# 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.

### Initial Exploration

Used df.info() to check structure and .describe() for summary statistics.

### 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.

## 3. Exploratory Data Analysis using Python (cont.)

### 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 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 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 |
|---|---|
| 3 | 64 |
| 4 | 90 |
| 7 | 85 |
| 9 | 97 |
| 12 | 68 |
| 13 | 72 |
| 16 | 81 |
| 20 | 90 |
| 22 | 62 |

Total rows: 839

## 4. Data Analysis using SQL (Business Transactions)

### 1 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 |

### 2 Shipping Type Comparison

Compared average purchase amounts between Standard and Express shipping.

| shipping_type text | round numeric |
|---|---|
| Standard | 58.46 |
| Express | 60.48 |

### 3 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 | 170436.0 |

## 4. Data Analysis using SQL (Business Transactions)

### 1 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 |

### 2 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 |

## 4. Data Analysis using SQL (Business Transactions)

### 1 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 | |

## 4. Data Analysis using SQL (Business Transactions)

### 1 Repeat Buyers & Subscriptions

Checked whether customers with >5 purchases are more likely to subscribe.

| subscription_status text | repeat_buyers bigint |
|---|---|
| No | 2518 |
| Yes | 958 |

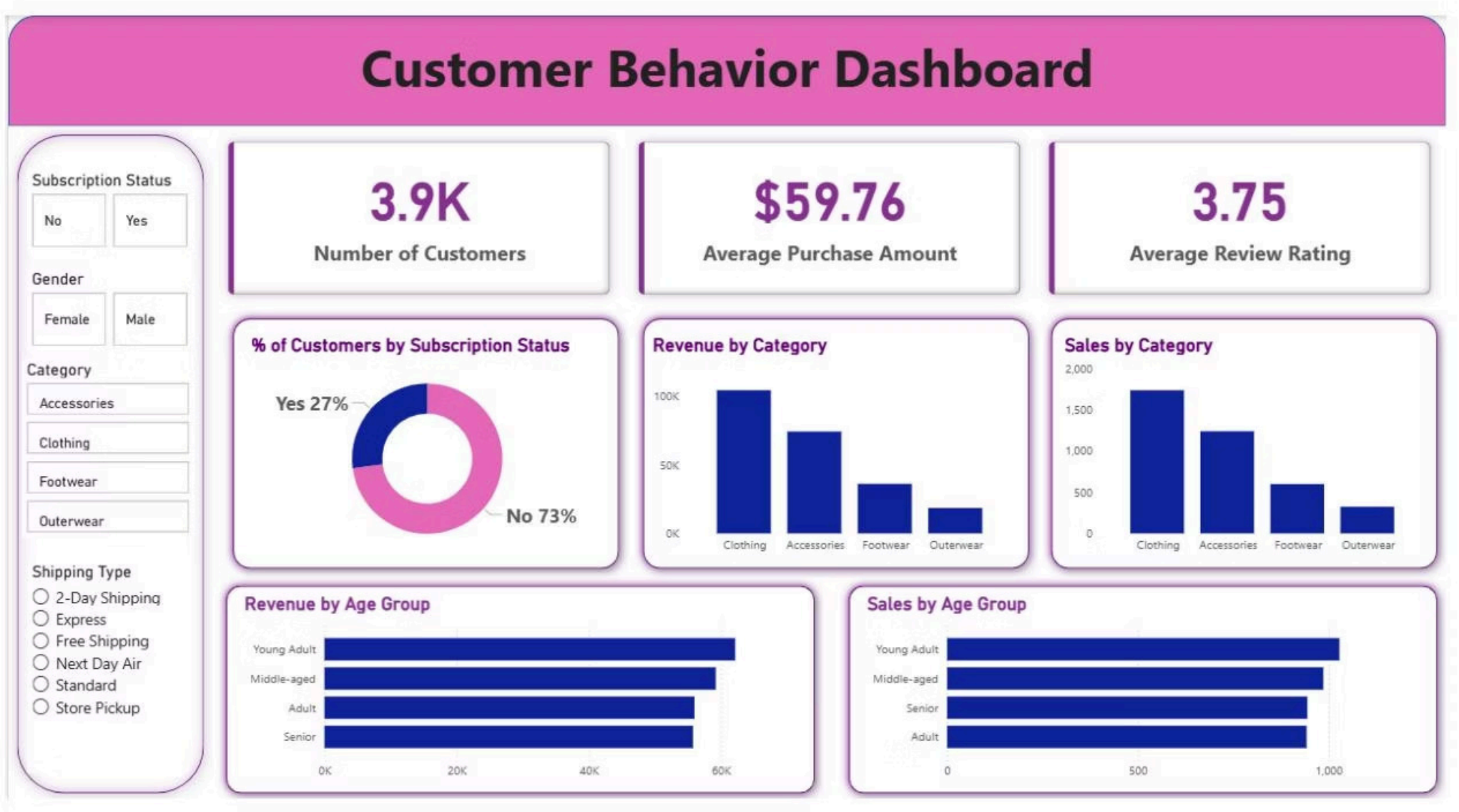
### 2 Revenue by Age Group

Calculated total revenue contribution of each age group.

| age_group text | total_revenue numeric |
|---|---|
| Young Adult | 62143 |
| Middle-aged | 59197 |
| Adult | 55978 |
| Senior | 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.

THANK U!