

This exploratory data analysis (EDA) focuses on understanding customer spending behavior, product category performance, and regional as well as temporal trends using transactional data. By leveraging clustering algorithms and detailed visualizations, the analysis aims to uncover actionable insights for enhancing sales strategies, optimizing product placement, and tailoring marketing efforts.

Spending Trends Across Product Categories

The analysis reveals significant variations in customer spending across different product categories. High-revenue categories, such as electronics and fashion, emerge as consistent contributors to overall sales. Conversely, categories like home decor and niche products show potential for growth with better-targeted campaigns. The study suggests re-evaluating promotional efforts and pricing strategies in underperforming categories to drive higher engagement.

Regional Spending Patterns and Insights

Spending patterns differ markedly across regions. Urban areas display higher average transaction values, likely due to higher purchasing power and product availability. Rural areas, while having lower transaction values, exhibit consistent spending habits. This suggests an opportunity to expand operations and enhance marketing efforts in these regions to increase market penetration.

Transaction Behavior and Sales Insights

The study delves into transaction data, analyzing metrics such as transaction frequency, ticket size, and overall sales distribution. Peak sales occur during holiday seasons and month-end periods, reflecting predictable consumer behavior. Additionally, insights into recurring purchase behaviors enable better inventory planning and resource allocation.

Product Category Performance Analysis

Performance metrics for each product category indicate top-performing items and those with declining demand. Categories with seasonal demand spikes, such as winter apparel or holiday-themed products, require timely inventory adjustments. The findings also recommend diversifying product offerings within low-performing categories to attract a broader audience.

Customer Segmentation and Spending Behavior

Using clustering techniques like K-Means, customers are segmented based on their spending habits, preferences, and purchasing power. Key customer segments, such as high spenders, occasional buyers, and bargain hunters, are identified. This segmentation guides

personalized marketing strategies, ensuring targeted offers and promotions resonate with the intended audience.</p> <h2>Temporal Spending Trends and Seasonal Insights</h2>

<p>Time-based analysis uncovers clear seasonal spending trends. Sales peak during festive seasons, with notable increases during end-of-year holidays and summer vacations. Insights into month-on-month trends highlight periods of slower activity, enabling businesses to design counter-cyclical promotions to boost sales during off-peak times.</p>