Customer Shopping Behavior Analysis

1. Project Overview

This project analyzes customer shopping behavior 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 behavior 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 the 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 .describe() for summary statistics

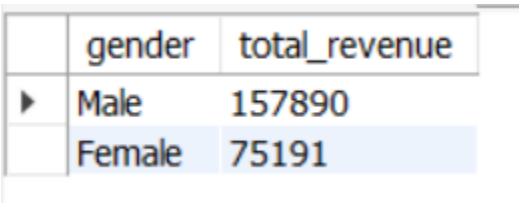
	Customer ID	Age	Purchase Amount (USD)	Review Rating	Previous Purchases
count	3900.000000	3900.000000	3900.000000	3863.000000	3900.000000
mean	1950.500000	44.068462	59.764359	3.750065	25.351538
std	1125.977353	15.207589	23.685392	0.716983	14.447125
min	1.000000	18.000000	20.000000	2.500000	1.000000
25%	975.750000	31.000000	39.000000	3.100000	13.000000
50%	1950.500000	44.000000	60.000000	3.800000	25.000000
75%	2925.250000	57.000000	81.000000	4.400000	38.000000
max	3900.000000	70.000000	100.000000	5.000000	50.000000

- **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 the **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)

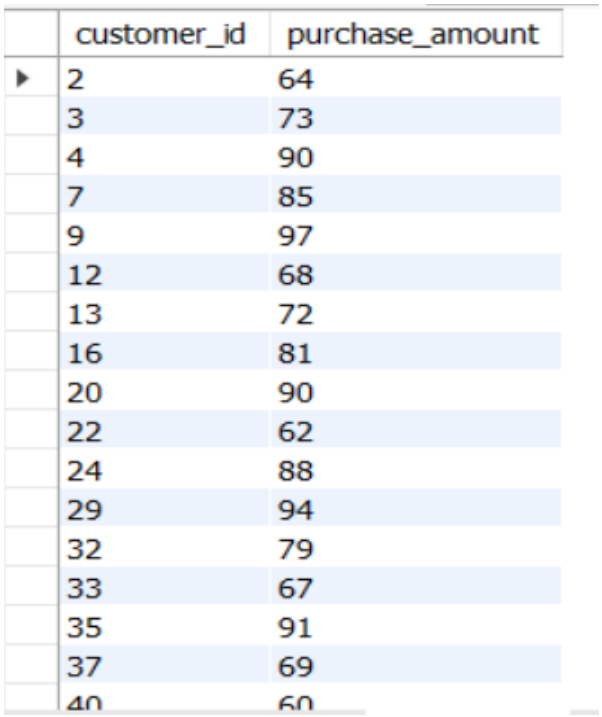
We performed structured analysis in **MySQL** to answer key business questions:

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



gender	total_revenue
Male	157890
Female	75191

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

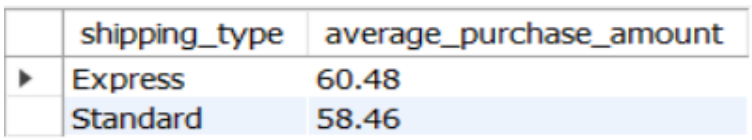


customer_id	purchase_amount
2	64
3	73
4	90
7	85
9	97
12	68
13	72
16	81
20	90
22	62
24	88
29	94
32	79
33	67
35	91
37	69
40	60

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

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

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



shipping_type	average_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	total_revenue	average_spend
Yes	1053	62645	59.49
No	2847	170436	59.87

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

item_purchased	percentage_of_products_discounted
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_segments	number_of_customers
New	83
Returning	701
Loyal	3116

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_customers
Yes	958
No	2518

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

age_group	total_revenue
young_adults	62143
middle-aged	59197
adults	55978
senior	55763

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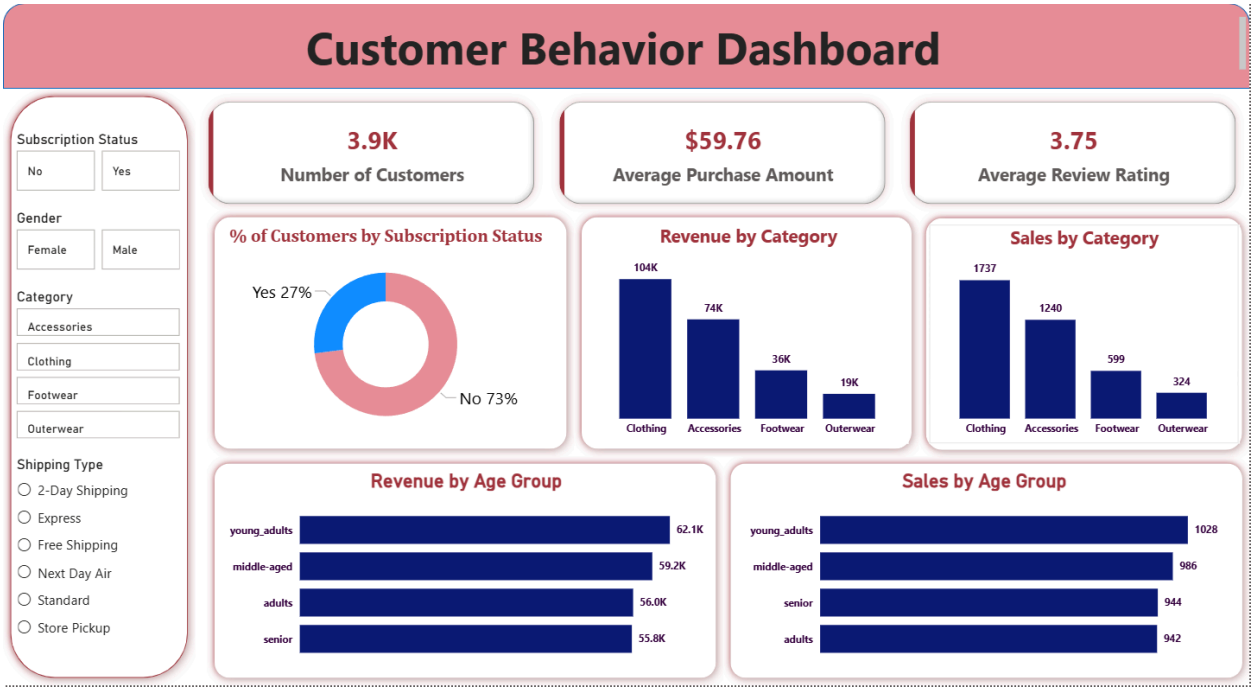
5. Dashboard in Power BI

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



6. Business Recommendations

- **Boost Subscriptions** –
  Promote exclusive benefits for subscribers.
- **Customer Loyalty Programs** –
  Reward repeat 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.