel, had significantly higher sales volumes compared to others.
- Product Prices Distribution: The distribution of product prices showed that most products were priced between $20 and $100.

Transaction Patterns

- Transactions Over Time: Analysis indicated trends in transactions over time, with observable peaks during weekends and the holiday season.
- Total Transaction Value Over Time: The total value of transactions exhibited seasonal patterns.

Summary Statistics and Missing Values

Descriptive statistics were calculated for the key variables in each dataset. Missing values were identified and handled using the forward fill method.

Business Insights

Based on the EDA, the following key business insights were derived:

Insight 1: Region-Specific Marketing Opportunities

- Observation: The majority of customers are from specific regions, North America and Europe.
- Insight: This indicates a potential for region-focused marketing strategies to enhance engagement and sales in these areas. Tailoring promotional campaigns and localizing content for these regions can attract more customers and increase revenue.

Insight 2: Customer Signup Trends

- Observation: There is a noticeable spike in customer sign ups during November and December.
- Insight: The trend suggests that customers are more likely to sign up during the holiday season. Leveraging this period with targeted marketing campaigns, special offers, and discounts can attract new customers and drive higher signups.

Insight 3: Popular Product Categories

- Observation: Certain product categories, such as electronics and apparel, have significantly higher sales volumes compared to others.
- Insight: This highlights opportunities to expand inventory and marketing efforts for these popular categories. Focusing on these high-demand products can increase sales and improve inventory turnover.

Insight 4: Price Sensitivity

- Observation: The product prices reveal that most products are priced between $20 and $100.
- Insight: Understanding customer price sensitivity allows businesses to adjust pricing strategies accordingly. Offering products within this price range and promoting value-for-money options can enhance customer satisfaction and drive sales.

Insight 5: Transaction Patterns

- Observation: There are observable peaks in transactions during weekends and the holiday season.
- Insight: The transaction patterns suggest potential seasonal and weekly trends. Businesses can plan promotions, stock inventory, and optimize marketing efforts around these peak periods to maximize sales and customer engagement.

Conclusion

The exploratory data analysis of the eCommerce transactions dataset has provided valuable insights into customer behavior, product preferences, and transaction trends. By leveraging these insights, businesses can develop targeted marketing strategies, optimize inventory management, and enhance overall customer experience.