EDA (Exploratory Data Analysis

Data Used in Analysis

1. Customers

	CustomerID	CustomerName	Region	SignupDate
count	200	200	200	200
unique	200	200	4	179
top	C001	Lawrence Carroll	South America	2024-11-11
freq	1	1	59	3

- **This describes that:**
  - There are 200 unique customers.
  - There are 4 unique regions
  - Most customers are from South America

2. Products

	Price
count	100.0000
mean	267.551700
std	143.219383
min	16.080000
25%	147.767500
50%	292.875000
75%	397.090000
max	497.760000

This describes that:

- There are 100 products.
- Average cost of products is 267.55.
- Cheapest product costs 16.08.
- Most expensive product costs 497.76.

3. Transaction

	Quantity	Total Value	Price
count	1000.0000	1000.000000	1000.0000
mean	2.537000	689.9955600	272.55407
std	1.117981	493.1444780	140.73639
min	1.000000	16.08000000	16.080000
max	4.000000	1991.040000	497.76000

This describes that:

- Total transactions happened are 1000.
- Average transaction cost is 272.55.

Business Insights

1. Top Customers By Revenue

- **Observation** : I identified the top 10 customers who generated the highest revenue
- **Insight** :
  - Focusing on these high-value customers can help in creating targeted marketing campaign and loyalty program to retain them and encourage repeat purchases.


```python
n = 10
top_customers = product_bought.groupby('CustomerName')['TotalValue'].sum().sort_values(ascending=False).head(n)
top_customers
```

```
CustomerName
Paul Parsons          10673.87
Bruce Rhodes           8040.39
Gerald Hines           7663.70
William Adams          7634.45
Aimee Taylor           7572.91
Anna Ball              7111.32
Mrs. Kimberly Wright   7073.28
Jennifer Pena          6819.57
Rodney Eaton           6715.72
Juan Mcdaniel          6708.10
Name: TotalValue, dtype: float64
```

- **According to derived information**
  - **High-Value Customers** : Top 10 customers contribute significantly to revenue, with the highest spending over $10,000. Personalised offers and loyalty programs can help retain these high-value customers.
  - A significant portion of revenue comes from a few top customers. Analyzing their purchasing patterns can help attracts similar high-value profiles.
  - Retention strategies like personalised recommendation can strengthen their loyalty.

2. Best Selling Products

- Observation : Best selling products with highest revenue
- Insights :
  - These products serve as key revenue drivers and reflect customer preferences.
  - We can use these products by featuring them in advertisements , also we can bundle any other small product with them or offer discounts which can boost sales.

Revenue by Products
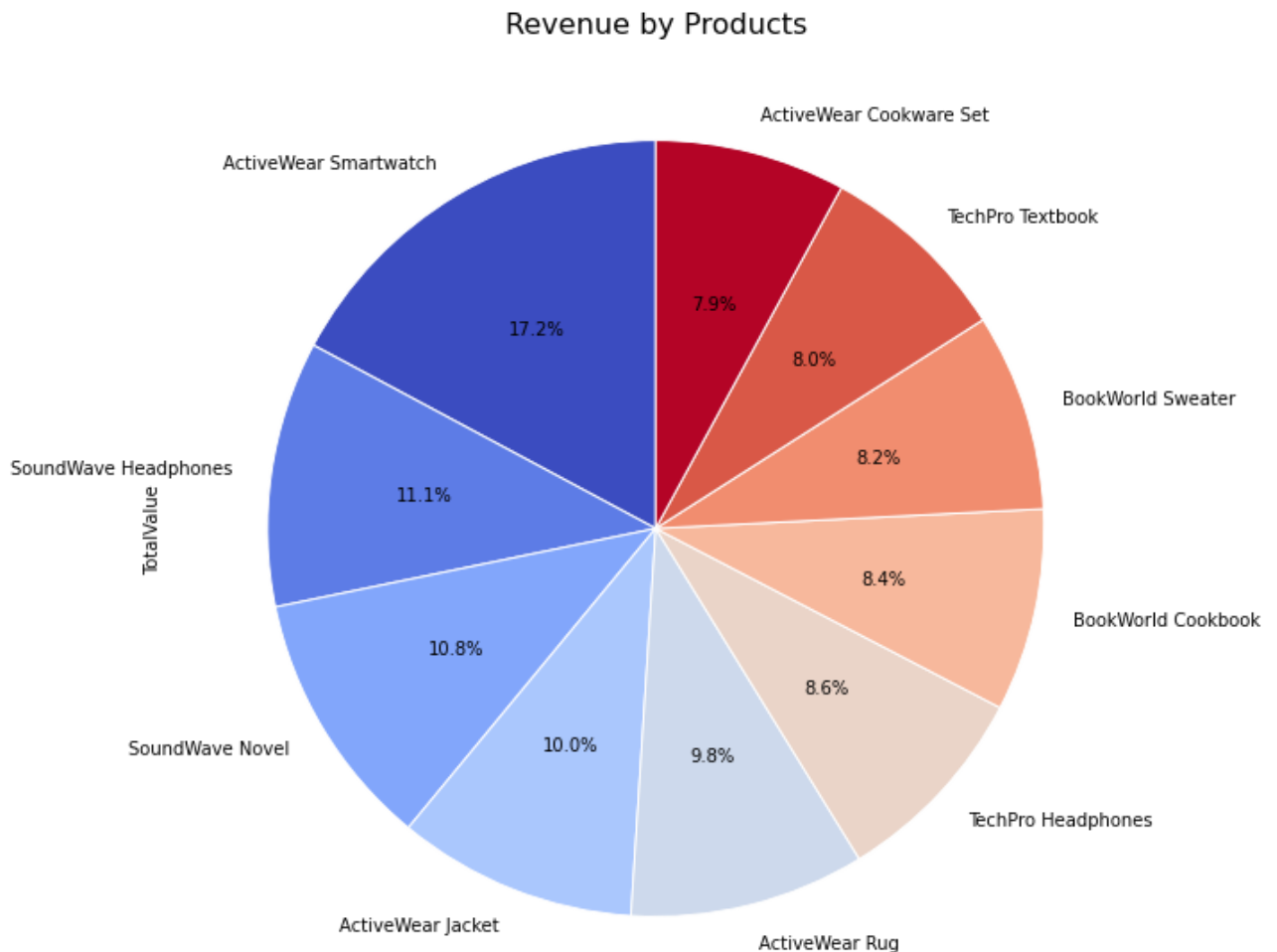
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- # According To This Data
  - Most of the best selling products are from ActiveWear. Around 45% (44.9% exactly) of the products are sold by this company . So we should use this brand in our advertisements and marketing campaigns.
  - We should also sign a deal with the manufacturer or distributor of these products to create monopoly and exclusivity on our platform.

3. Most Selling Categories

- **Observation** : The product categories that generates the highest revenue were identified.
- **Insights** :
  - Popular Categories indicate broader customer preferences ,offering opportunities to expand product offerings within these areas.

Revenue by Categories
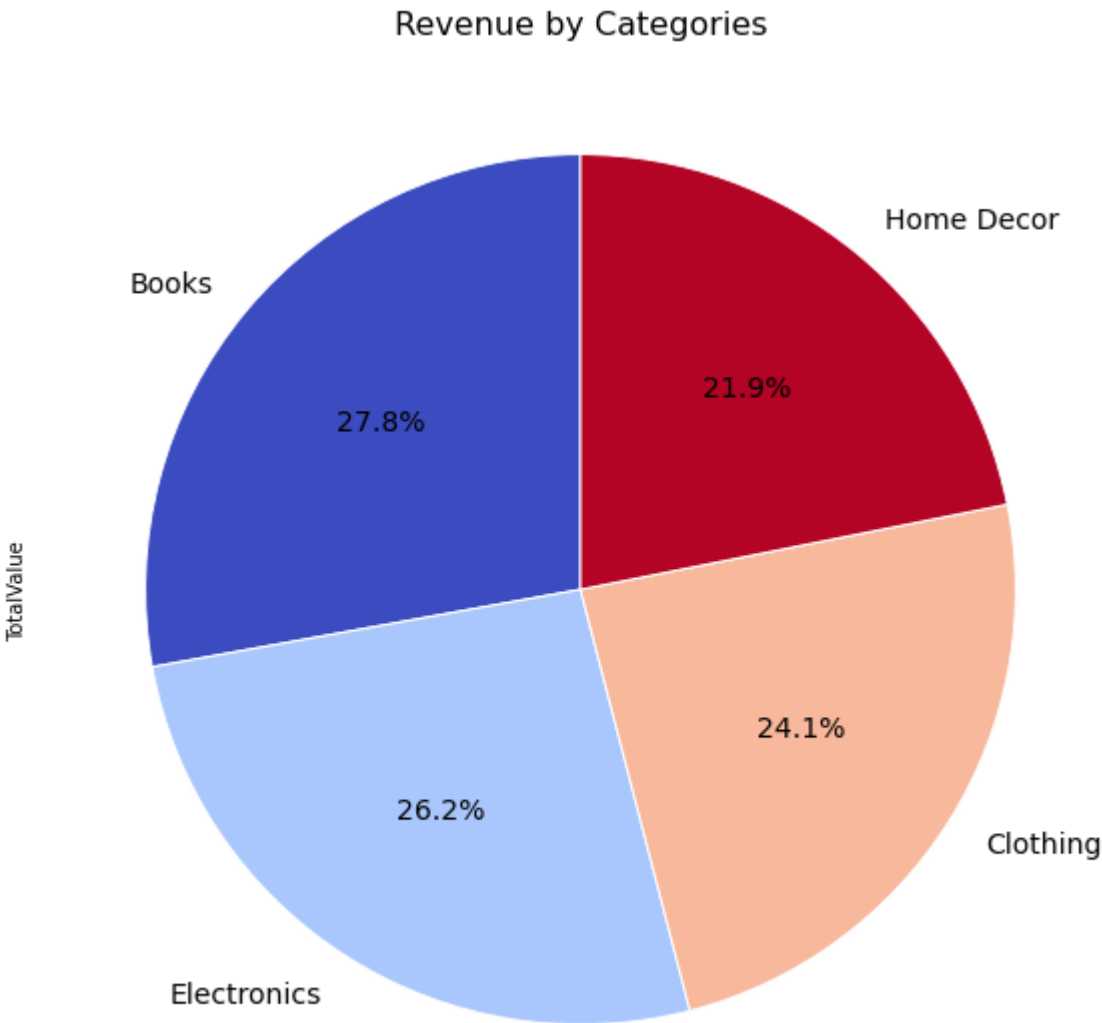
-
-
- **Here Dominating Categories are books and electronics**
  - **Books** : Focus on best sellers and niche genres to cater to diverse audiences. Offer personalized recommendations and bulk discounts to boost sales and customer engagement.
  - **Electronics** : Highlight popular brands and high-demand gadgets. Use bundle offers extended warranties, and seasonal discounts to attract teach-savvy customers and maximize revenues.

4. Frequent Customers

- **Observation** : Transaction frequency of all customer was analysed
- **Insights** :
    - Frequent Customer Indicate a high level of engagement and loyalty . These customers are prime candidates for personalized marketing campaigns , subscription models, or exclusive discounts to strengthen the relationship.
    - Monitoring their purchase trends also helps predict future buying behavior, enabling proactive engagement strategies to prevent churn.


Transactions by Customers Over Time

-
- ## According to this data
    - **Engaged Customers** : Focus on the 3-6 transaction group , as they represent the most active and engaged customers. This group have a potential to be a loyal customer.
    - Target them with personalised offers to encourage more purchases.
    - **Low Activity Customers** : Around 12 (one transaction) + 9 (two transactions) are very less active. Before the number of these kind customers increase , we need to create strategies (discounts , incentive , or personalised advertisement) to re-engage them.
    - **High Loyalty Customers:** The customers with transaction 8-to-11 are highly valuable. Strengthen their loyalty with exclusive perks, early access to new products, or VIP rewards programs.

5. Sales during Particular Time (Season)

- **Observation** : Monthly revenue trends were analyzed to identify seasonal sales patterns.
- **Insights**
  - Seasonal trends highlight peak revenue periods, guiding inventory planning , staffing , and promotional activities. Offering targeted campaigns ,such as holiday-themed discounts , limited-time bundles , or festive promotions during peak seasons , can maximize revenue.

Monthly Revenue by Product Category
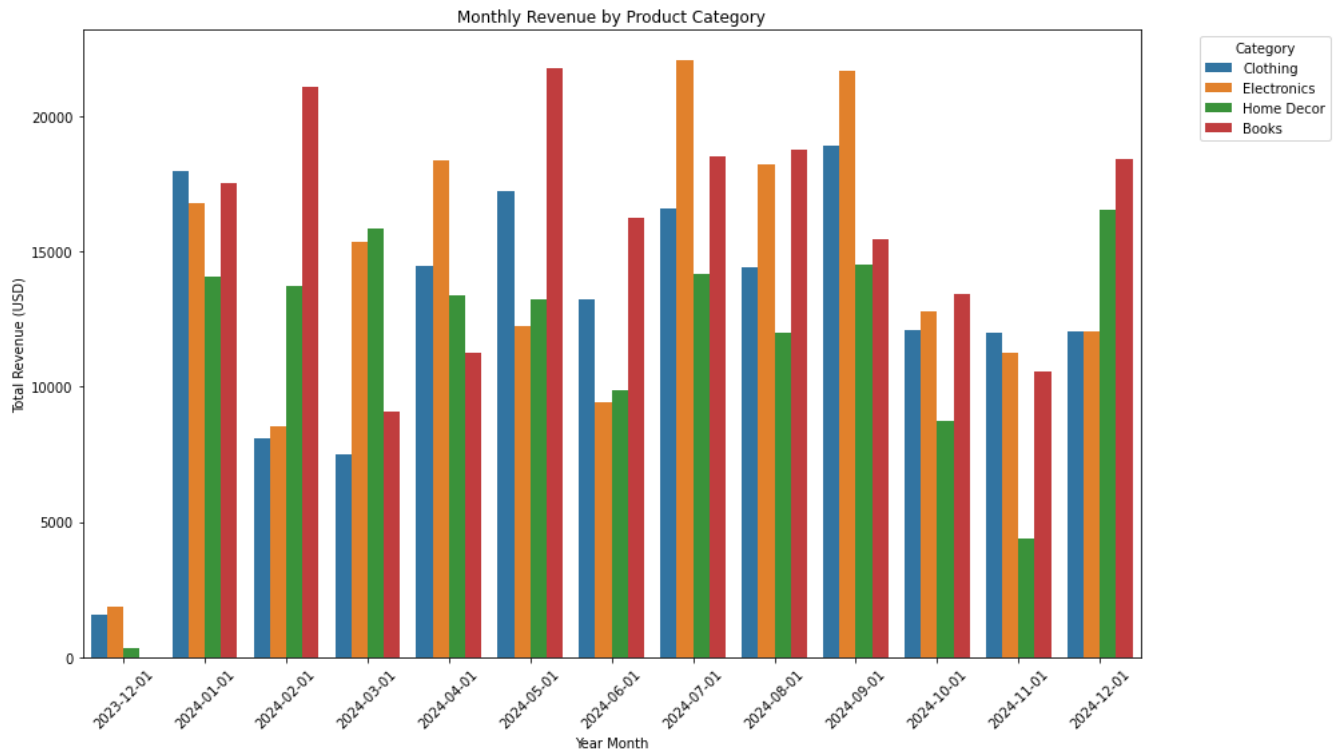
  - ## According To This Information
    - **Electronics** revenue peaks mid-year and end-year , likely due to sales. for example Apple student discount in June and Diwali sales in India during November and Christmas sales in December.
    - **Clothing** maintains a steady revenue but peaks during the season changes. Special promotions time with seasonal changes can hekp maintain and boost clothing sales.
    - **Home Decor** revenue is steady also peaks at early and mid-year. Most of the people renovate their home at any time in a year so it shows a steady behaviour.
    - **Books** : Books show sporadic revenue spikes , notably in Jan , Feb , May and December. Promoting books during these periods and offering bundled deals can enhance sales.