Customer Shopping Behaviour Analysis

1. Project Overview

This 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, Colour)
    - Shopping behaviour (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

I began with data preparation and cleaning in Python:

- **Data Loading:** Imported the dataset using pandas
- **Initial Exploration:** Used df.info() to check structure and .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	Na
std	1125.977353	15.207589	NaN	NaN	NaN	23.685392	NaN	NaN	NaN	NaN	0.716983	NaN	NaN	Na
min	1.000000	18.000000	NaN	NaN	NaN	20.000000	NaN	NaN	NaN	NaN	2.500000	NaN	NaN	Na
25%	975.750000	31.000000	NaN	NaN	NaN	39.000000	NaN	NaN	NaN	NaN	3.100000	NaN	NaN	Na
50%	1950.500000	44.000000	NaN	NaN	NaN	60.000000	NaN	NaN	NaN	NaN	3.800000	NaN	NaN	Na
75%	2925.250000	57.000000	NaN	NaN	NaN	81.000000	NaN	NaN	NaN	NaN	4.400000	NaN	NaN	Na
max	3900.000000	70.000000	NaN	NaN	NaN	100.000000	NaN	NaN	NaN	NaN	5.000000	NaN	NaN	Na

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 Standardisation**: 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.

4. Data Analysis using SQL (Business Transactions)

I performed structured analysis in MySQL to answer key business questions:

1. **Revenue by Gender** – Compared total revenue generated by male vs. female customers.

	gender	revenue
▶	Male	157890.00
	Female	75191.00

2. **High-Spending Discount Users** – Identified customers who used discounts but still spent above the average purchase amount.

	customer_id	purchase_amount_usd
▶	2	64.00
	3	73.00
	4	90.00
	7	85.00
	9	97.00
	12	68.00
	13	72.00
	16	81.00
	20	90.00
	22	62.00
	24	88.00
	29	94.00

3. **Top 5 Products by Rating** – Found products with the highest average review ratings

	item_purchased	Average_Product_Rating
▶	Gloves	3.86
	Sandals	3.84
	Boots	3.82
	Hat	3.80
	Skirt	3.78

4. **Shipping Type Comparison** – Compared average purchase amounts between Standard and Express shipping

	shipping_type	avg_purchase_amount
▶	Express	60.48
	Standard	58.46

5. **Subscribers vs. Non-Subscribers** – Compared average spend and total revenue across subscription status.

	subscription_status	total_customers	avg_spend	total_revenue
▶	No	2847	59.87	170436.00
	Yes	1053	59.49	62645.00

6. **Discount-Dependent Products** – Identified 5 products with the highest percentage of discounted purchases

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

7. **Customer Segmentation** – Classified customers into New, Returning, and Loyal segments based on purchase history.

	customer_segment	Number_of_Customers
▶	Loyal	3116
	Returning	701
	New	83

8. **Top 3 Products per Category** – Listed the 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
	1	Outerwear	Jacket	163
	2	Outerwear	Coat	161

9. **Repeat Buyers & Subscriptions** – Checked whether customers with >5 purchases are more likely to subscribe.

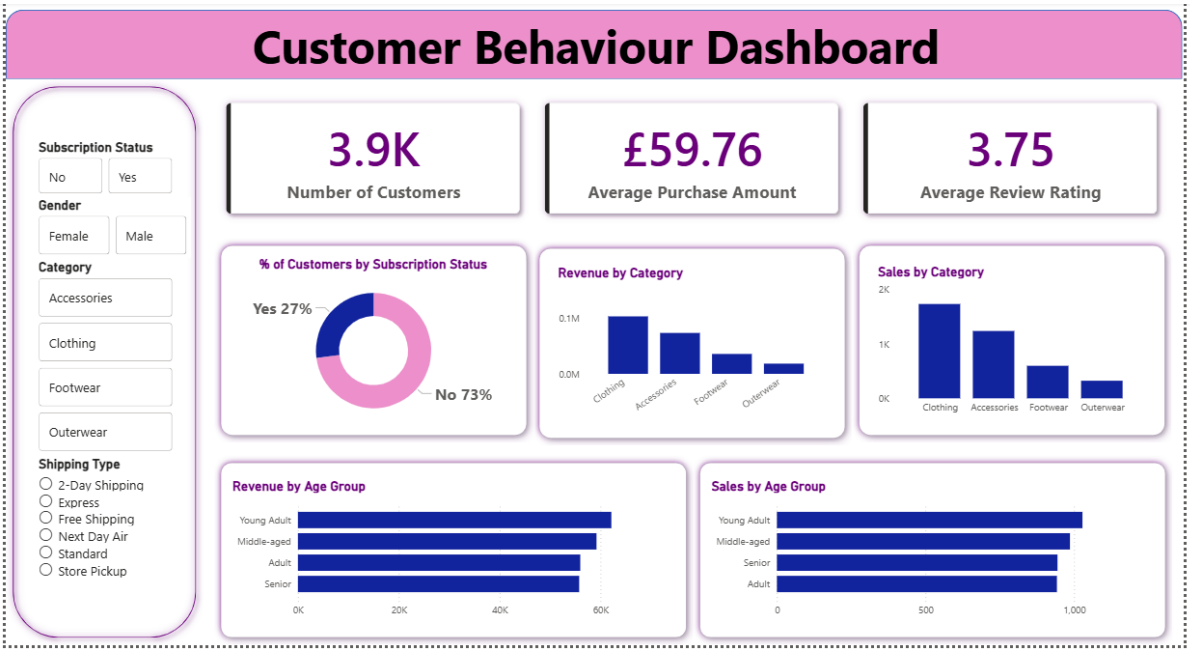
	subscription_status	repeat_buyers
▶	Yes	958
	No	2518

10. **Revenue by Age Group** – Calculated total revenue contribution of each age group.

	age_group	total_revenue
▶	Young Adult	62143.00
	Middle-aged	59197.00
	Adult	55978.00
	Senior	55763.00

5. Dashboard in Power BI

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



6. Business Recommendations

- **Boost Subscriptions -** Promote exclusive benefits for subscribers
- **Customer Loyalty Scheme** – Reward repeat buyers to move them into the “Loyalty segment”
- **Product Positioning** – Highlight top-rated and best-selling products in upcoming campaigns
- **Targeted Marketing** – Focus efforts on high-revenue age groups and express-shipping users