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

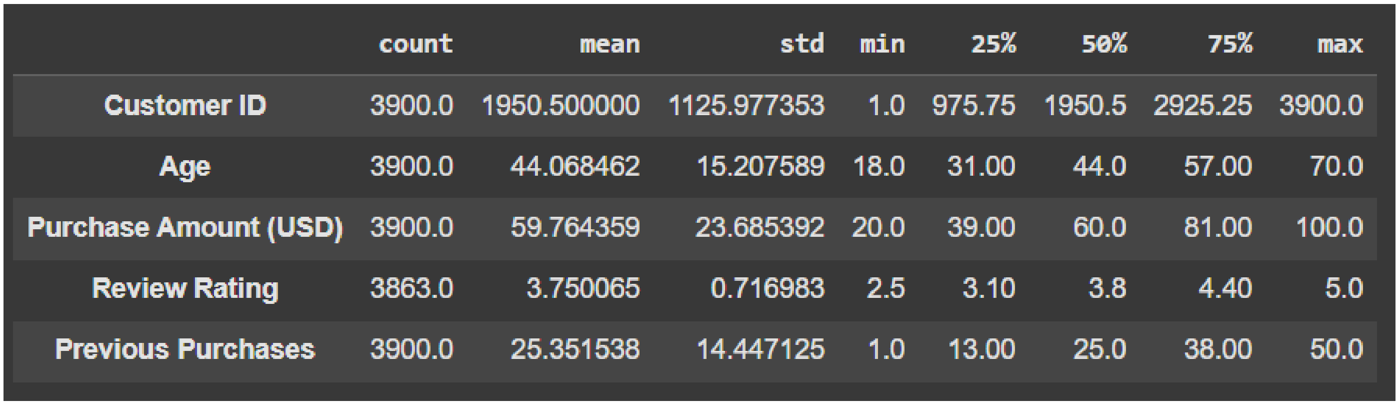
- Rows: 3,900
- Columns: 18
- Key Features:
- Customer demographics (Age, Gender, Location, Subscription Status)
- Purchase details (Item Purchased, Category, Purchase Amount, Season, Size, Color)
- Shopping behavior (Discount Applied, Promo Code Used, Previous Purchases, Frequency of Purchases, Review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

- **Initial Exploration:** Used df.info()to check structure and df.describe() for summary statistics.



	count	mean	std	min	25%	50%	75%	max
Customer ID	3900.0	1950.500000	1125.977353	1.0	975.75	1950.5	2925.25	3900.0
Age	3900.0	44.068462	15.207589	18.0	31.00	44.0	57.00	70.0
Purchase Amount (USD)	3900.0	59.764359	23.685392	20.0	39.00	60.0	81.00	100.0
Review Rating	3863.0	3.750065	0.716983	2.5	3.10	3.8	4.40	5.0
Previous Purchases	3900.0	25.351538	14.447125	1.0	13.00	25.0	38.00	50.0

- **Missing Data Handling:** Checked for null values and imputed missing values in the Review Ratingcolumn 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.

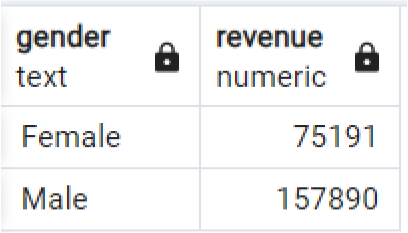
- **Data Consistency Check:** Verified if discount_ applied and promo_code_used were redundant; dropped promo_code_used.

- **Database Integration:** Connected Python script to PostgreSQL and loaded the cleaned Data Frame into the database for SQL analysis.

4. Data Analysis using SQL (Business Transactions)

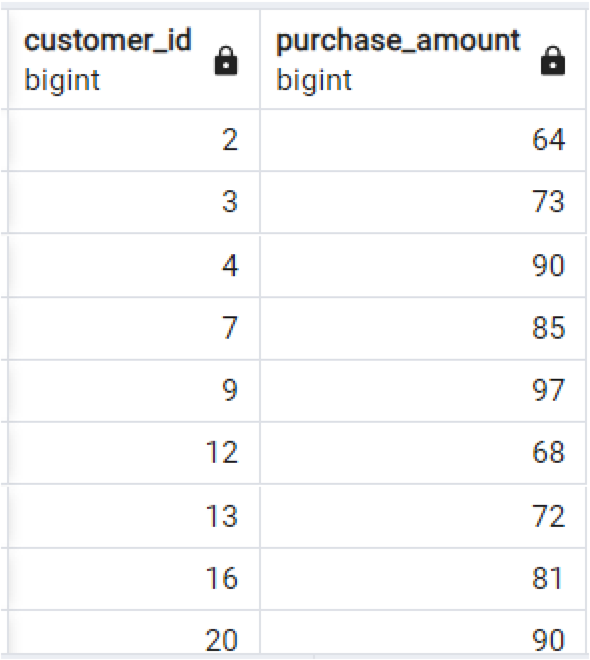
We performed structured analysis in PostgreSQL to answer key business questions:

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



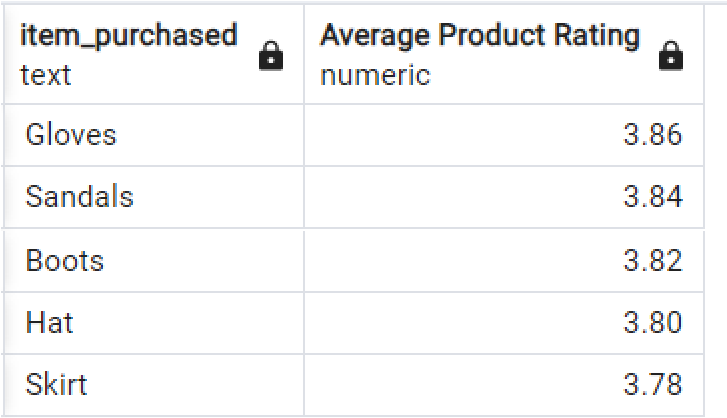
gender text	revenue numeric
Female	75191
Male	157890

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



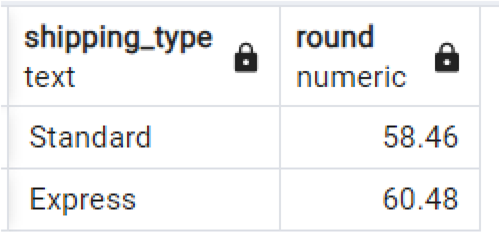
customer_id bigint	purchase_amount bigint
2	64
3	73
4	90
7	85
9	97
12	68
13	72
16	81
20	90

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



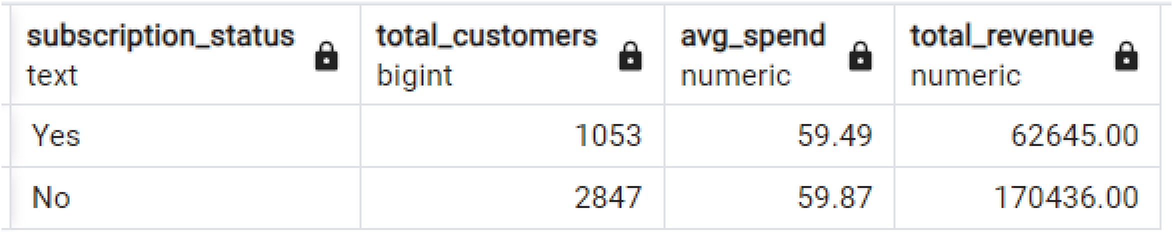
item_purchased text	Average Product Rating numeric
Gloves	3.86
Sandals	3.84
Boots	3.82
Hat	3.80
Skirt	3.78

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



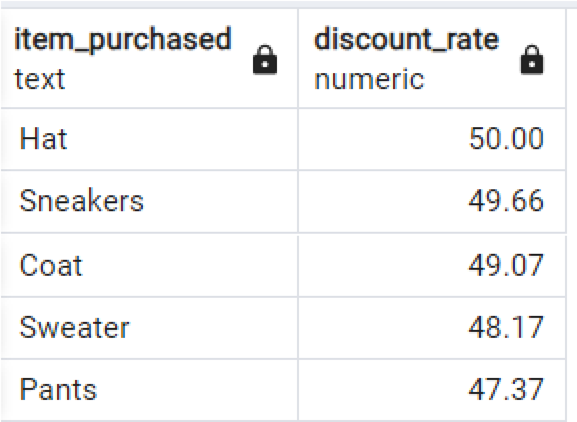
shipping_type text	round numeric
Standard	58.46
Express	60.48

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



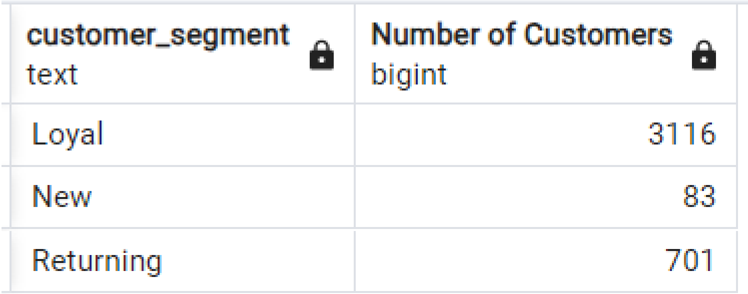
subscription_status text	total_customers bigint	avg_spend numeric	total_revenue numeric
Yes	1053	59.49	62645.00
No	2847	59.87	170436.00

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



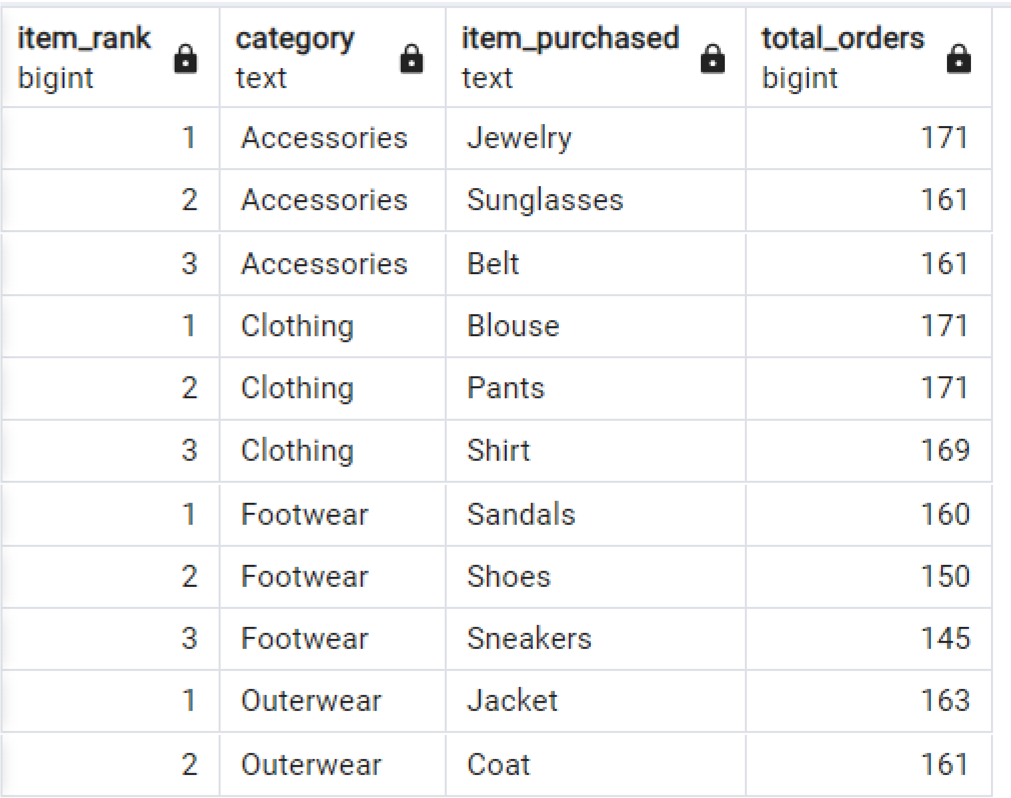
item_purchased text	discount_rate numeric
Hat	50.00
Sneakers	49.66
Coat	49.07
Sweater	48.17
Pants	47.37

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



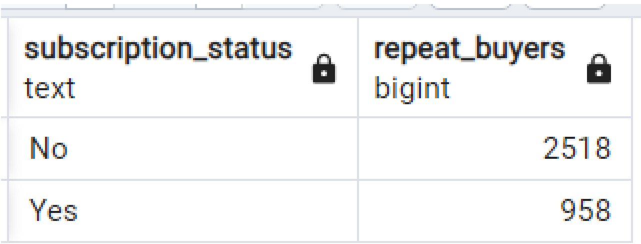
customer_segment text	Number of Customers bigint
Loyal	3116
New	83
Returning	701

8. **Top 3 Products per Category** – Listed the most purchased products within each category.



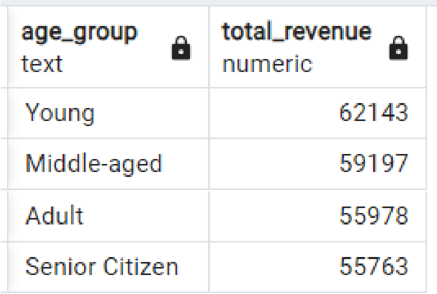
item_rank bigint	category text	item_purchased text	total_orders bigint
1	Accessories	Jewelry	171
2	Accessories	Sunglasses	161
3	Accessories	Belt	161
1	Clothing	Blouse	171
2	Clothing	Pants	171
3	Clothing	Shirt	169
1	Footwear	Sandals	160
2	Footwear	Shoes	150
3	Footwear	Sneakers	145
1	Outerwear	Jacket	163
2	Outerwear	Coat	161

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



subscription_status text	repeat_buyers bigint
No	2518
Yes	958

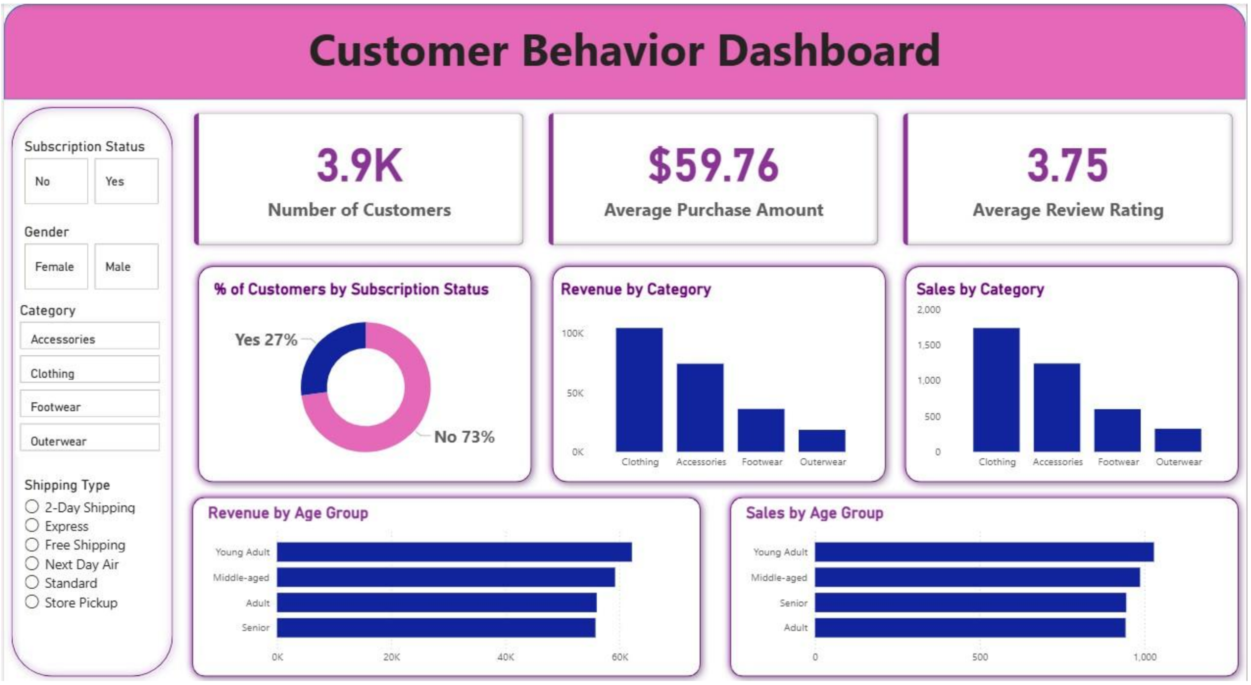
10. **Revenue by Age Group** – Calculated total revenue contribution of each age group.



age_group text	total_revenue numeric
Young	62143
Middle-aged	59197
Adult	55978
Senior Citizen	55763

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.