CUSTOMER RETURN BEHAVIOUR DASHBOARD

1. Project Overview

This project analyzes customer purchase and return patterns for key drivers of product returns. Applying data preprocessing in Python and visualization in Power BI, this study offers practical insights into product categories, demographic factors, and means of payment that contribute to higher return rates. The final objective is to recommend strategies toward the least returns and improvements in CLV.

2. Data Pre-processing

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# 1.IMPORT LIBARARIES
import pandas as pd
import numpy as np

# 2.LOAD DATA FILE
df=pd.read_csv('/content/ecommerce_customer_data_custom_ratios.csv')

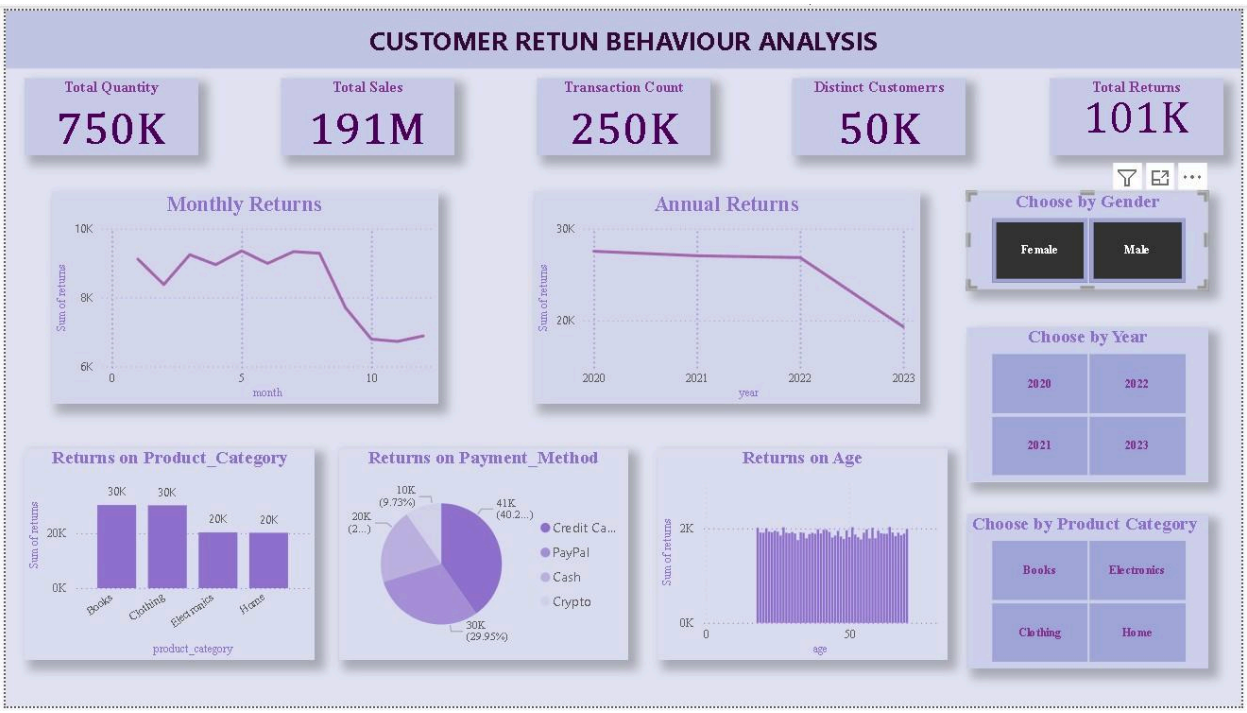
# 3.STANDARDIZE THE COLUMN NAMES
df.columns=df.columns.str.strip().str.replace(' ', '_').str.lower()

# 4.CONVERT DATATYPES
df['purchase_date']=pd.to_datetime(df['purchase_date'],errors='coerce')
df['product_price']=df['product_price'].astype(float)
df['total_purchase_amount']=df['total_purchase_amount'].astype(float)
df['quantity']=df['quantity'].astype(int)
df['returns']=df['returns'].fillna(0).astype(int)

# 5.HANDLE MISSING VALAUES
df['customer_name']=df['customer_name'].fillna('No name')
df['product_category']=df['product_category'].fillna('Misc')
df['payment_method']=df['payment_method'].fillna('Unknown')
df['gender']=df['gender'].fillna('Unknown')

# 6.REMOVE NEGATIVE OR INVALID VALUES
df=df[df['quantity']>0]
df=df[df['product_price']>0]
```

3. Power BI Dashboard Design



4. Key Insights & Findings

- The business achieved 750K total quantity sold and ₹191M in total sales across 250K transactions, indicating strong sales performance.
- 101K total returns highlight a notable return rate that requires continuous monitoring to protect profitability.
- Monthly returns remained high for most of the year but declined sharply in the final months, suggesting improved operational control or seasonal buying behavior.
- Annual returns decreased steadily from 2020 to 2023, with a significant drop in 2023, indicating successful improvements in product quality, logistics, and return policies.
- Books and Clothing recorded the highest return volumes, pointing to issues such as product expectations, sizing, or description accuracy.

- Credit card payments account for the highest share of returns, followed by digital payment methods, showing a correlation between payment flexibility and return behavior.

- Return behavior is evenly spread across age groups and genders, indicating that returns are primarily influenced by product and service factors rather than demographics.

- Interactive filters (Year, Gender, Product Category) enable quick identification of high-return segments and trends.

5. Conclusion

This Customer Return Behaviour Analysis project effectively uses Power BI to analyze return patterns across time, product categories, payment methods, and customer demographics. While overall sales performance is strong, returns—especially in Clothing and Books—remain a key challenge. The declining annual return trend, reflects positive improvements in business processes and customer satisfaction. Data preprocessing and cleaning were performed using Python to ensure data accuracy, consistency, and reliability before visualization, enabling meaningful insights and data-driven decision-making to improve profitability and operational efficiency.

Project Submitted By
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