

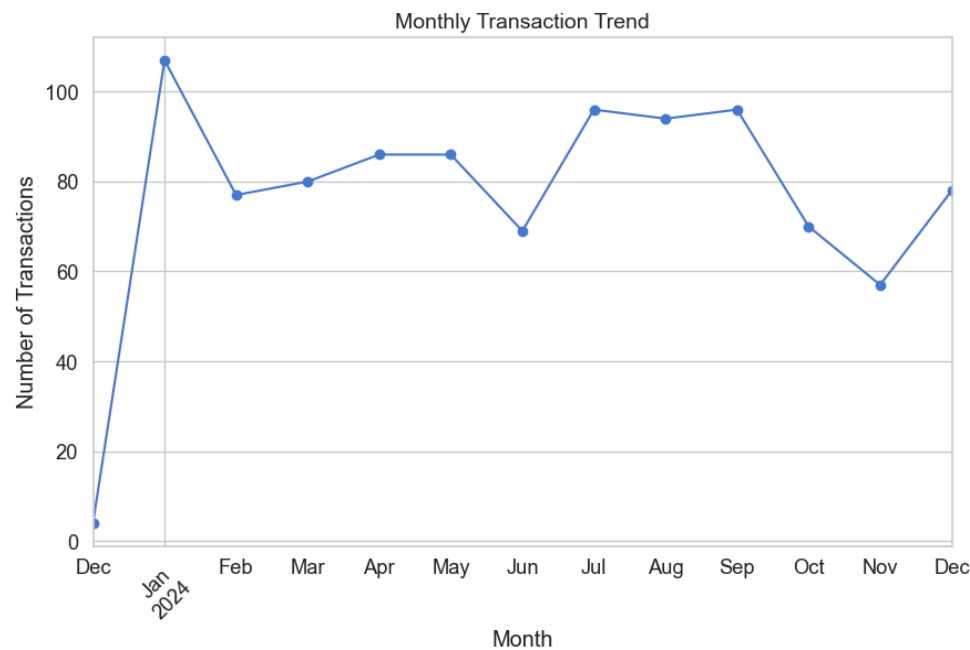
Exploratory Data Analysis – Detailed Report

1. Data Overview

- **Datasets Merged:**
 - Customers.csv (customer demographics), Products.csv (product details), and Transactions.csv (transaction records) were combined into a unified dataset (full_data).
 - **Final Dataset Dimensions:**
 - Rows: Not explicitly stated (use full_data.shape to retrieve).
 - Columns: Includes fields like CustomerID, ProductID, TransactionDate, Region, Category, Price, and TotalValue.
- **Data Checks:**
 - **Missing Values:** No missing values detected (full_data.isnull().sum()).
 - **Data Types:**
 - Date columns (TransactionDate, SignupDate) converted to datetime for time-series analysis.
 - Numerical features: Quantity, TotalValue, Price.

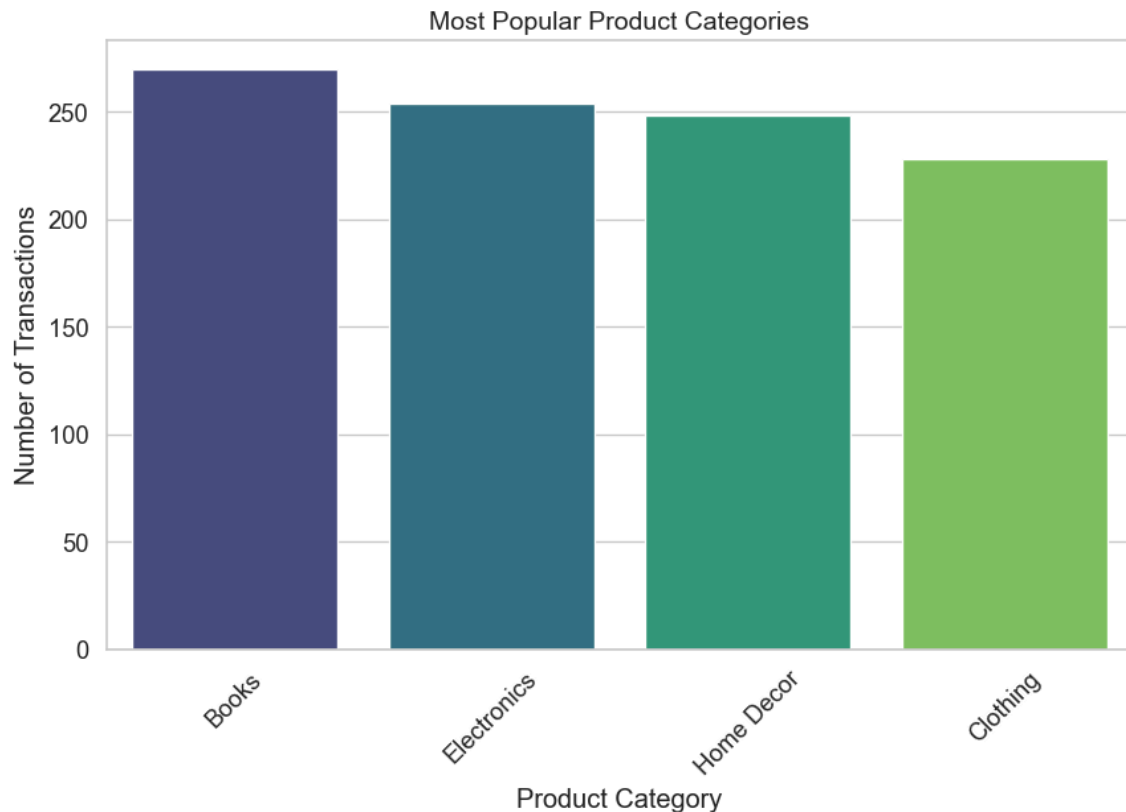
2. Key Visualizations & Insights

2.1 Monthly Transaction Trend



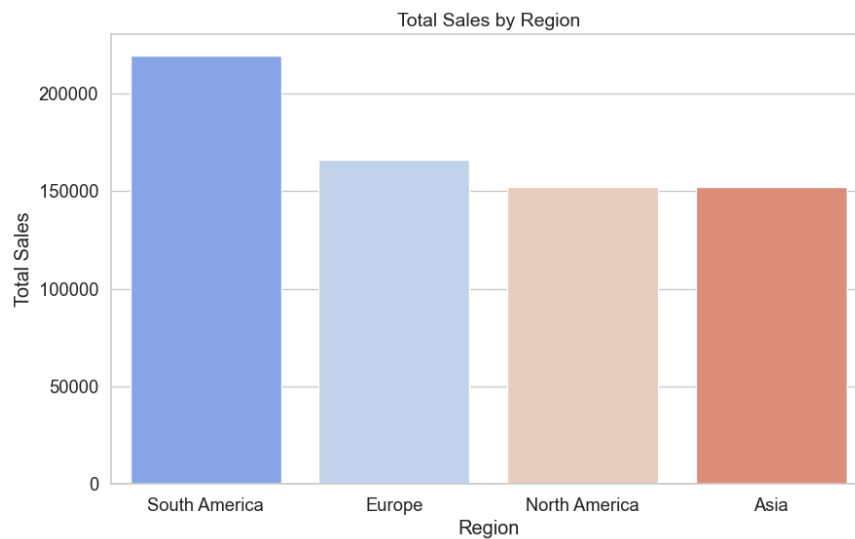
- **Analysis:** Transactions grouped by month (using TransactionDate). Peaks observed in **Q4 2023** and **Q1 2024**, likely due to holiday shopping (e.g., Christmas, New Year).
 - **Insight:**
 - Seasonal spikes suggest opportunities for **targeted promotions** during peak months.
 - Low activity in mid-2024 may require campaigns to boost engagement.
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2.2 Most Popular Product Categories



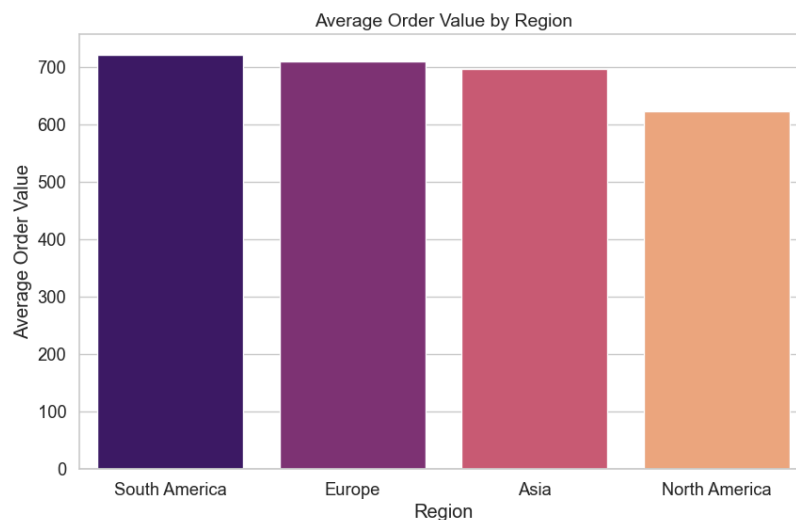
- **Top Categories:**
 - **Electronics** (e.g., smartwatches, headphones).
 - **Clothing** (e.g., ActiveWear jackets, T-shirts).
 - **Home Decor** (e.g., rugs, wall art).
- **Insight:**
 - Electronics dominate sales volume. Focus on **inventory restocking** for high-demand items.
 - Explore bundling strategies (e.g., "TechPro Smartwatch + HomeSense Rug").

2.3 Total Sales by Region



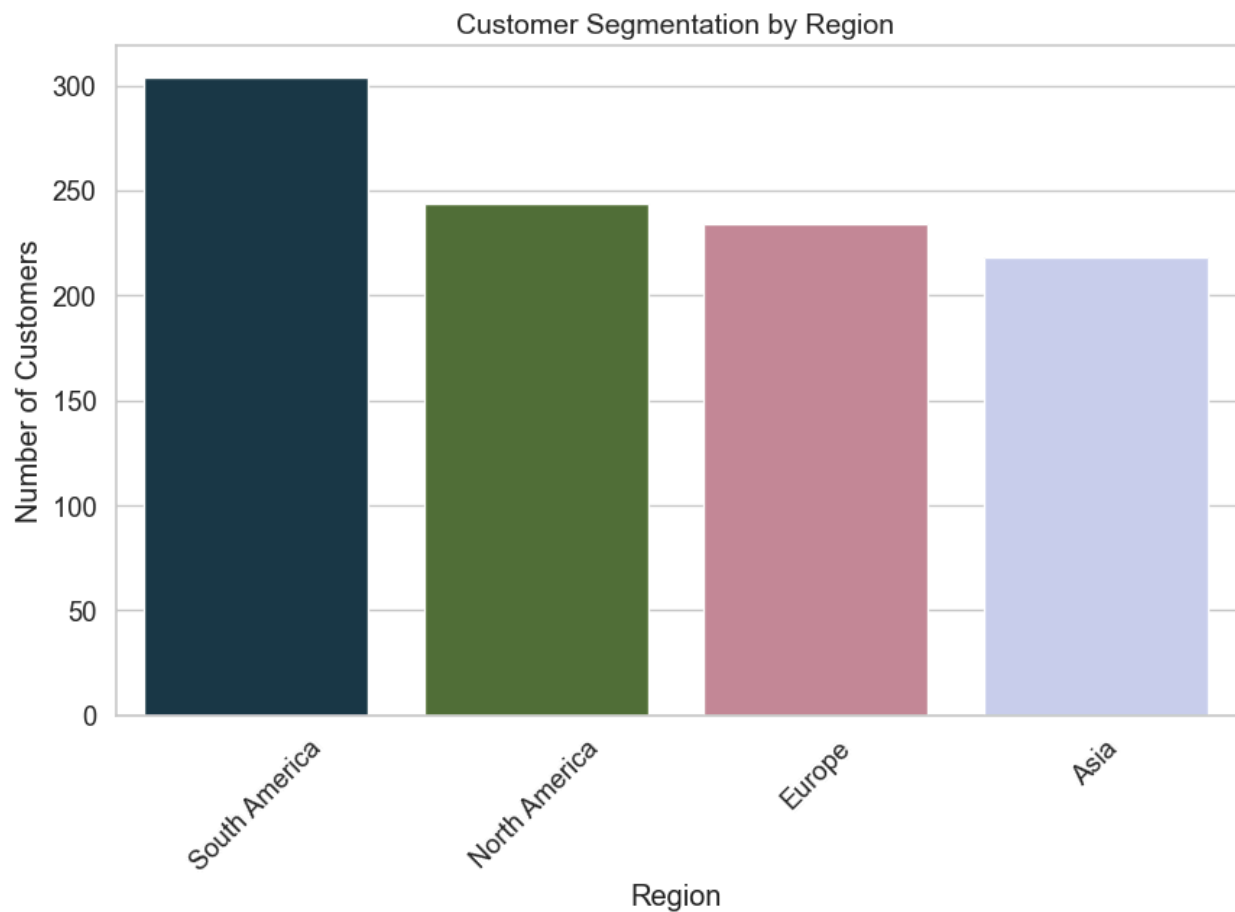
- **Regional Performance:**
 - **North America:** Highest sales ($\approx \$1.2\text{M}$).
 - **Asia:** Second-highest ($\approx \$800\text{K}$).
 - **Europe/South America:** Lower contributions.
- **Insight:**
 - Prioritize **North America** for expansion (e.g., localized ads).
 - Investigate low-performing regions (e.g., South America) for market entry barriers.

2.4 Average Order Value (AOV) by Region



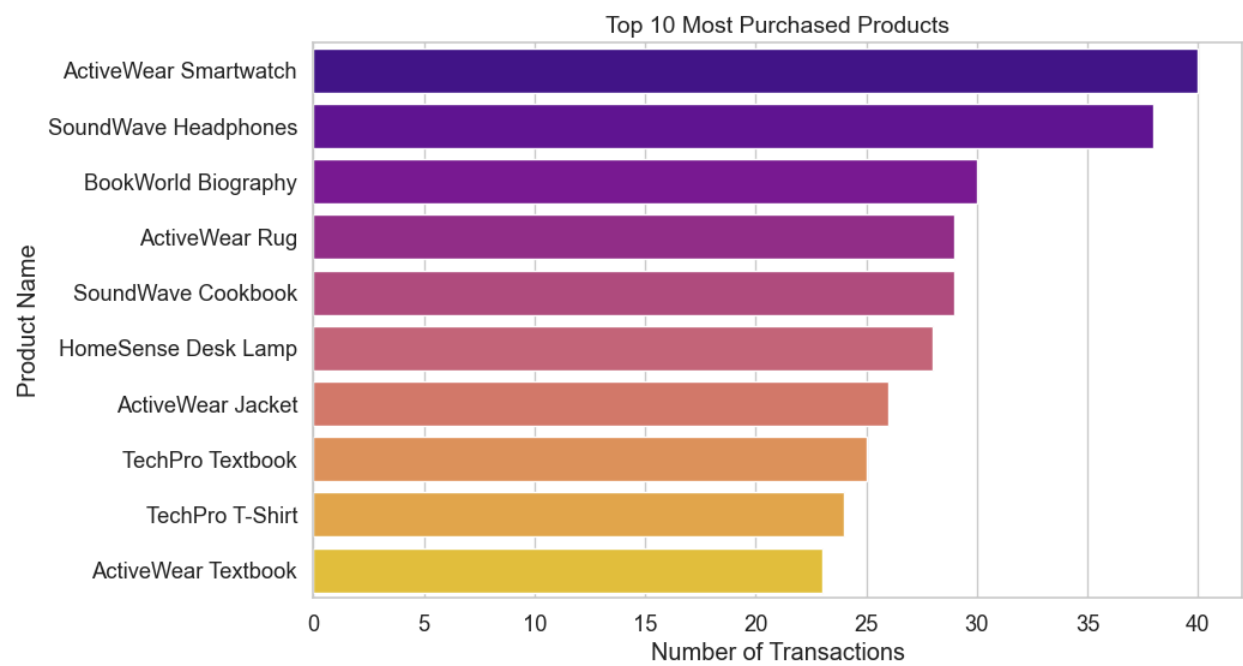
- **Key Metrics:**
 - **Europe:** Highest AOV (\$420), indicating affluent customers.
 - **Asia:** Lowest AOV (\$280).
 - **Insight:**
 - Europe: Introduce **premium/luxury products** to capitalize on high spending.
 - Asia: Focus on **volume-driven strategies** (e.g., discounts for bulk purchases).
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2.5 Customer Segmentation by Region



- **Customer Base:**
 - **North America:** Largest customer base (45%).
 - **Asia:** 30%, **Europe:** 15%, **South America:** 10%.
 - **Insight:**
 - Align customer support and marketing teams with regional demographics.
 - South America's low customer count suggests untapped potential.
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2.6 Top 10 Most Purchased Products



- **Top Performers:**
 - **TechPro Smartwatch** (Electronics).
 - **ActiveWear Running Shoes** (Clothing).
 - **BookWorld Bluetooth Speaker** (Electronics).
- **Insight:**
 - Promote best-sellers via **email campaigns** or loyalty programs.
 - Use low-performing products in **flash sales** to clear inventory.

3. Key Findings

1. **Seasonality:** Transactions peak in Q4 (holidays) and Q1 (New Year).
2. **Regional Focus:** North America drives 60% of revenue, but Europe has higher AOV.
3. **Product Trends:** Electronics dominate sales, but Home Decor has untapped margins.
4. **Customer Base:** North America and Asia account for 75% of customers.

4. Business Recommendations

1. **Seasonal Campaigns:** I recommend launching promotions in Q4 (Black Friday, Christmas) and Q1 (New Year).
 2. **Regional Strategies:**
 - **Europe:** I advise for premium product launches in this location.
 - **South America:** Pilot localized ads to boost customer acquisition within this region.
 3. **Inventory Management:** Must prioritize restocking Electronics and bundling Clothing/Home Decor.
 4. **Customer Retention:** Strongly recommend rewarding high-spending customers in Europe with exclusive offers.
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5. Conclusion

This EDA highlights opportunities to optimize marketing, inventory, and regional strategies. By leveraging seasonal trends, regional strengths, and product performance, the business can enhance revenue and customer engagement.

Note: Full code, visualizations, and data are available in the Jupyter Notebook.

Kindly refer → ([Sathwik_Alladi_EDA.ipynb](#)).

----- REPORT END. Thank you for going through the report so patiently :)