

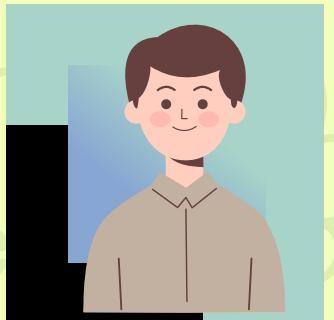
# MARKETING CAMPAIGN

RAKAMIN DATA SCIENCE BOOTCAMP  
BATCH 38

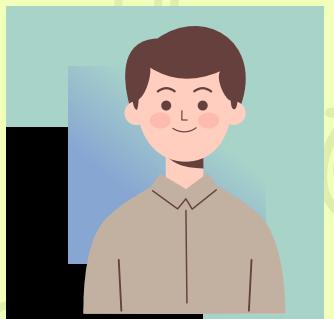
VIDA SUPERSTORE



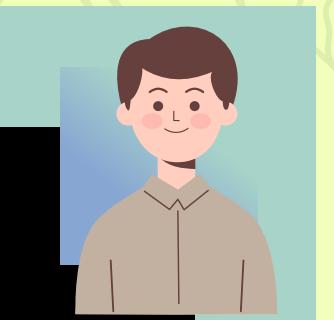
# OUR CREATIVE TEAM



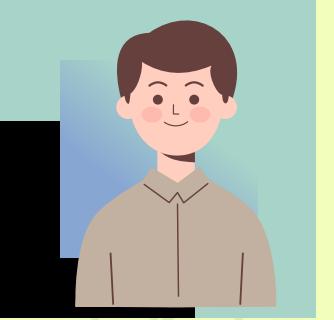
**ARI HASUDUNGAN**



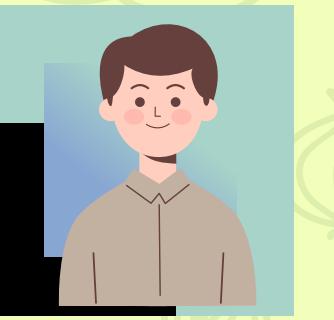
**HELGA FAVIAN**



**M. YAZID PRATAMA**



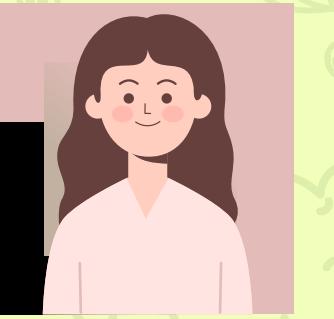
**M. HAMSYAH SYAIFUDIN**



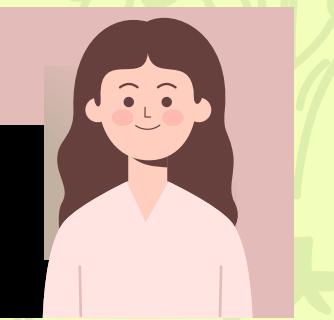
**ZULFIKAR FAUZI**



**NISHRINA RAWI**



**SHANIA TAMARA F.**



**ZAHRA SHAFA M.**



# OUR OUTLINE

**BUSINESS  
UNDERSTANDING**



**EXPLORATORY  
DATA ANALYSIS**



**DATA  
PREPROCESSING**



**MODELLING AND  
EVALUATION**



**BUSINESS  
RECOMMENDATION**



# PROBLEM STATEMENT

## Marketing Campaign Response Rate

**14.9%**

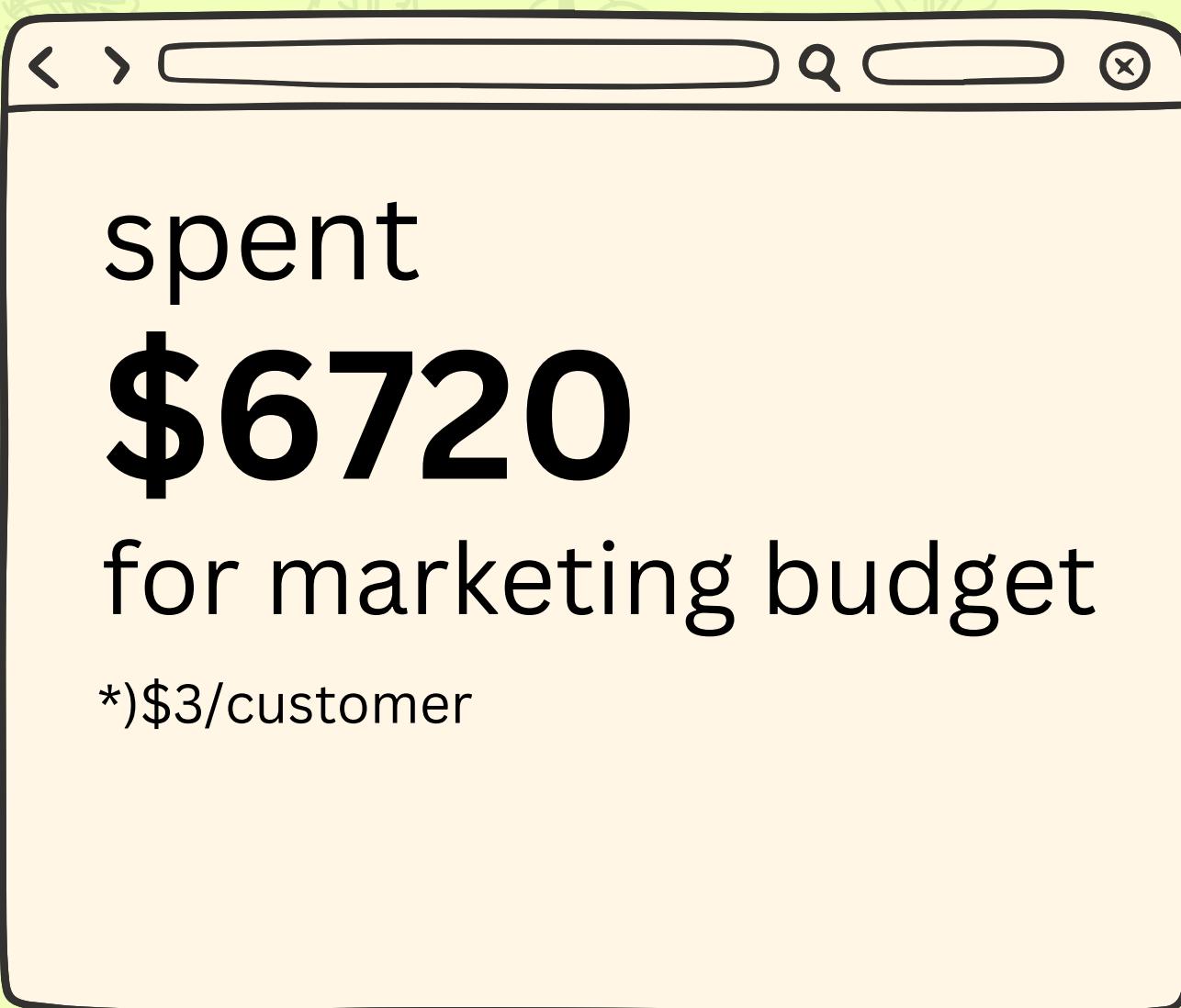
Only 334 out of 2240 customers **respond** the marketing campaign

**85.1%**

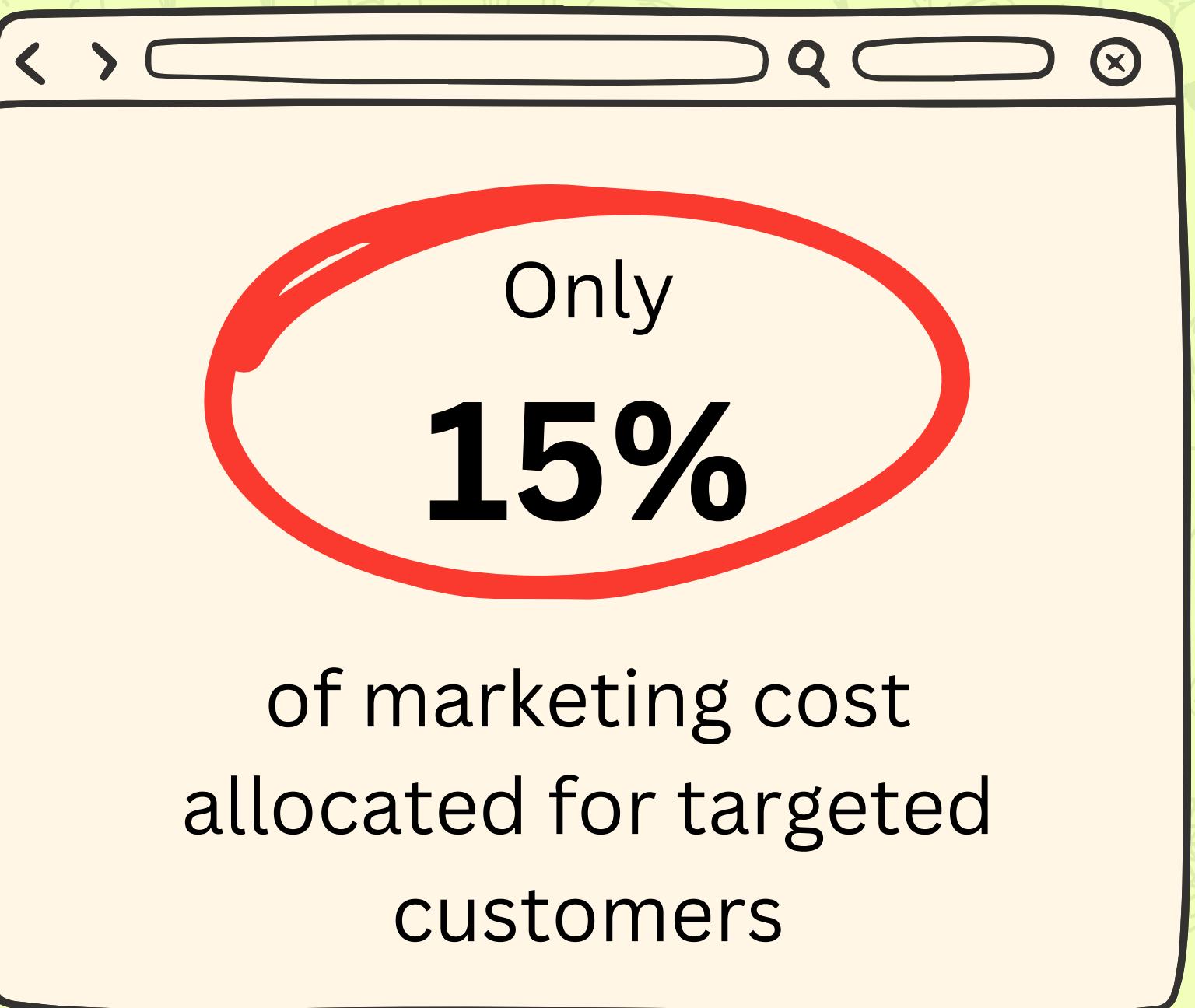
1904 out of 2240 customers **not respond** the marketing campaign



# PROBLEM STATEMENT



## Inefficient Marketing Cost





# BUSINESS UNDERSTANDING

## GOALS, OBJECTIVE, AND BUSINESS METRICS

### GOALS

Increasing marketing campaign response rate and reducing expenses by lowering marketing cost

### OBJECTIVE

1. Build machine learning model to predict customer who likely to accept the marketing campaign
2. Segmenting customers using RFM Analysis to help decide on the marketing campaign plan

### BUSINESS METRICS

1. Response Rate (RR)
2. Cost Per Acquisition
3. Marketing Budget Efficiency

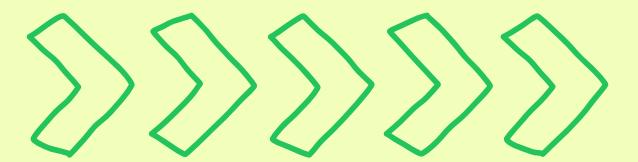
# EXPLORATORY DATA ANALYSIS

the process of visually and statistically examining datasets to uncover patterns, trends, and anomalies, facilitating a deeper understanding of the data's characteristics and informing subsequent analytical decisions.

DATA UNDERSTANDING

BUSINESS INSIGHT





# DATA UNDERSTANDING

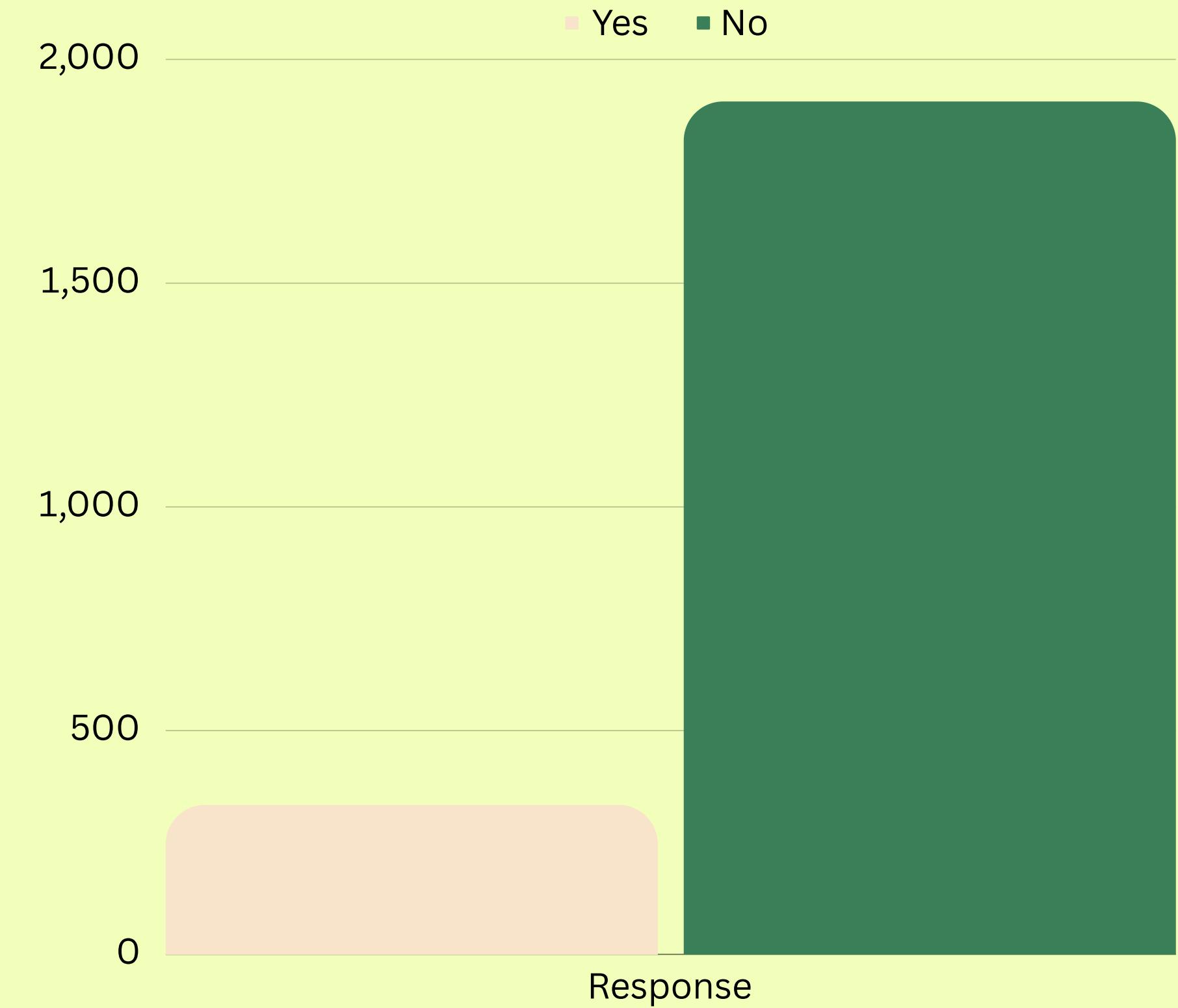


| RESPONSES CAMPAIGN       | ABOUT CUSTOMER | PRODUCT TYPE     | NUMBER OF PURCHASES |
|--------------------------|----------------|------------------|---------------------|
| ACCEPTEDCMP1             | DTCUSTOMER     | MNTFISHPRODUCTS  | NUMDEALSPURCHASES   |
| ACCEPTEDCMP2             | EDUCATION      | MNTMEATPRODUCTS  | NUMCATALOGPURCHASES |
| ACCEPTEDCMP3             | MARITAL        | MNTFRUITS        | NUMSTOREPURCHASES   |
| ACCEPTEDCMP4             | KIDHOME        | MNTSWEETPRODUCTS | NUMWEBPURCHASES     |
| ACCEPTEDCMP5             | TEENHOME       | MNTWINES         | NUMWEBVISITSMONTH   |
| COMPLAIN                 | INCOME         | MNTGOLDPRODS     |                     |
| <b>RESPONSE (TARGET)</b> |                |                  |                     |



# Business Insights

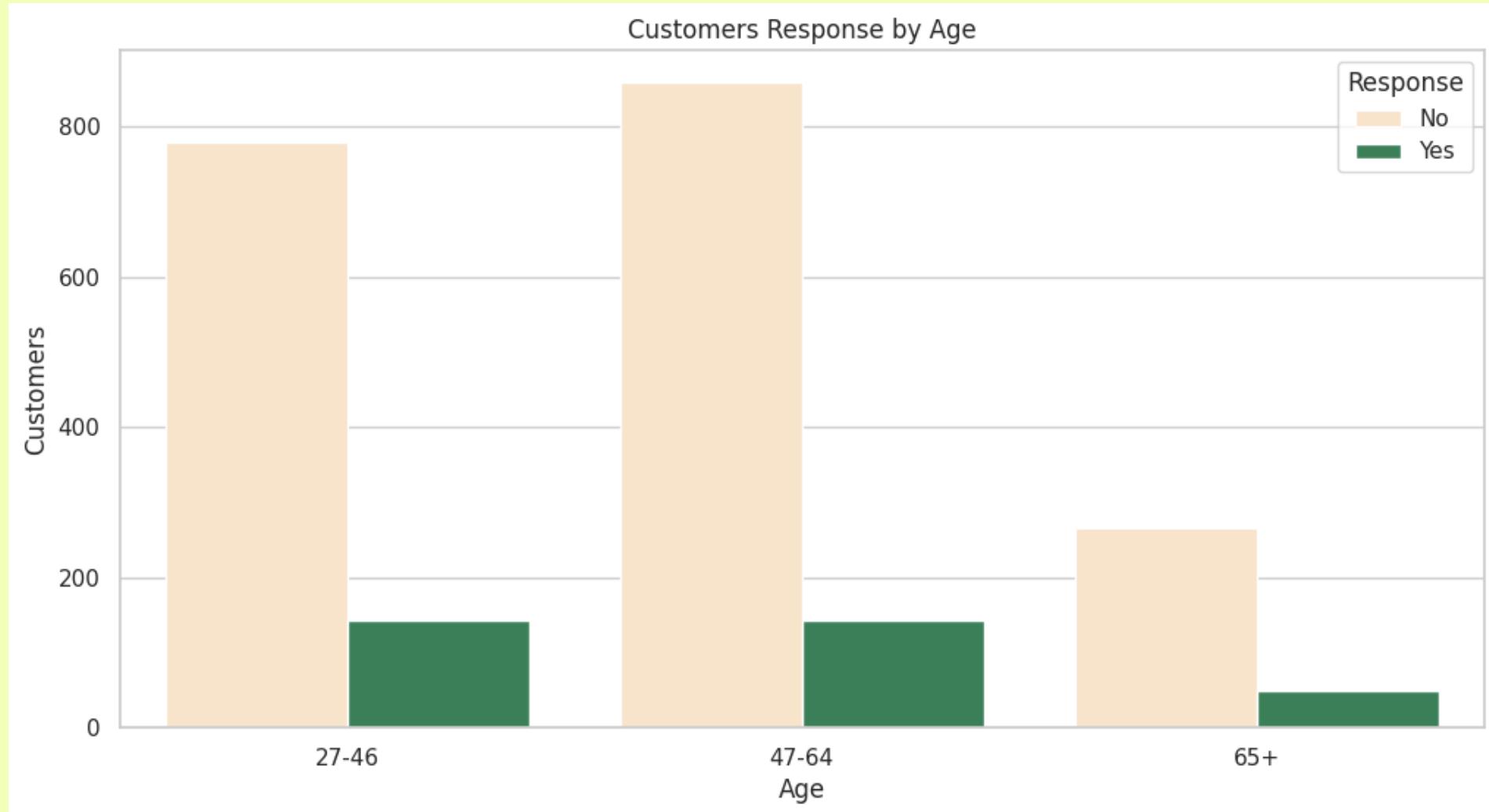
RESPONSE TO CAMPAIGN



Only 334 of 2240 customers who responded to marketing campaign

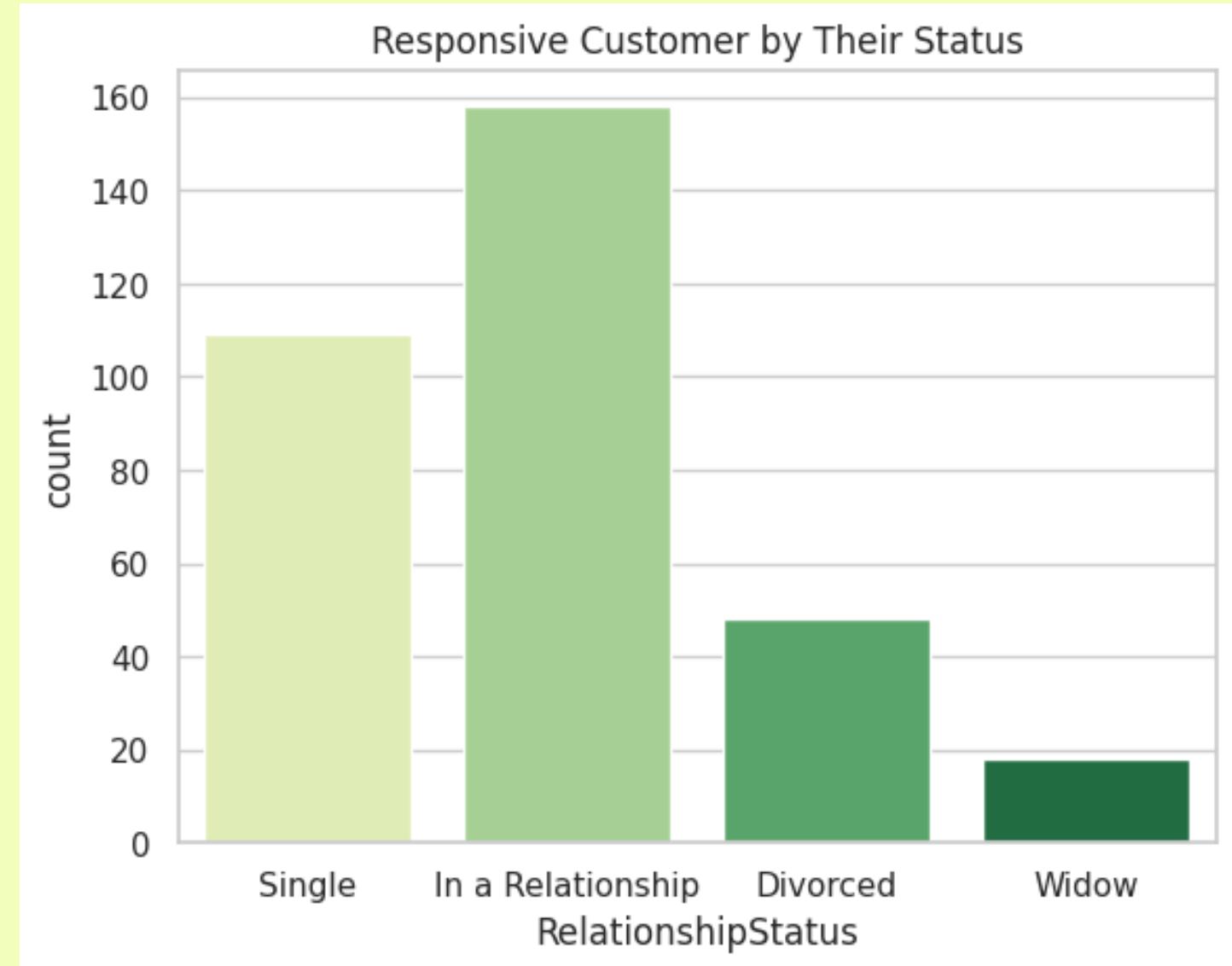
# Business Insights

## Response by Age



From all customers who responded to the campaign, customer with an age above 65 who responded the least to the campaign.

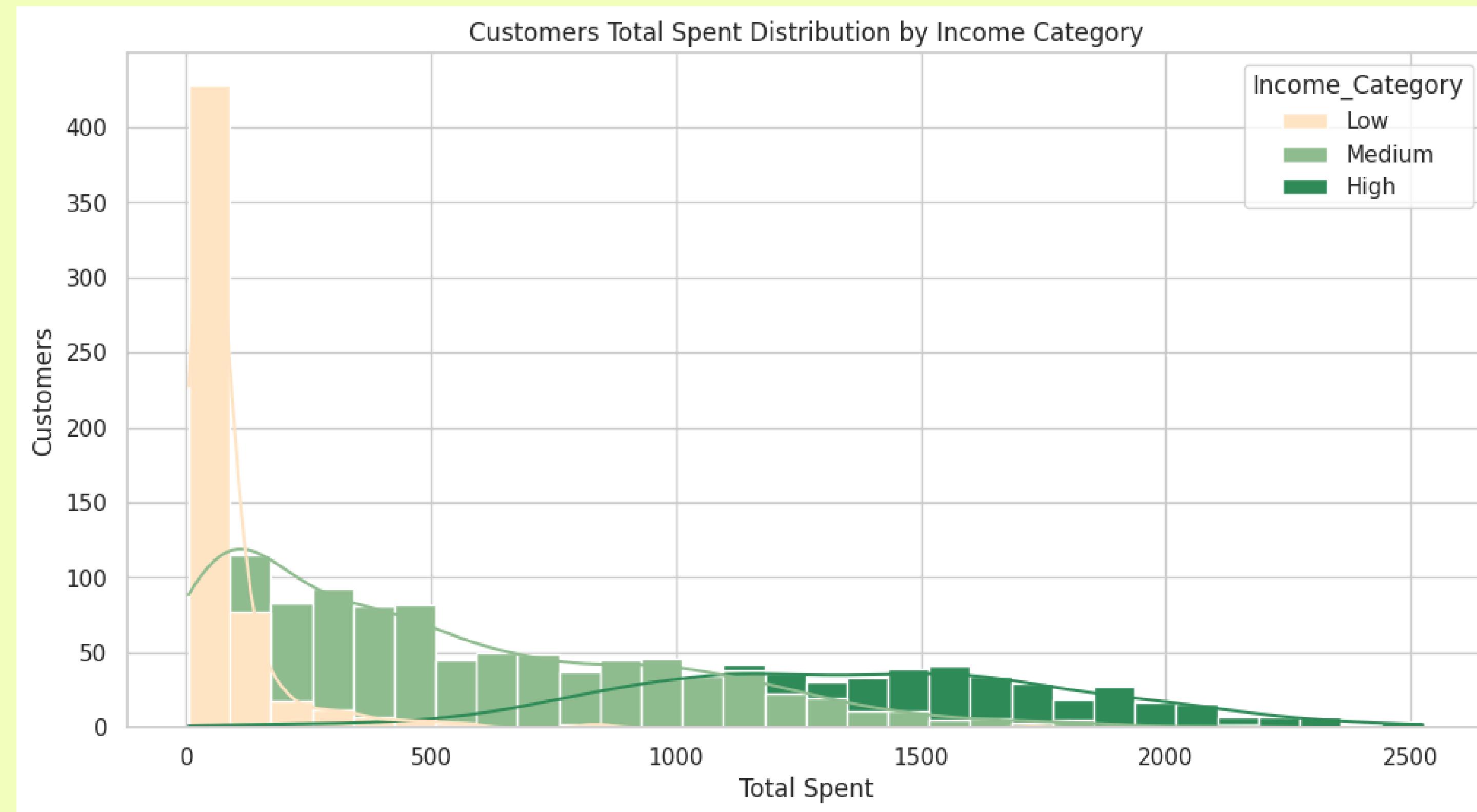
## Status of Responsive Customer



Customers with the status 'In a Relationship' are the customers who responded the most to the campaign

# Income-Total Spend

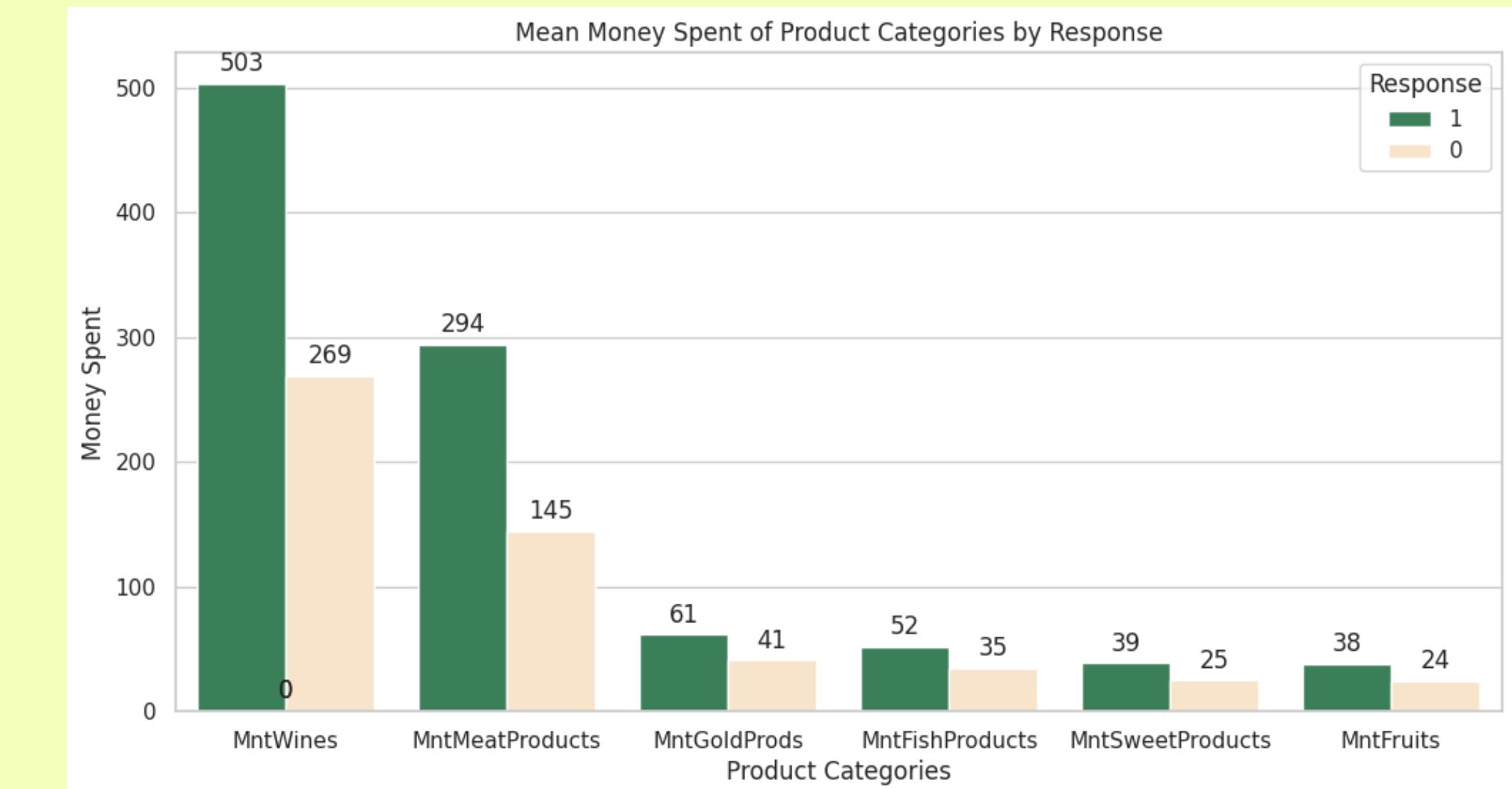
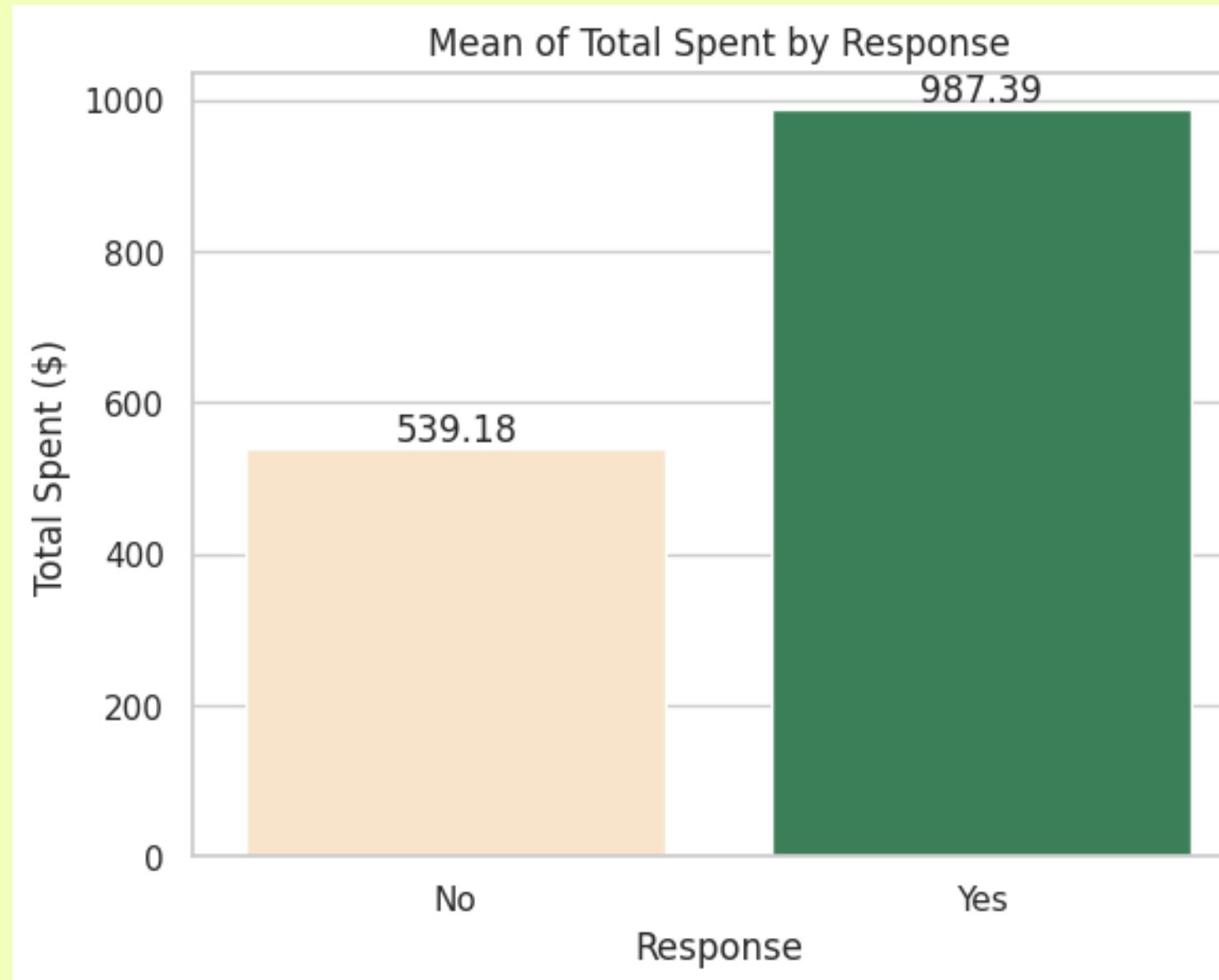
# Business Insights



Customers with high income spent more money than customers with low income

# Total Spent by Response

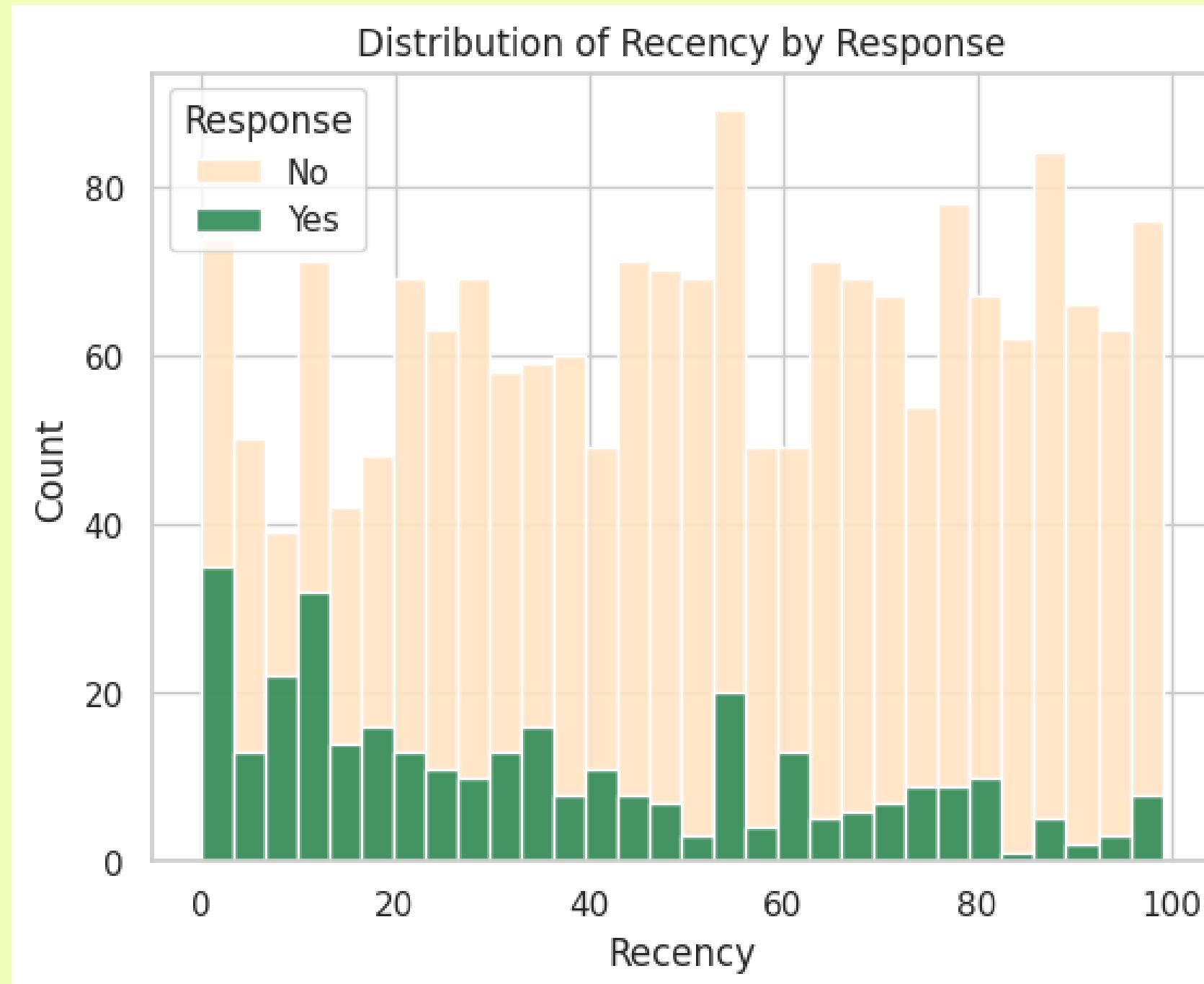
# Business Insights



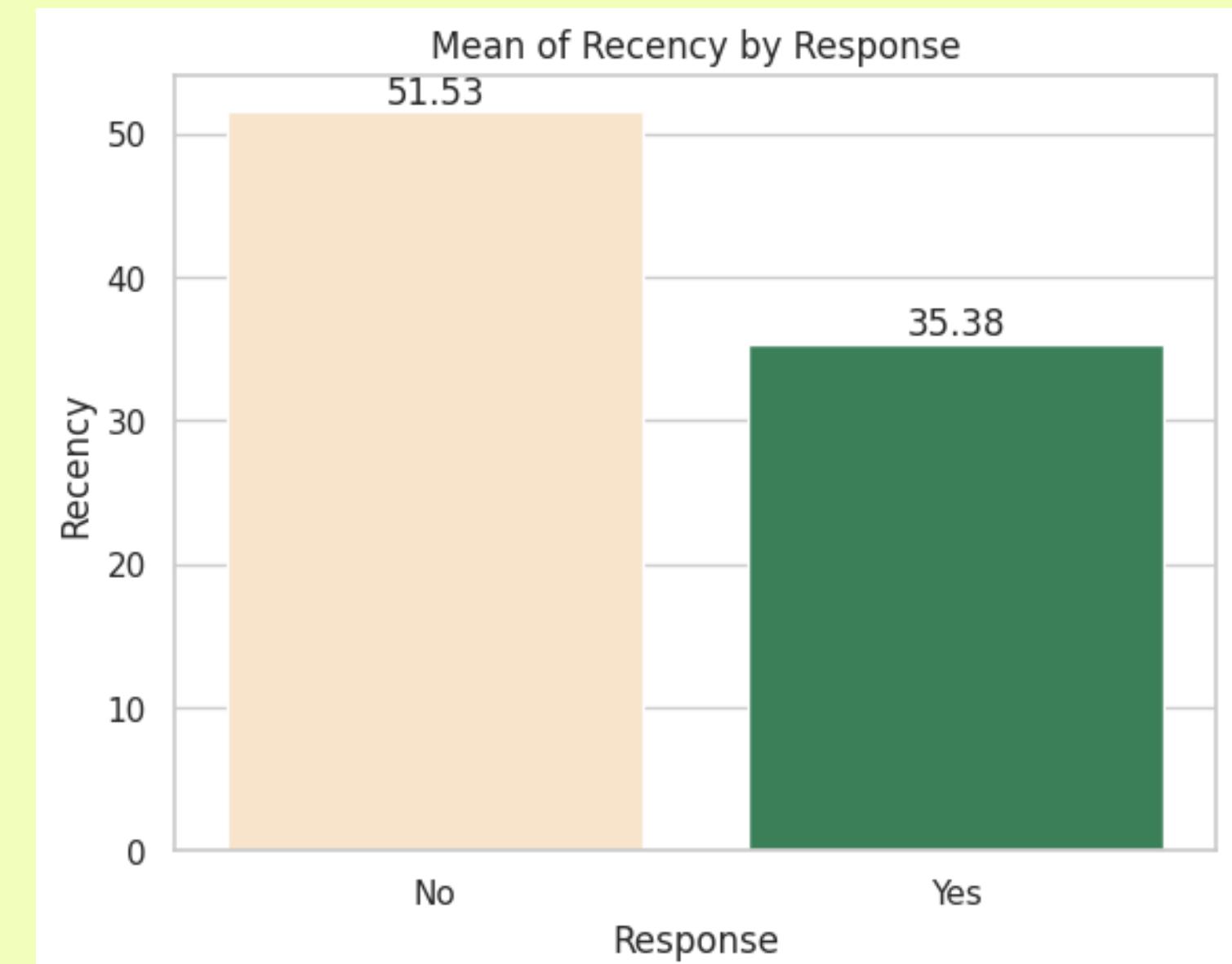
Customers who response campaign spent more money than customers who didn't response the marketing campaign

# Days to Recent Purchase by Response

# Business Insights

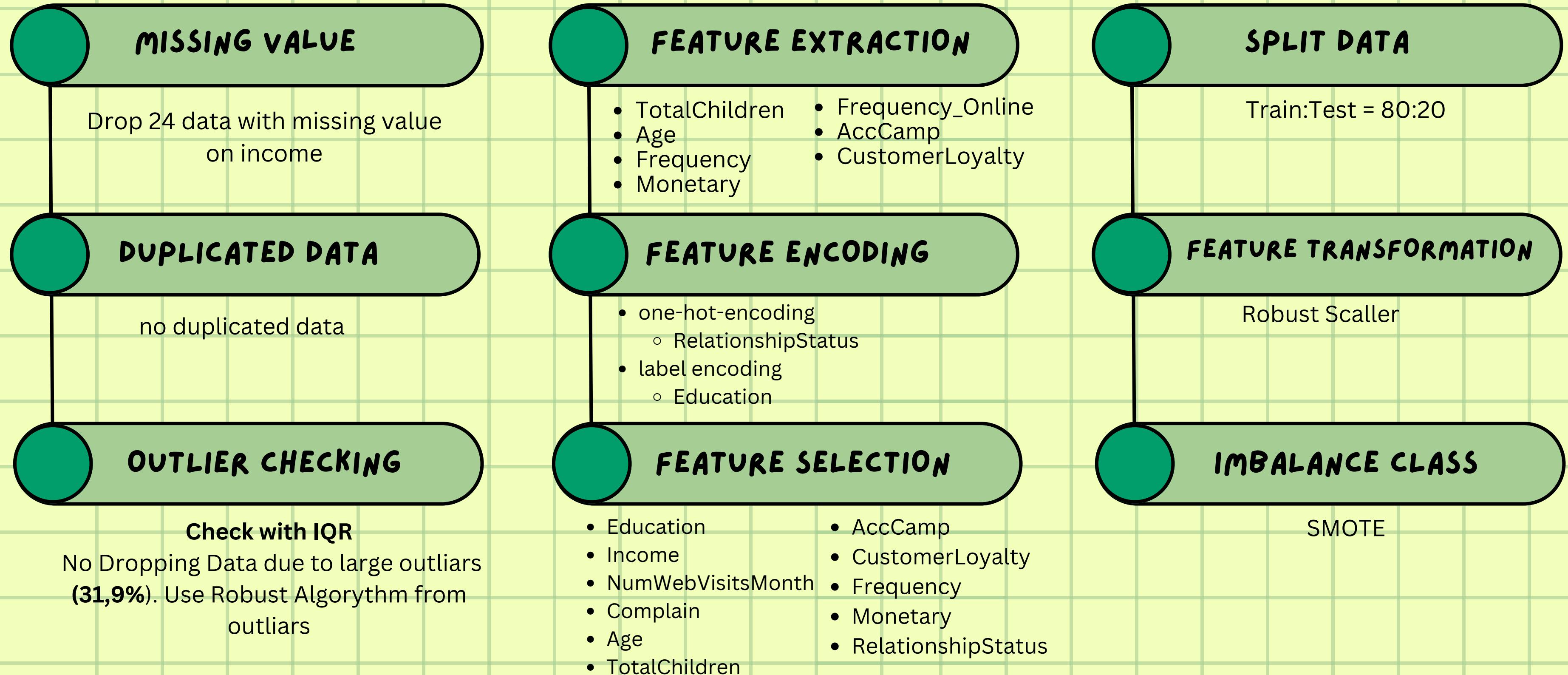


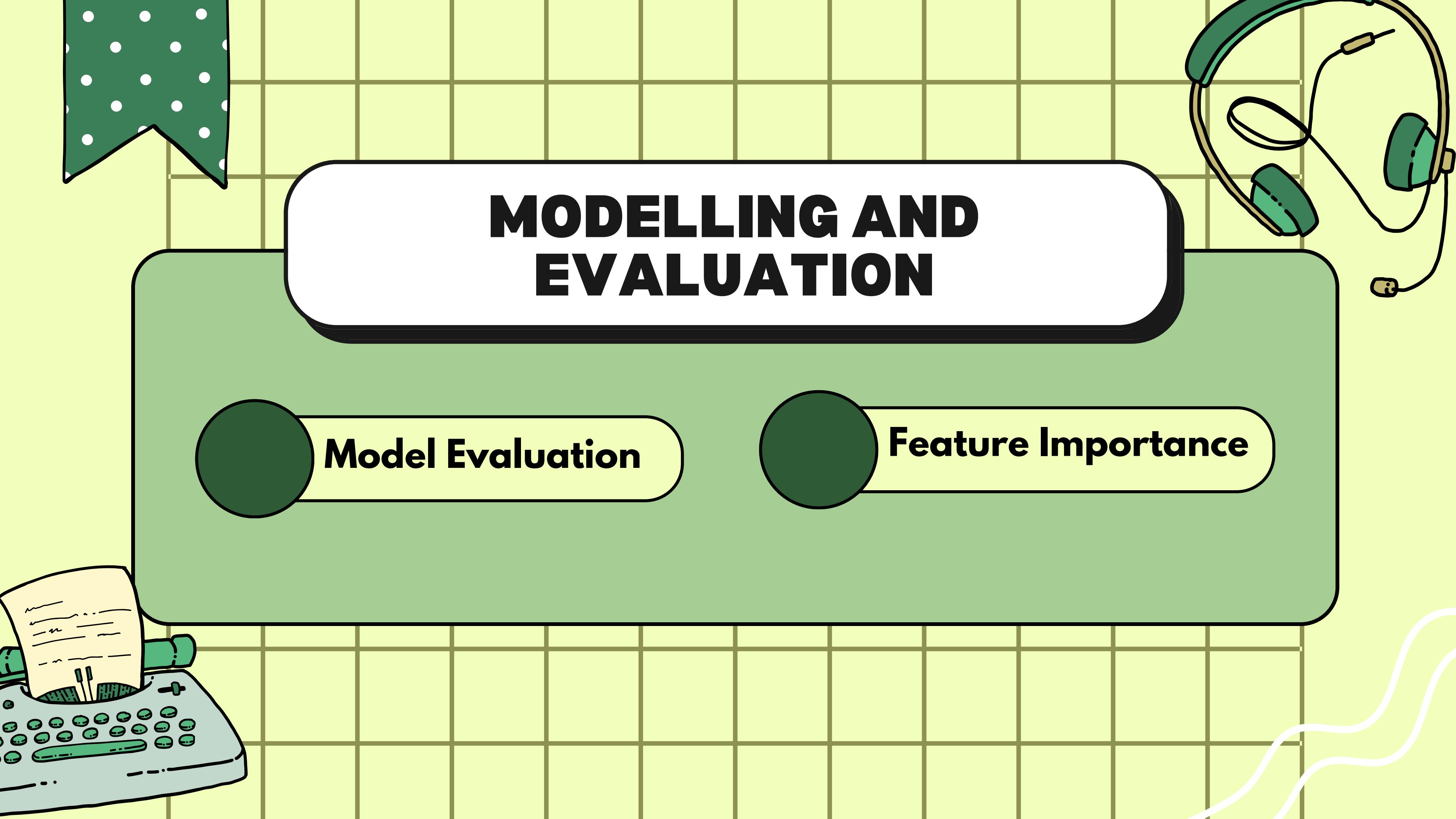
Customers with lower days of last purchase more likely to response the marketing campaign



Customers who response campaign have lower days of purchase recency

# DATA PREPROCESSING





# **MODELLING AND EVALUATION**

**Model Evaluation**

**Feature Importance**

# Confusion Matrix

Customer who predicted to respond the campaign and in reality respond the campaign

Customer who predicted to respond the campaign but in reality not respond the campaign

This error will impact :



|        |              | Predicted |             |
|--------|--------------|-----------|-------------|
|        |              | Reponse   | Not Reponse |
| Actual | Reponse      | TP        | FN          |
|        | Not Response | FP        | TN          |

Customers predicted not respond to the campaign, but in reality, if they receive the campaign, they will respond to it.

This error will impact:

Losing Potential Customer

Customers predicted not respond to the campaign and in reality, they will not respond to it.

# Classification Metrics

## Precision

Model predict customers are accepted the campaign, but actually customers not accepted the campaign  
(FP)

Increase Response Rate  
Minimize Marketing Cost

## Recall

Model predict customers are not accepted the campaign, but actually customers interested to accept the campaign  
(FN)

Losing potential customers/  
Lowering Response Rate

# MODEL COMPARISON

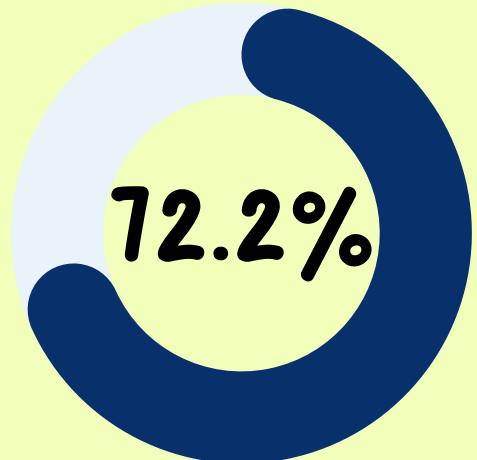
| index | Models                 | Train Accuracy | CV Accuracy | Test Accuracy | Train Precision | CV Precision | Test Precision | Train Recall | CV Recall | Test Recall | Train F1- Score | CV F1-Score | Test F1-Score |
|-------|------------------------|----------------|-------------|---------------|-----------------|--------------|----------------|--------------|-----------|-------------|-----------------|-------------|---------------|
| 0     | RandomForestClassifier | 99.76          | 90.89       | 88.79         | 100.00          | 87.21        | 67.80          | 99.29        | 80.83     | 48.19       | 99.64           | 83.52       | 56.34         |
| 1     | LGBMClassifier         | 99.76          | 91.37       | 88.25         | 99.57           | 86.94        | 64.06          | 99.72        | 83.25     | 49.40       | 99.65           | 84.58       | 55.78         |
| 2     | SVC                    | 91.72          | 88.41       | 88.61         | 88.61           | 83.06        | 63.51          | 86.22        | 76.24     | 56.63       | 87.40           | 79.38       | 59.87         |
| 3     | AdaBoostClassifier     | 89.40          | 86.57       | 86.08         | 86.47           | 80.12        | 53.41          | 80.82        | 72.45     | 56.63       | 83.55           | 75.87       | 54.97         |
| 4     | LogisticRegression     | 84.43          | 84.47       | 85.17         | 80.39           | 78.65        | 50.54          | 70.45        | 65.19     | 56.63       | 75.09           | 71.22       | 53.41         |
| 5     | KNeighborsClassifier   | 92.71          | 88.18       | 84.27         | 84.03           | 76.70        | 47.96          | 96.45        | 86.15     | 56.63       | 89.81           | 81.01       | 51.93         |
| 6     | DecisionTreeClassifier | 99.76          | 85.07       | 83.18         | 100.00          | 74.53        | 44.32          | 99.29        | 75.11     | 46.99       | 99.64           | 74.57       | 45.61         |

# Classification Metrics

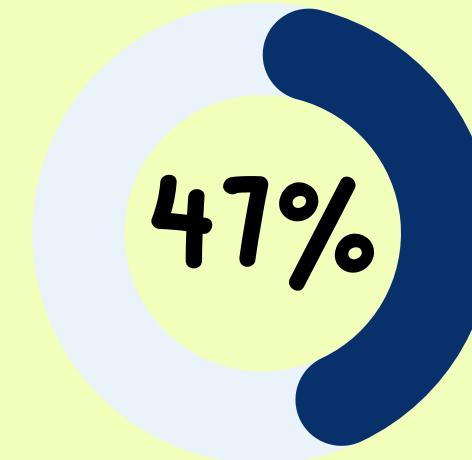
## Hyperparameter Tuning (rf\_tuned)

max\_features=3, min\_samples\_split=2, n\_estimators=300

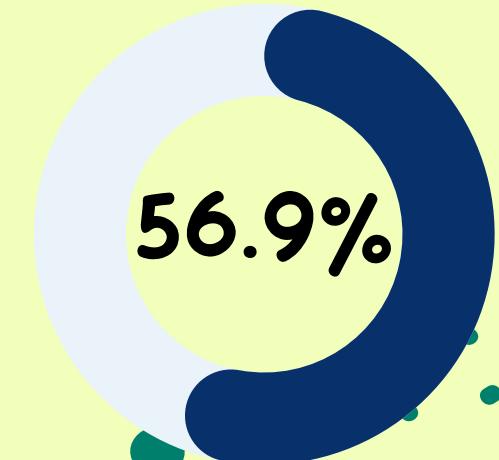
Precision



Recall



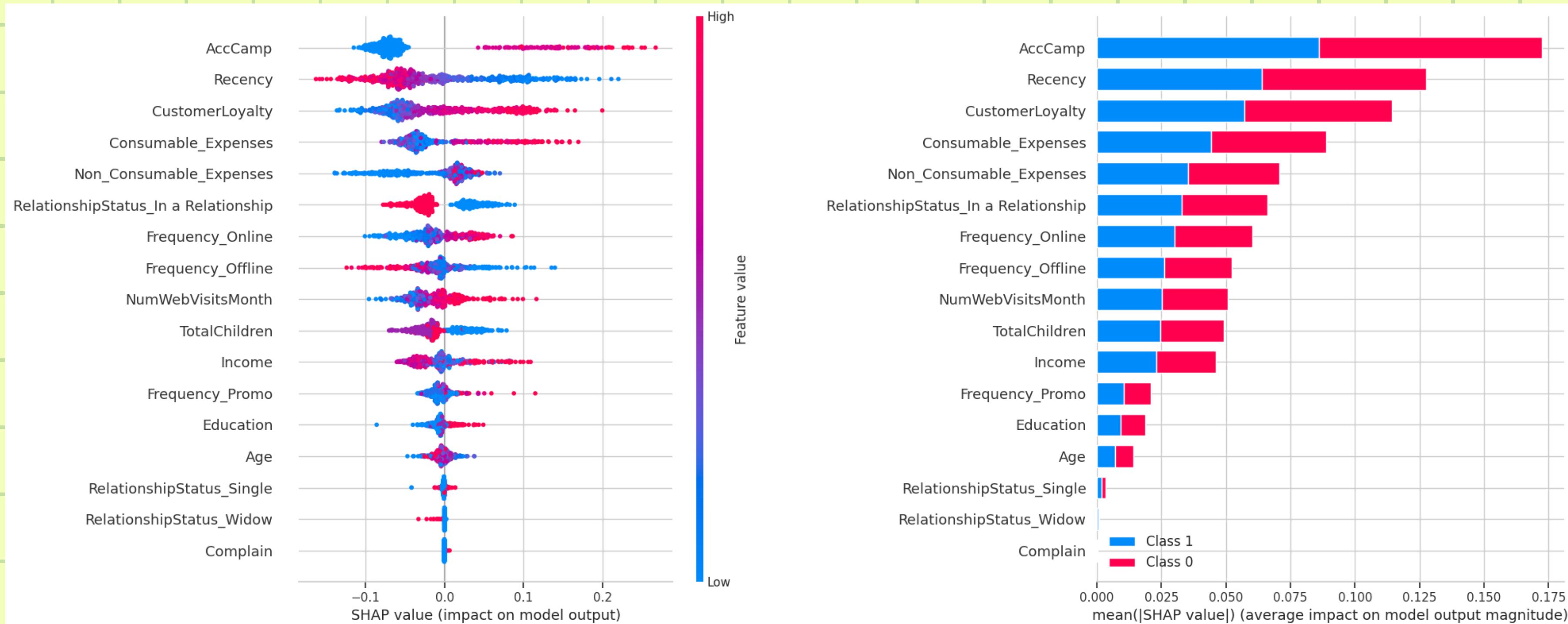
F1-Score



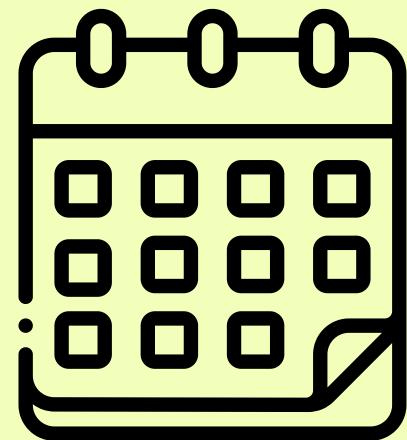
Confusion Matrix

|        |              | Predicted                      |                               |
|--------|--------------|--------------------------------|-------------------------------|
|        |              | Not Response                   | Response                      |
| Actual | Not Response | True Negative<br>455<br>82.28% | False Positive<br>15<br>2.71% |
|        | Response     | False Negative<br>44<br>7.96%  | True Positive<br>39<br>7.05%  |

# Feature importance

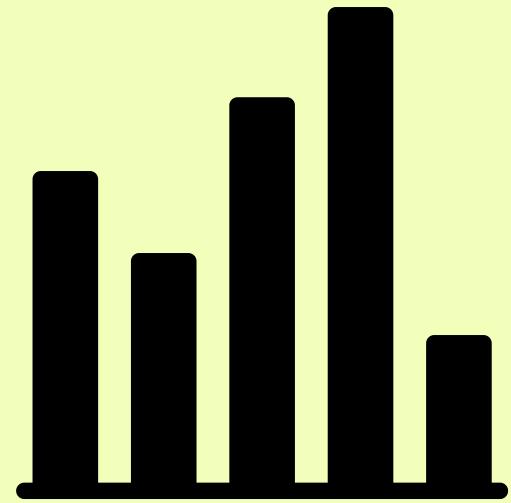


# RFM ANALYSIS



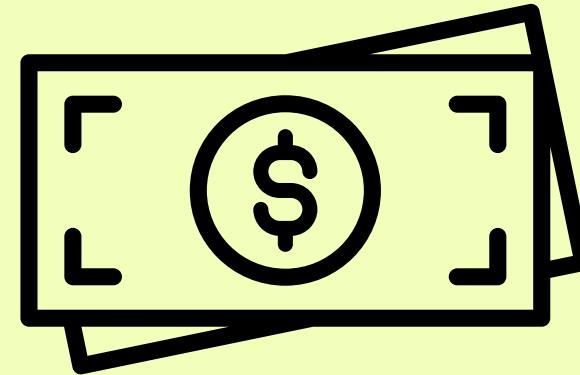
## RECENCY

This measures **how recently a customer has made a purchase**. Customers who have made a purchase more recently are often considered **more valuable**.



## FREQUENCY

This measures **how often a customer makes a purchase**. Customers who make frequent purchases are typically **more engaged and loyal**.



## MONETARY

This measures the **monetary value of a customer's purchases**. Customers who spend more money are often considered **more valuable to the business**.

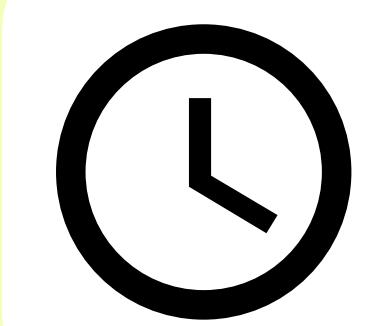
# RFM ANALYSIS

## CHAMPION



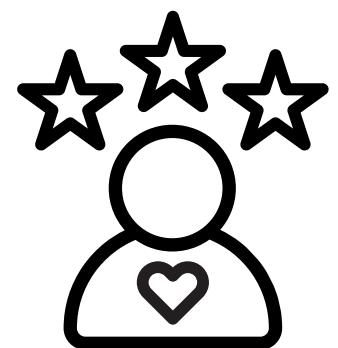
This means they have the best scores in all three RFM components, indicating recent purchases (R), frequent purchases (F), and high purchase value (M).

## RECENT CUSTOMER



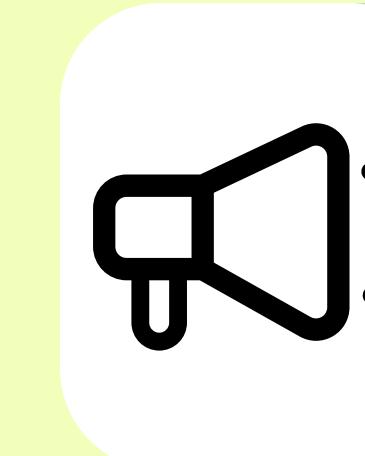
Customers who have recently made a purchase, as indicated by RFM scores that include high Recency and varying Monetary and Frequency values.

## POTENTIAL LOYALIST



Customers with RFM scores that show potential to become loyal customers. They may have just started making regular purchases or have growth potential in the value of their purchases.

## CUSTOMER NEEDING ATTENTION



Customers with RFM scores that indicate special attention are required as they may show signs of decline in one or more aspects of RFM.

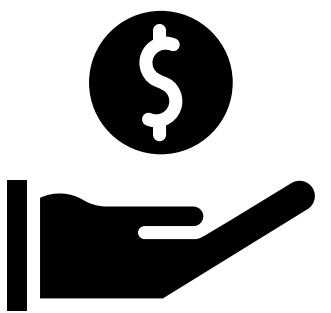
# RFM ANALYSIS

## AT RISK



Customers at risk of leaving the business or no longer shopping, as indicated by an RFM score that shows a significant decline in at least one aspect of RFM.

## LOYAL CUSTOMER



Customers with scores that are around the high level for Frequency and Monetary, but may have Recency that is not as optimal as Champions.

## ABOUT TO SLEEP



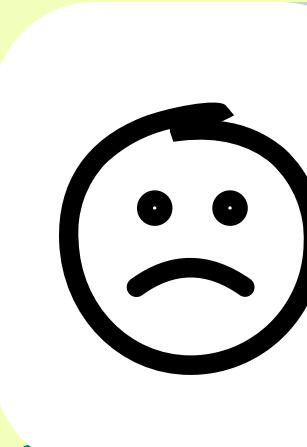
Customers who show signs of inactivity in the near future. This includes customers who may have had a drop in Frequency or Monetary, but still made a purchase relatively recently.

## CAN'T LOSE THEM



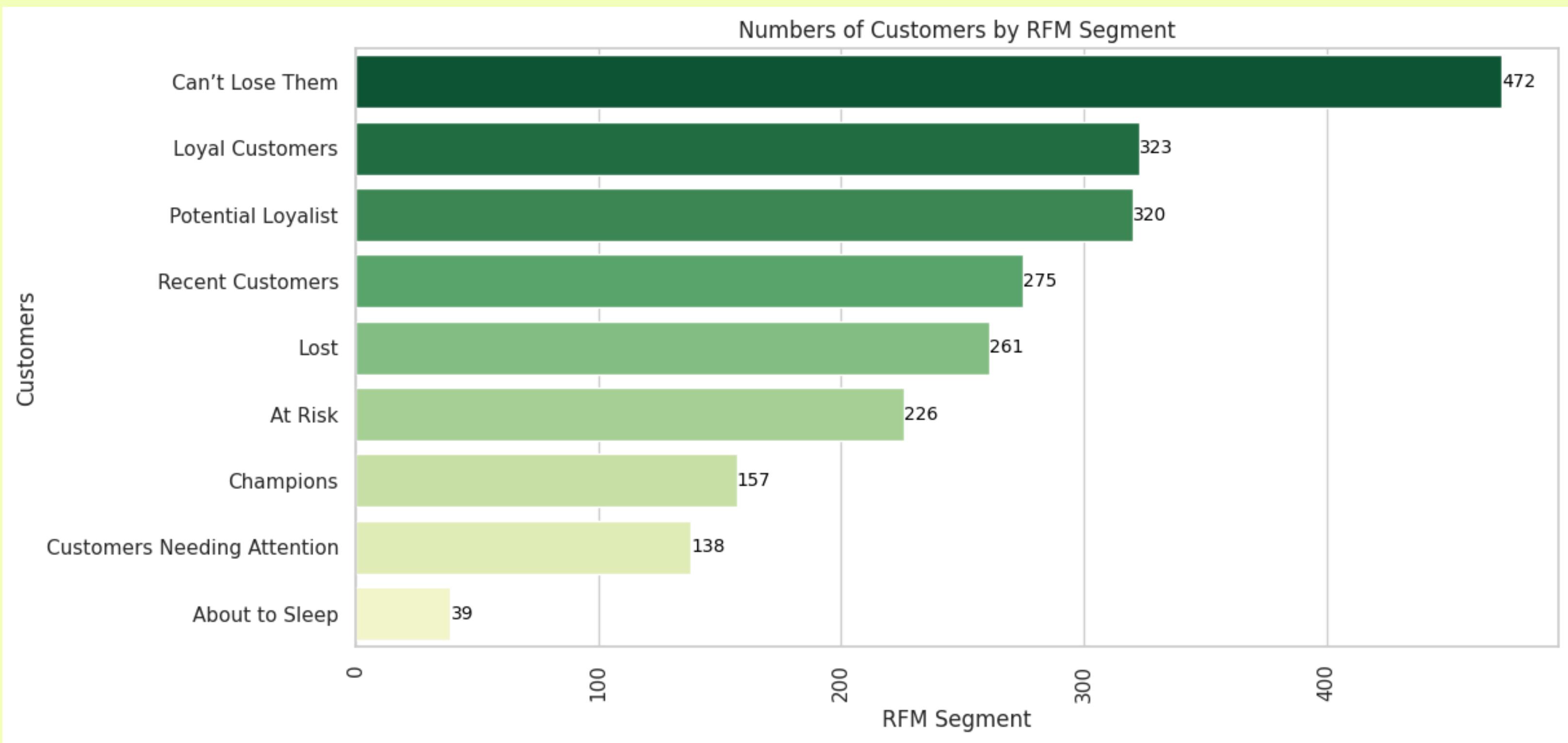
Customers who, although no longer as optimal as before, are still important to retain. They may show a decline in one or two RFM components.

## LOST



Customers who are no longer active or lost to the business, show a significant decline in all aspects of RFM.

# RFM ANALYSIS



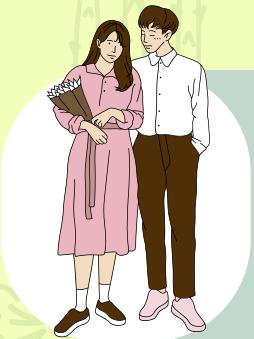
# BUSINESS RECOMMENDATIONS



Provide attractive offers (promos or discounts) to customers with a Basic education level



give attractive offers (promos or discounts) by targeting low income customers



Provide an event "shopping with a partner is cheaper and more romantic"



create a bundling promo



special offer for those who have 2 or more children



Create campaigns on the importance of eating fish and discount for "fish" products



create promos or discounts for seniors over 65 years old



create exclusive promos if shopping on the website



## BUSINESS RECOMMENDATION (BASED ON CUSTOMER SEGMENTATION WITH RFM ANALYSIS)

### CHAMPIONS

Provide exclusive incentives and special offers to Champions to maintain their loyalty levels.

### RECENT CUSTOMERS

Send welcome offers and additional discounts to encourage subsequent purchases.

### POTENTIAL LOYALIST

Offer incentives and special promotions to encourage Potential Loyalists to become loyal customers.

### CUSTOMER NEEDING ATTENTION

Send a special offer or discount as a stimulus to increase re-engagement.

# BUSINESS RECOMMENDATIONS

## LOYAL CUSTOMER

Offer special loyalty rewards, such as discounts or free gifts because reaching targets in their purchase.

## CAN'T LOSE THEM

Providing customer support by sending emails and offering personalized solutions such as discounts strengthens their loyalty and prevents potential churn.

## AT RISK

Offer a one-time loyalty bonus or an upgrade to their account status as a token of appreciation for their past loyalty

## ABOUT TO SLEEP

Launch re-engagement campaigns such as personalized product recommendations or limited-time offers, to rekindle their interest

## LOST

Send attractive email offers, such as significant discounts or exclusive gifts to reconnect with customers.

# BUSINESS IMPACT

**Respon Rate**

**Marketing Budget  
Efficiency**

**Cost per Acquisition**

# RESPONSE RATE

True Positive = 39

False Positive = 15

$$\text{Response Rate} = \frac{\text{TP}}{\text{TP} + \text{FP}}$$

Before

14,9%

After

72,22%

# MARKETING BUDGET EFFICIENCY

**True Positive =39**

**False Positive=15**

| Before Machine Learning                |         |                     |
|--|---------|---------------------|
| Marketing Budget                       | =2240*3 | 6720                |
| Marketing Budget For Targeted Customer | =334*3  | 1002                |
| Marketing Budget Efficiency            |         | =1002/6720<br>=0.15 |

| After Machine Learning                 |       |                     |
|--|-------|---------------------|
| Marketing Budget                       | =54*3 | 162                 |
| Marketing Budget For Targeted Customer | =39*3 | 117                 |
| Marketing Budget Efficiency            |       | =117/162<br>=0.7222 |

# COST PER ACQUISITION

| Before Machine Learning   |         |       | After Machine Learning    |       |      |
|---------------------------|---------|-------|---------------------------|-------|------|
| Marketing Budget          | =2240*3 | 6720  | Marketing Budget          | =54*3 | 162  |
| Responsive Customers      |         | 334   | Responsive Customers      |       | 39   |
| Cost Per Acquisition (\$) |         | 20.12 | Cost Per Acquisition (\$) |       | 4.15 |