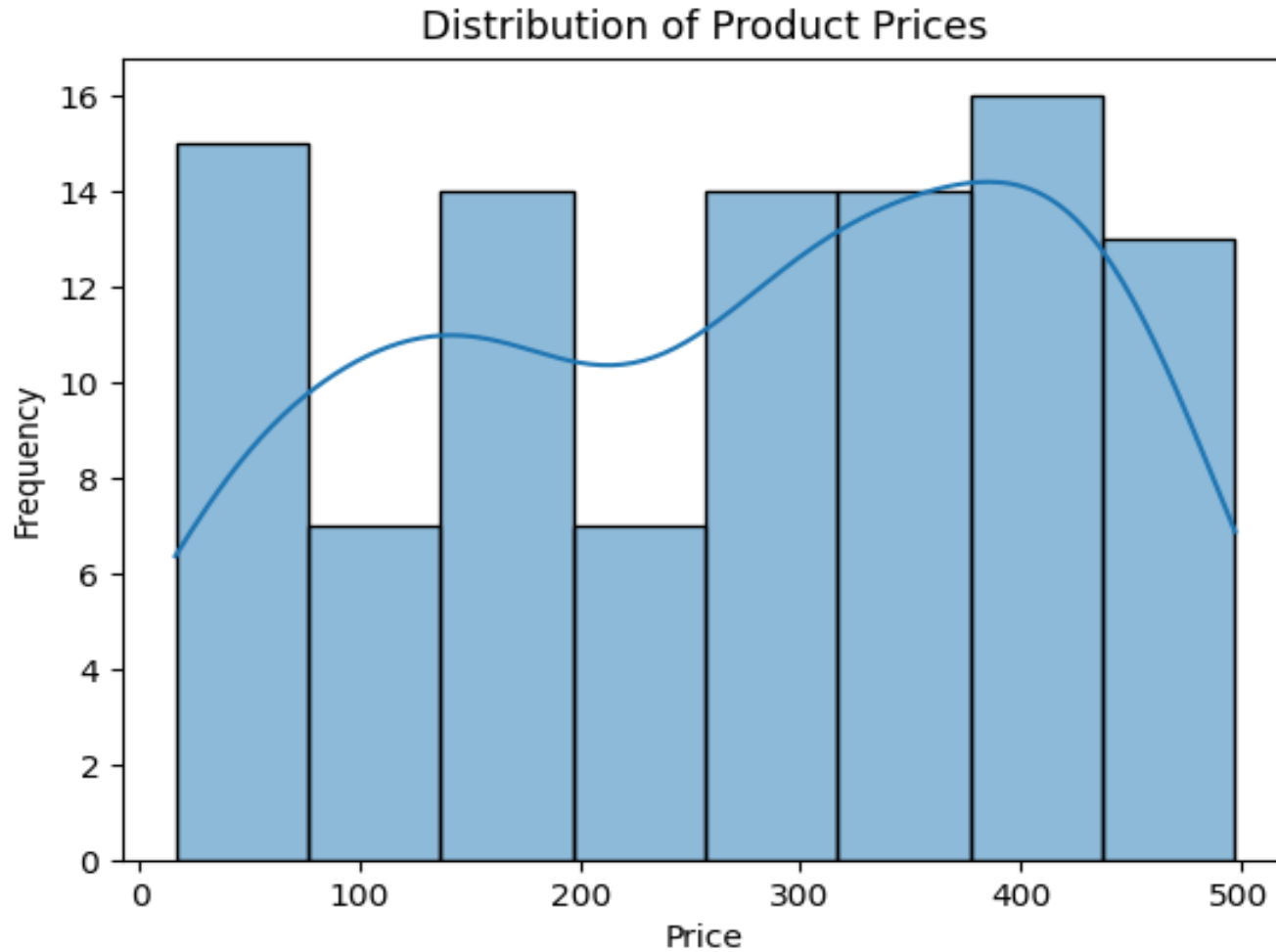


# **Task 1: Business Insights on Exploratory Data Analysis (EDA)**

**Plot 1: Distribution of Product Prices**



```
import seaborn as sns
import matplotlib.pyplot as plt
sns.histplot(products_df['Price'],
kde=True)
plt.title('Distribution of Product
Prices')
plt.xlabel('Price')
plt.ylabel('Frequency')
plt.savefig(r'C:\Users\DELL\Downloads\plot_image1.
png')
plt.show()
```

## **1)Price Targeting:**

The price distribution analysis identifies a concentration of products priced between 200 and 300, indicating a key price range where most customers make purchases. This insight offers opportunities for targeted marketing strategies aimed at price-sensitive customers within this range. Businesses can capitalize on this by creating promotions or special offers that appeal to this segment, such as discounts or limited-time deals. Additionally, bundling complementary products within this price range can encourage higher average order values. By focusing efforts on this sweet spot, companies can enhance sales and better engage customers, driving increased revenue while optimizing pricing strategies.

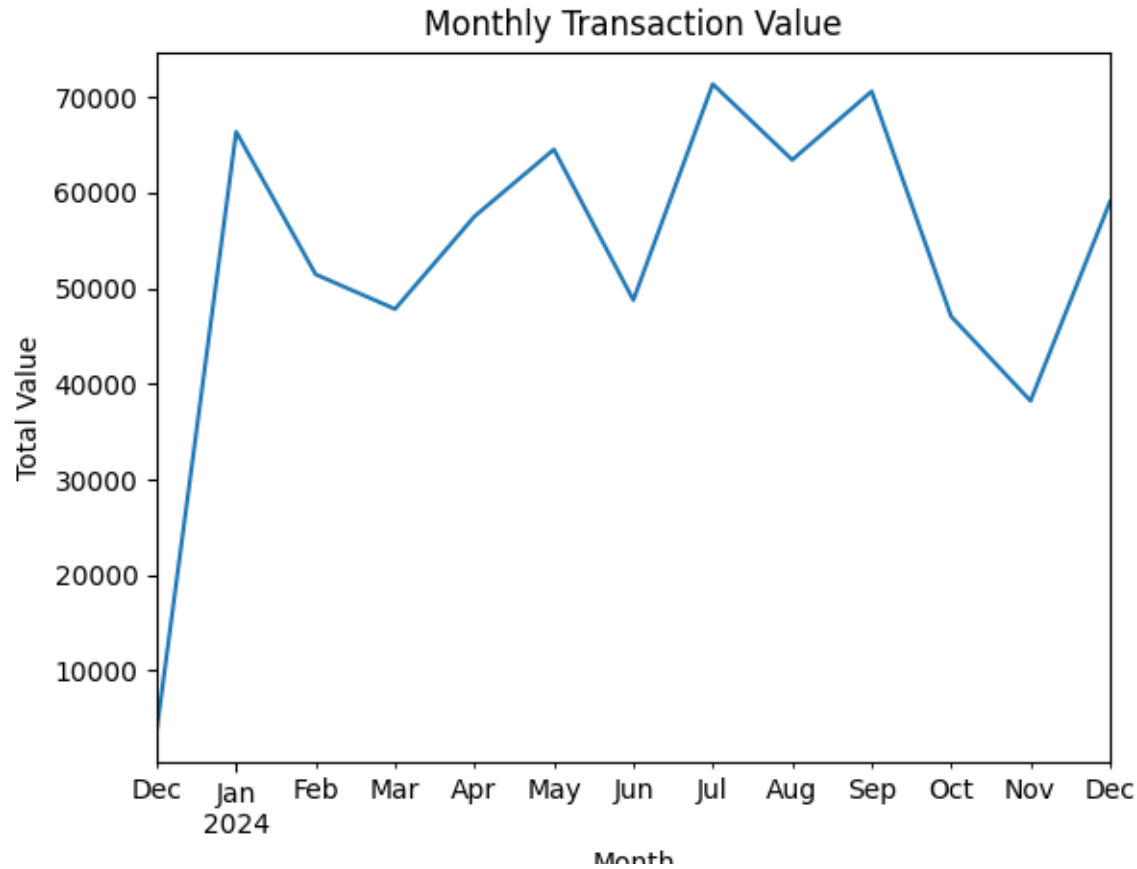
## **2)High-End Market:**

The presence of outliers with very high prices (above 500) suggests a potential market for premium products. Analyzing these high-priced products, including their unique features, target customer segments, and marketing channels, could reveal opportunities to cater to high-end clientele with exclusive offerings and premium pricing strategies.

## **This version adds the following elements:**

- Specificity:** Instead of just mentioning "features," it specifies "unique features" to highlight the importance of differentiating premium products.
- Focus on Customer Segments:** It emphasizes the need to understand the specific characteristics and preferences of the target audience for premium products.
- Marketing Channels:** It acknowledges the importance of appropriate marketing channels to reach and engage the target audience for high-end products.

Plot 2: Monthly Transaction Value

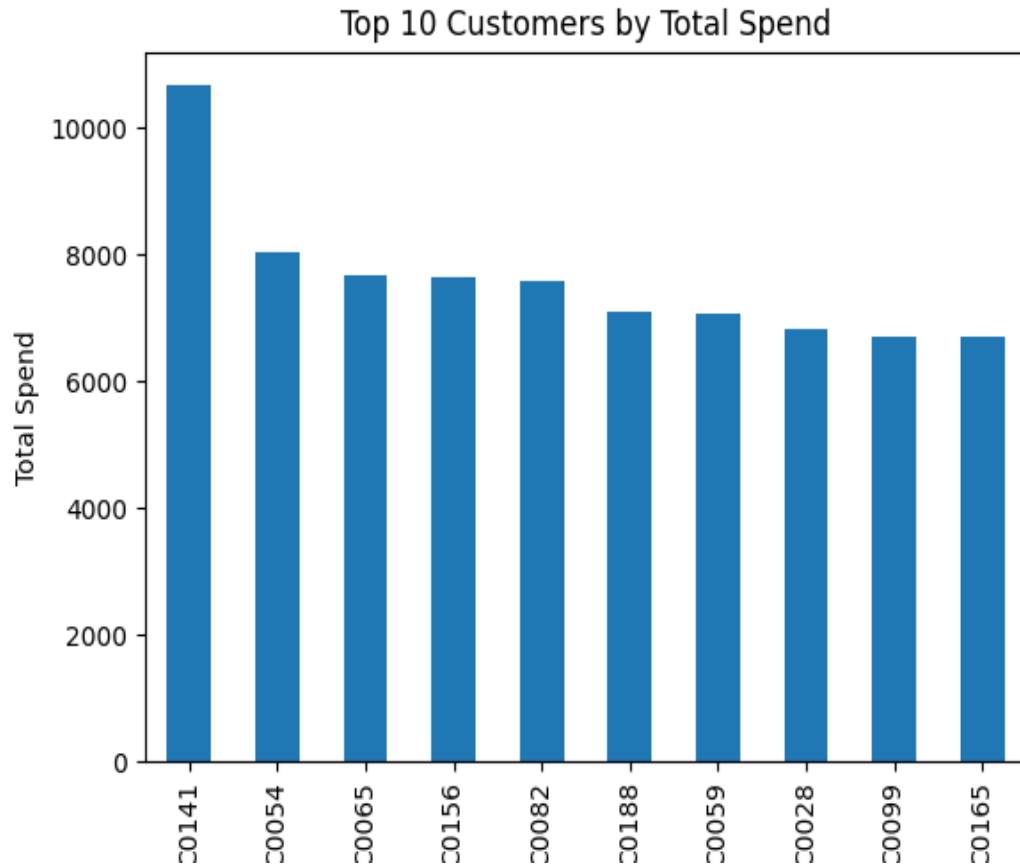


```
transactions_df['TransactionMonth'] =  
transactions_df['TransactionDate'].dt.to_period('M')monthly_tr  
ansactions =  
transactions_df.groupby('TransactionMonth')['TotalValue'].sum  
( )monthly_transactions.plot(kind='line', title='Monthly  
Transaction Value')plt.ylabel('Total  
Value')plt.xlabel('Month')plt.savefig(r'C:\Users\DELL\Download  
s\plot_image2.png')plt.show()
```

**3)Seasonality and Strategic Planning:** Recognizing and leveraging seasonal sales patterns is essential for effective strategic planning. Analyzing sales data helps businesses identify peak months like July and September, during which targeted promotions and enhanced marketing efforts can significantly boost revenue. Conversely, understanding slower months such as October allows businesses to proactively plan to mitigate downturns, optimize inventory levels, and reduce excess costs. By aligning marketing strategies, promotional activities, and stock management with these trends, businesses can maintain a balanced approach to profitability, ensuring steady growth and improved operational efficiency throughout the year.

**4)Year-over-Year Comparison:** Analyzing monthly trends from this year against previous years provides valuable insights into customer behavior and market dynamics. Significant deviations from historical patterns could indicate shifts in preferences, external influences, or emerging market conditions that warrant attention. This analysis helps businesses pinpoint areas needing improvement, such as addressing declining sales months or enhancing underperforming strategies. Additionally, identifying growth opportunities in standout months enables targeted investments and refined planning. This comprehensive approach ensures adaptability, continuous improvement, and sustained success in an ever-changing market environment.

### Plot 3: Top 10 Customers by Total Spend



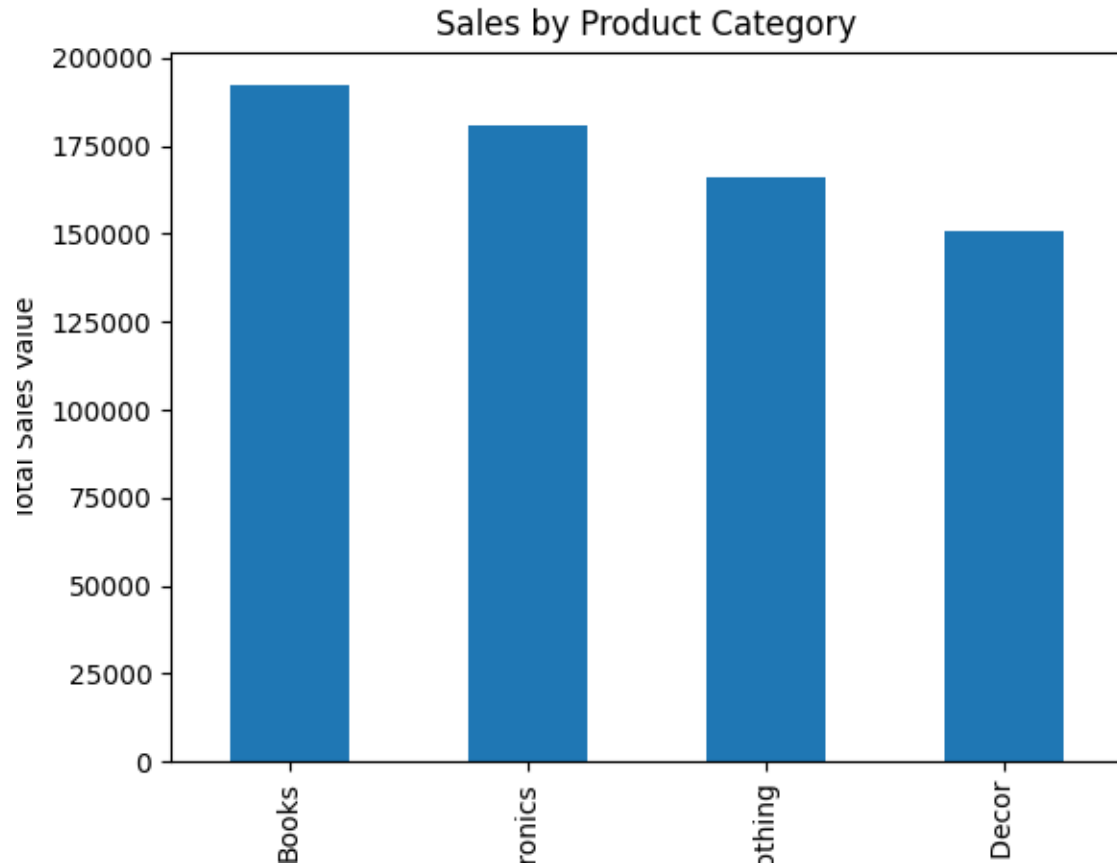
```
customer_spend =  
transactions_df.groupby('CustomerID')['TotalValue'].sum()to  
p_customers =  
customer_spend.sort_values(ascending=False).head(10)top_  
customers.plot(kind='bar', title='Top 10 Customers by Total  
Spend')plt.ylabel('Total Spend')plt.xlabel('Customer  
ID')plt.savefig(r'C:\Users\DELL\Downloads\plot_image3.png'  
)plt.show()
```

**5)Pareto Principle in Action:** The analysis highlights the Pareto Principle, where a small fraction of customers (top 10) drive a significant portion of total sales. This finding underscores the importance of focusing on high-value customers through targeted retention strategies. By nurturing these top contributors with personalized offers, loyalty programs, or exclusive rewards, businesses can secure consistent revenue streams and foster long-term relationships. Understanding their preferences and behaviors allows for tailored marketing efforts, ensuring these valuable customers remain engaged and satisfied, ultimately maximizing profitability and growth opportunities. Investing in data-driven insights further refines strategies, enhancing competitive advantage.

**6)Customer Segmentation Potential:** The diverse spending levels within the top 10 customers highlight a valuable opportunity for effective customer segmentation. By dividing customers into distinct tiers, such as high-value, medium-value, and low-value segments, businesses can implement targeted strategies to enhance engagement and drive revenue growth. High-value customers can be rewarded with exclusive offers, premium services, and personalized experiences to maintain loyalty and encourage continued spending. Medium-value customers can be incentivized with tailored promotions or upselling strategies to elevate their purchasing behavior. Additionally, understanding low-value customers can help identify untapped opportunities. This approach improves customer satisfaction, retention, and return on investment.



**Plot 4: Sales by Product Category**



```
category_sales = transactions_df.merge(products_df,  
on='ProductID')category_sales.groupby('Category')['TotalValue'  
].sum().sort_values(ascending=False).plot(kind='bar',  
title='Sales by Product Category')plt.ylabel('Total Sales  
Value')plt.xlabel('Category')plt.savefig(r'C:\Users\DELL\Downlo  
ads\plot_image4.png')plt.show()
```

**7) Profitable Categories and Upselling:** Identifying the most profitable product categories is crucial for optimizing inventory management and product development strategies. By understanding which categories contribute the most to revenue, businesses can allocate resources more effectively, ensuring popular items are always in stock and trends are met. Additionally, focusing on these high-performing categories opens up opportunities for upselling or cross-selling complementary products. For instance, recommending related products or offering bundle deals can increase the average order value, boost overall sales, and enhance the customer experience. A strategic approach to upselling can lead to more engaged customers and improved profitability, driving sustained growth.

### **Combined Analysis:**

1) Analyzing the price distribution alongside sales by category reveals insights into how price sensitivity varies across different categories. For example, categories with lower average prices may see higher volumes of sales, suggesting price sensitivity among customers. In contrast, premium categories with higher prices could still maintain strong sales, indicating that customers are willing to pay a premium for specific items. This combined analysis helps businesses tailor their pricing strategies by identifying price-sensitive categories that require discounts or promotions and premium categories where value-added marketing and pricing can enhance profitability and drive sales growth.

- **Customer Lifetime Value:**

Customer Lifetime Value (CLV) goes beyond assessing total spend by factoring in a customer's entire purchase history and their potential for future purchases. By analyzing past buying behavior, frequency, and transaction amounts, businesses can predict future value and prioritize high-value customers. CLV helps to identify customers who are more likely to become repeat buyers and those with long-term loyalty. This enables businesses to focus retention efforts, such as offering loyalty rewards or personalized promotions, to nurture relationships with the most profitable customers, ensuring sustained revenue streams and boosting overall profitability over time.