Customer Shopping Behaviour Analysis

1. Project Overview

Project analyses customer shopping behaviour using transactional data from 3,900 purchases across various product categories. The goal is to uncover insights into spending patterns, customer segments, product preferences, and subscription behaviour to guide strategic business decisions.

2. Dataset Summary

- Rows: 3,900
- Columns: 18
- Key Features:
  - Customer demographics (Age, Gender, Location, Subscription Status)
  - Purchase details (Item Purchased, Category, Purchase Amount, Season, Size, Color)
  - Shopping behavior (Discount Applied, Promo Code Used, Previous Purchases, Frequency of Purchases, Review Rating, Shipping Type)
- Missing Data: 37 values in Review Rating column

3. Exploratory Data Analysis using Python

We began with data preparation and cleaning in Python:

- Data Loading: Imported the dataset using pandas.
- Initial Exploration: Used df.info () to check structure and df.describe() for summary statistics.

	Customer ID	Age	Gender	Item Purchased	Category	Purchase Amount (USD)	Location	Size	Color	Season	Review Rating	Subscription Status	Shipping Type	Discou Appli
count	3900.000000	3900.000000	3900	3900	3900	3900.000000	3900	3900	3900	3900	3863.000000	3900	3900	39
unique	NaN	NaN	2	25	4	NaN	50	4	25	4	NaN	2	6	
top	NaN	NaN	Male	Blouse	Clothing	NaN	Montana	M	Olive	Spring	NaN	No	Free Shipping	
freq	NaN	NaN	2652	171	1737	NaN	96	1755	177	999	NaN	2847	675	22
mean	1950.500000	44.068462	NaN	NaN	NaN	59.764359	NaN	NaN	NaN	NaN	3.750065	NaN	NaN	N
std	1125.977353	15.207589	NaN	NaN	NaN	23.685392	NaN	NaN	NaN	NaN	0.716983	NaN	NaN	N
min	1.000000	18.000000	NaN	NaN	NaN	20.000000	NaN	NaN	NaN	NaN	2.500000	NaN	NaN	N
25%	975.750000	31.000000	NaN	NaN	NaN	39.000000	NaN	NaN	NaN	NaN	3.100000	NaN	NaN	N
50%	1950.500000	44.000000	NaN	NaN	NaN	60.000000	NaN	NaN	NaN	NaN	3.800000	NaN	NaN	N
75%	2925.250000	57.000000	NaN	NaN	NaN	81.000000	NaN	NaN	NaN	NaN	4.400000	NaN	NaN	N
max	3900.000000	70.000000	NaN	NaN	NaN	100.000000	NaN	NaN	NaN	NaN	5.000000	NaN	NaN	N

Discount Applied	Promo Code Used	Previous Purchases	Payment Method	Frequency of Purchases
3900	3900	3900.000000	3900	3900
2	2	NaN	6	7
No	No	NaN	PayPal	Every 3 Months
2223	2223	NaN	677	584
NaN	NaN	25.351538	NaN	NaN
NaN	NaN	14.447125	NaN	NaN
NaN	NaN	1.000000	NaN	NaN
NaN	NaN	13.000000	NaN	NaN
NaN	NaN	25.000000	NaN	NaN
NaN	NaN	38.000000	NaN	NaN
NaN	NaN	50.000000	NaN	NaN

● **Missing Data Handling:** Checked for null values and imputed missing values in the Review Rating column using the median rating of each product category.

● **Column Standardization:** Renamed columns to snake case for better readability and documentation.

● **Feature Engineering:**

  ○ Created age_group column by binning customer ages.

  ○ Created purchase_frequency_days column from purchase data.

● **Data Consistency Check:** Verified if discount_applied and promo_code_used were redundant; dropped promo_code_used.

● **Database Integration:** Connected Python script to MySQL and loaded the cleaned DataFrame into the database for SQL analysis.

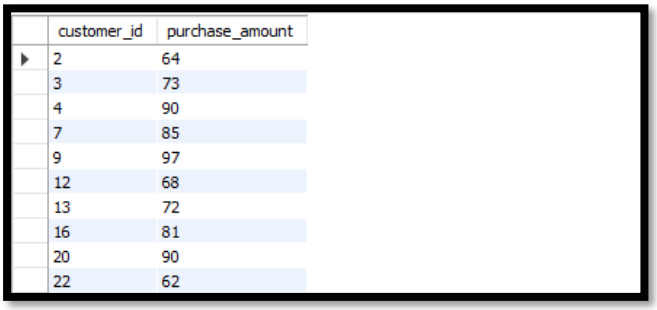
3. Data Analysis using SQL (Business Transactions)

We performed structured analysis in MySQL to answer key business questions

-- Q1. What is the total revenue generated by male vs. female customers?

gender	revenue_generated
Male	157890
Female	75191

-- Q2. Which customers used a discount but still spent more than the average purchase amount?

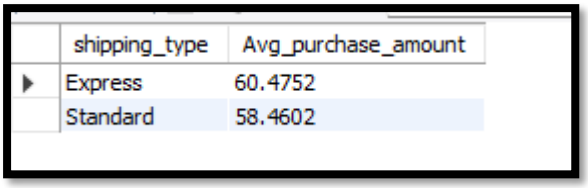


customer_id	purchase_amount
2	64
3	73
4	90
7	85
9	97
12	68
13	72
16	81
20	90
22	62

-- Q3. What are the top 5 products with the highest average review rating?

item_purchased	avg_rating
Gloves	3.86
Sandals	3.84
Boots	3.82
Hat	3.8
Handbag	3.78

-Q4. Compare the average Purchase Amounts between Standard and Express Shipping.



shipping_type	Avg_purchase_amount
Express	60.4752
Standard	58.4602

-Q5. Do subscribed customers spend more? Compare average spend and total revenue between subscribers and non-subscribers.

subscription_status	total_customers	total_purchase_amount	avg_spend
Yes	1053	62645	59.4919
No	2847	170436	59.8651

-- Q6. Which 5 products have the highest percentage of purchases with discounts applied?

item_purchased	discount_rate
Hat	50.00
Sneakers	49.66
Coat	49.07
Sweater	48.17
Pants	47.37

-- Q7. Segment customers into New, Returning, and Loyal based on their total number of previous purchases, and show the count of each segment.

customer_segment	Number of Customers
Loyal	3116
Returning	701
New	83

-- Q8. What are the top 3 most purchased products within each category?

item_Rank	category	item_purchased	total_orders
1	Accessories	Jewelry	171
2	Accessories	Sunglasses	161
3	Accessories	Belt	161
1	Clothing	Blouse	171
2	Clothing	Pants	171
3	Clothing	Shirt	169
1	Footwear	Sandals	160
2	Footwear	Shoes	150
3	Footwear	Sneakers	145

-- Q9. Are customers who are repeat buyers (more than 5 previous purchases) also likely to
subscribe?

subscription_status	repeat_buyers
Yes	958
No	2518

-Q10. What is the revenue contribution of each age group?

	age_group	revenue_contribution
▶	Young adult	62143
	Middle-aged	59197
	Adult	55978
	Senior	55763

4. Dashboard in Power BI

Finally, we built an interactive dashboard in Power BI to present insights visually.

5. Business Recommendations

- Boost Subscriptions – Promote exclusive benefits for subscribers.
- Customer Loyalty Programs – Reward repeats buyers to move them into the “Loyal” segment.
- Review Discount Policy – Balance sales boosts with margin control.
- Product Positioning – Highlight top-rated and best-selling products in campaigns.
- Targeted Marketing – Focus efforts on high-revenue age groups and express-shipping users.