

Analysing Retail Sales Patterns: Insights into Product Demand and Revenue Distribution

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This report examines a retail sales dataset of 1,000 transactions of various categories like Beauty, Clothing, and Electronics. The set provides the quantity sold, price per unit, and amount of sales to give an insight into the sales performance, customer demand, and revenue distribution.

The key metrics are an average of 2.51 units per transaction quantity sold, with an average price of \$179.89 per unit for a mean total sales amount of \$456. The total sales amount varies fairly moderately, with a standard deviation of \$559.99, indicating a wide range in the value of transactions. In this case, the large difference between the medians of price and the total amount \$50 versus \$135 suggests that the majority of purchases are in lower-priced items with much higher-priced items bringing up the mean on occasion.

Skewness and kurtosis from a statistical point of view pinpoint specific features of the distribution. For example, the total sales amount shows positive skewness of 1.38, indicating that in this distribution, the upper tail is longer since there are a few large-value transactions. Thus, the data set allows us to analyse the pattern of sales performance and product demand; it will therefore be very informative for inventory management, pricing strategies, and targeted marketing interventions.

Violin Plots

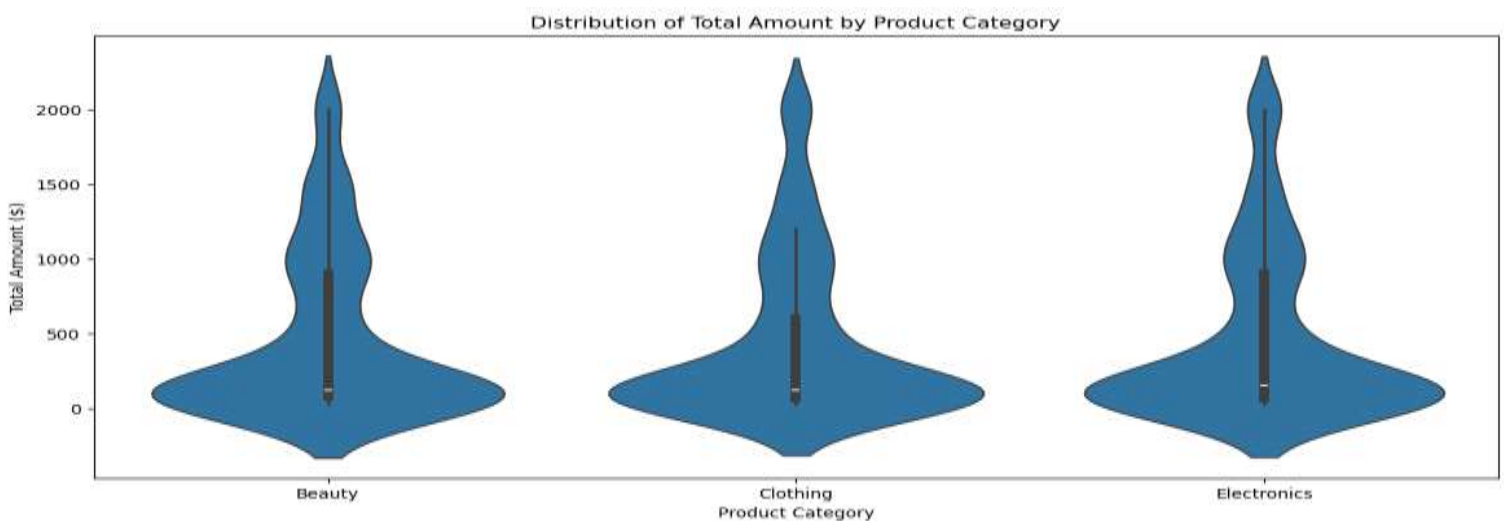


Figure (1)

Figure (2)

Figure (3)

This violin plot displays the distribution of the quantity of total sales amount across the three product categories: Beauty, Clothing, and Electronics.

- **Distribution Shape:** Whereas each category covers a great span of total sales amount, they also have very distinct distributions. The thickness of each "violin" shape is representative of the density of sales at various quantities; the wider portions represent more frequent quantities in value.
- **Central tendency:** The heavy amount of sales across categories rests on lower amounts, evidenced by the wider, denser areas that hang closest to the bottom. The median values across categories are similarly low.
- **Outliers and Spread:** All categories show very long upper tails, with points towards occasional high-value transactions. However, the heavy amount of transactions for each category occurs at lower amounts.
- **Comparison Across Categories:** Overall shape and spread of distribution are similar across categories, indicating consistent sales patterns. That would imply that Beauty has a bit more variation in higher total amounts than Clothing and Electronics.

Pie Chart

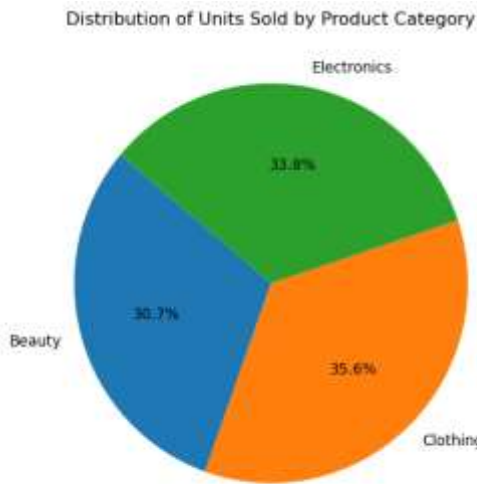


Figure (4)

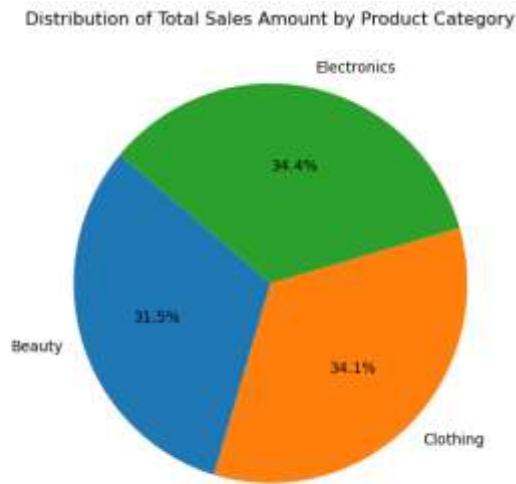


Figure (5)

Below is a chart showing the distribution of units sold by product category. It reflects the various shares that each class of product holds with respect to unit sales. All these together reflect consumer demand, crystal clear across products. The larger slice indicates high volume sales, which belongs to popular categories, while the smaller one highlights those with low demand.

The Distribution of Total Sales Amount by Product Category chart fills in the amount for each category of products, showing the contribution to the total revenue in order to describe the financial weight of each product type. This chart shows which categories are more profitable, making segments that drive revenues more easily identifiable.

These insights together help the stakeholders to identify both high-demand and high-revenue categories, which will be very helpful in making decisions about inventory, marketing, and strategic planning for product offering optimization with profits.

Scatter Plot

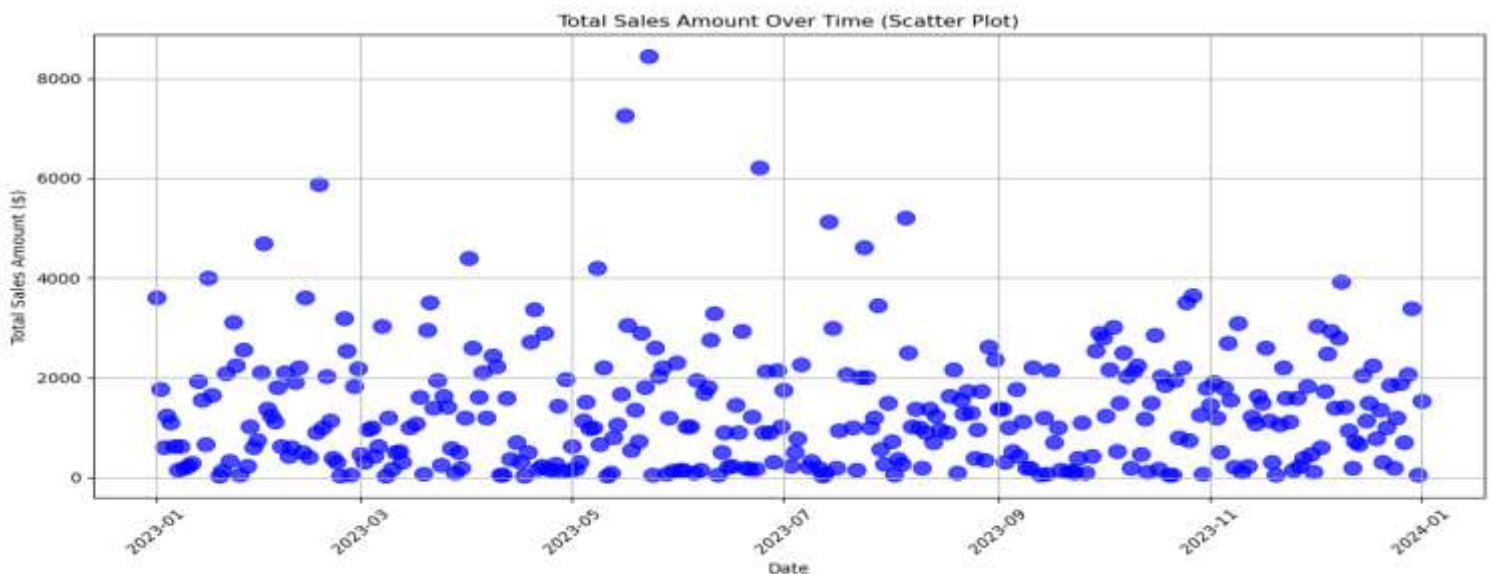


Figure (6)

The scatter plot displays the **Total Sales Amount** over time, with each dot representing an individual transaction. The x-axis shows the date of the transaction, and the y-axis represents the total sales amount in dollars.

- **Sales Concentration:** Most of the transactions have a total sales amount less than \$2,000, indicating that lots of sales have relatively low values.
- **High-Value Outliers:** A few transactions exceed \$6,000, which indicates sporadic high-value sales to be outliers in the general trend.
- **Consistency Over Time:** The scattering of the points is consistent along the timeline; hence, no strong seasonal pattern is spotted, along with any significant fluctuation.
- **High Variability in Sales:** The spread of the points down the y-axis indicates a high variability in transaction amount, which is further supported by the high standard deviation of the total sales in this dataset.