

## **Assignment 2**

### **SmartRetail's Growing Challenges in Customer Engagement**

SmartRetail, a rapidly growing online retailer, has been a strong player in the e-commerce space, offering a wide range of products spanning fashion, electronics, home essentials, and groceries. Despite its large and diverse customer base, the company has struggled with customer engagement, inefficient marketing campaigns, and high acquisition costs. Unlike competitors who use data-driven marketing strategies, SmartRetail still relies heavily on mass marketing tactics, leading to ineffective customer outreach and wasted advertising spend.

The company's leadership team is concerned that customer retention rates have plateaued, and marketing campaigns are failing to reach the right audience. While SmartRetail collects vast amounts of customer data the marketing team lacks a systematic approach to leveraging this information to drive personalized, high-converting marketing strategies.

#### **The CEO's Call for a Data-Driven Strategy**

During a recent board meeting, Sarah Lin, the CEO of SmartRetail, expressed frustration over the company's stagnant customer retention rates and the ineffectiveness of recent discount-driven campaigns. The Chief Marketing Officer (CMO) argued that increasing promotional offers to all customers could boost engagement. However, the Chief Financial Officer (CFO) warned that widespread discounting could erode profitability and damage the company's margins.

Sarah Lin saw an opportunity to pivot toward a more strategic and data-driven approach to customer segmentation and personalized marketing. She established the Customer Intelligence Taskforce, an initiative aimed at leveraging machine learning and business analytics to develop a targeted customer engagement strategy. The taskforce will play a pivotal role in identifying valuable customer segments, predicting future purchasing behavior, and crafting highly personalized marketing campaigns.

#### **Your Role as a Business Analytics Consultant**

You have been hired as a Business Analytics Consultant on SmartRetail's newly formed Customer Intelligence Taskforce. Your primary responsibility is to utilize machine learning models and business analytics techniques to extract insights from customer data and formulate actionable recommendations for the company's marketing team.

#### **Available Customer Data**

SmartRetail has provided access to a dataset containing the following customer information about the last interaction with the company:

- Customer ID - Unique identifier for each customer
- Age - Age of the customer
- Gender - Gender of the customer (Male/Female)
- Item Purchased - The item purchased by the customer
- Category - Category of the item purchased
- Purchase Amount (USD) - The amount of the purchase in USD

- Location - Location where the purchase was made
- Size - Size of the purchased item
- Color - Color of the purchased item
- Season - Season during which the purchase was made
- Review Rating - Rating given by the customer for the purchased item
- Subscription Status - Indicates if the customer has a subscription (Yes/No)
- Shipping Type - Type of shipping chosen by the customer
- Discount Applied - Indicates if a discount was applied to the purchase (Yes/No)
- Promo Code Used - Indicates if a promo code was used for the purchase (Yes/No)
- Previous Purchases - The total count of transactions concluded by the customer at the store, excluding the ongoing transaction
- Payment Method - Customer's most preferred payment method
- Frequency of Purchases - Frequency at which the customer makes purchases (e.g., Weekly, Fortnightly, Monthly)

### The Urgency to Act

The executive team expects data-backed recommendations to inform SmartRetail's marketing strategy within the next quarter. With rising competition from AI-driven retailers like Amazon and Shopify, SmartRetail must pivot toward intelligent, data-driven decision-making to avoid losing market share.

The Customer Intelligence Taskforce has one clear mandate: *"Leverage machine learning to transition from mass marketing to targeted, high-conversion strategies while maintaining profitability."*

The company is counting on your expertise to transform data into insights, and insights into action.

### Instructions

1. **Download the Dataset:** Use the **SmartRetail's Dataset** from Moodle
2. **Complete All Tasks:** Follow the tasks outlined below step-by-step.
3. **Prepare Files for Submission:** Submit your work as a ZIP file named: `StudentNumber_Assignment2.zip`. This ZIP file should contain:
  - A Jupyter Notebook file (`StudentNumber_Assignment2.ipynb`).
4. **Upload to Moodle:** Submit the ZIP file on Moodle under the appropriate assignment link before the deadline.

### Question 1 3 points

SmartRetail's marketing team is eager to better understand customer behaviour before implementing AI-driven solutions. Currently, the company lacks visibility into how different customer segments interact with its platform. Without these insights, marketing efforts remain inefficient and untargeted. A thorough data exploration process is required to uncover trends, which will form the foundation for segmentation and predictive modelling efforts.

Generate visualizations (bar charts, histograms, heatmaps) to detect trends and summarize the main customer spending patterns & engagement trends.

**Q1.1** - Provide three insights you extracted from the EDA analysis [Free text + code] *3 points*

**Question 2** *6 points*

SmartRetail's marketing team recognizes that different customer groups have distinct shopping behaviors, preferences, and spending habits. By continuing with a one-size-fits-all marketing approach, the company risks alienating high-value customers while overspending on ineffective promotions for low-value segments. The goal is to identify actionable customer segments that will allow SmartRetail to tailor its marketing campaigns for maximum impact.

**Q2.1.** Please provide the number of customers segments. [Free text + code] *3 points*

**Q2.2.** Are the customers segments well defined? How did you measure it? [Free text + code] *1.5 points*

**Q2.2.** Interpret the customer segments [Free text] *1.5 points*

**Question 3** *5 points*

Customer retention remains a key challenge for SmartRetail. SmartRetail is concerned about customer retention. Instead of predicting churn, the company wants to be able to identify loyal customers who consistently shop and engage with the platform through subscription. This will help enhance loyalty programs and retention strategies.

**Q3.1.** Develop two models to answer the company need. Why did you choose those models? [Free text + code] *3 points*

**Q3.2.** Which model would you choose to be deployed? Which metric did you consider in the decision? Why? [Free text] *2 points*

**Question 4.** *6 points*

SmartRetail is looking to enhance its customer engagement and increase sales by moving away from static product suggestions toward a more dynamic and personalized approach. Given the available data, the company wants to explore how customer shopping behavior, purchase frequency, and spending patterns can be leveraged to make more relevant recommendations.

**Q4.1** With this in mind, how can SmartRetail develop a recommendation system that better aligns with customer purchasing behavior and preferences? What approach would you take to ensure recommendations are relevant and personalized? Justify your choice and demonstrate your implementation. [Free text + code] *4 points*

**Q4.2** How do you evaluate the model? [Free text + code] *1 points*

**Q4.3** Please give two suggestions to improve the dataset in the context of the recommendations systems [Free text ] *1 points*