

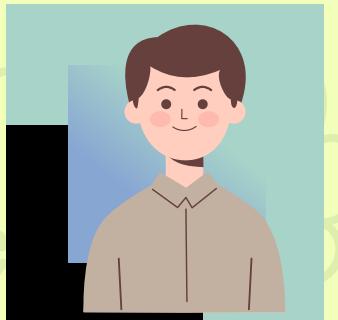
MARKETING CAMPAIGN

RAKAMIN DATA SCIENCE BOOTCAMP
BATCH 38

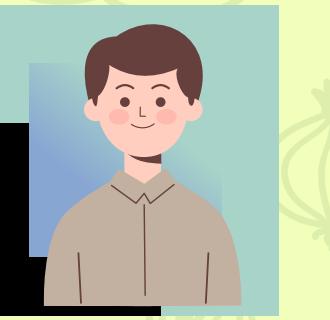
VIDA SUPERSTORE



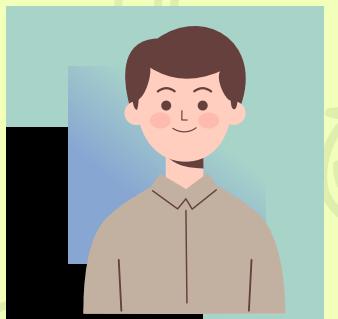
OUR CREATIVE TEAM



ARI HASUDUNGAN



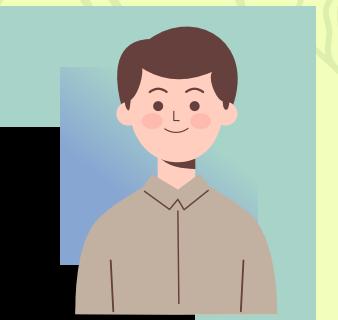
ZULFIKAR FAUZI



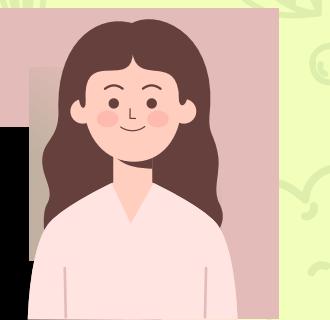
HELGA FAVIAN



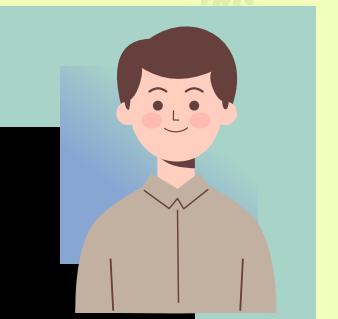
NISHRINA RAWI



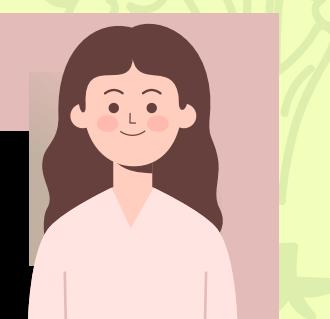
M. YAZID PRATAMA



SHANIA TAMARA F



M. HAMSYAH SYAIFUDIN

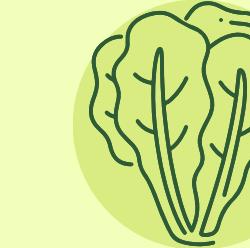


ZAHRA SHAFA M.



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

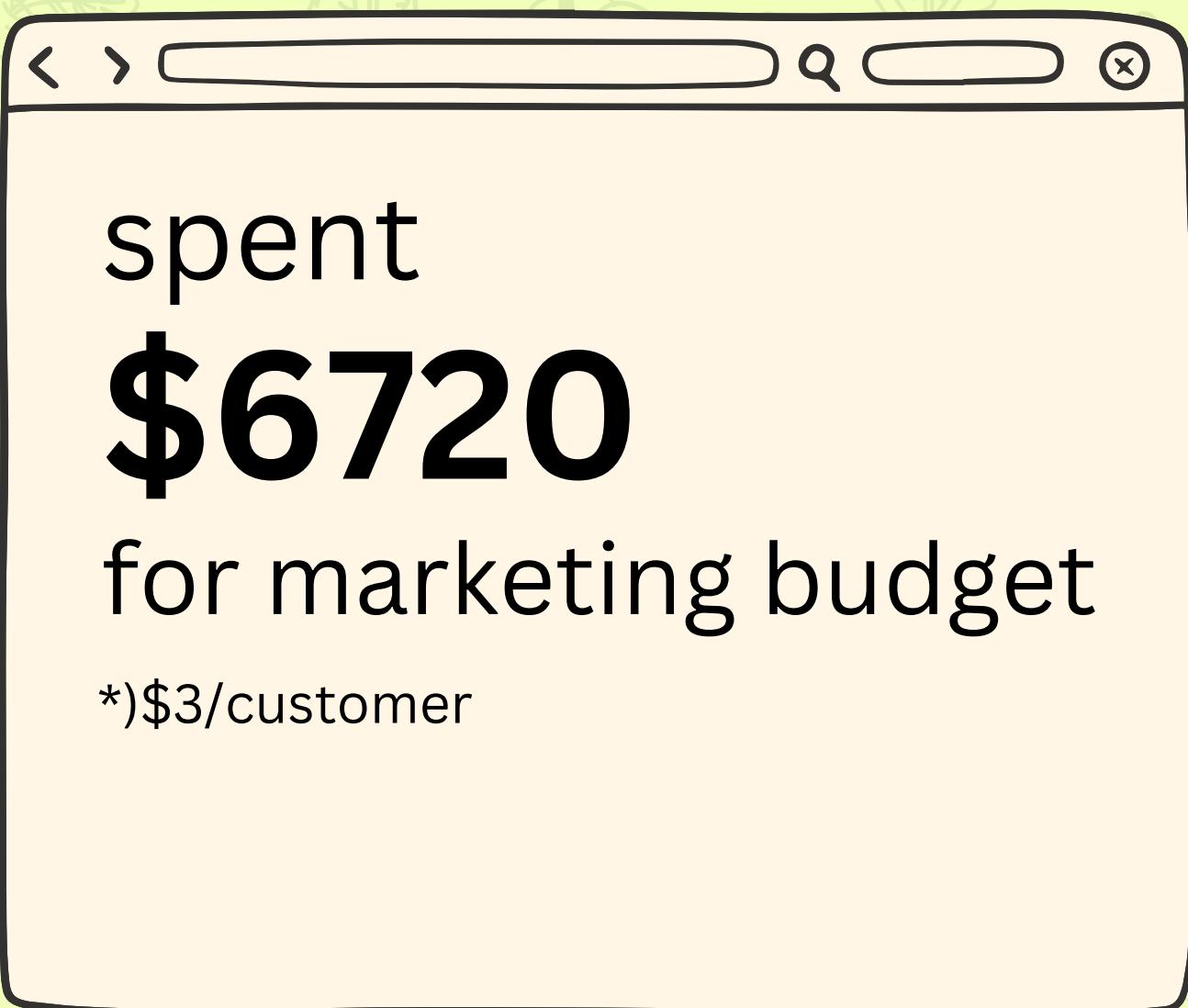
85.1%

1904 out of 2240* customers
not respond
the marketing campaign



*by sample data

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



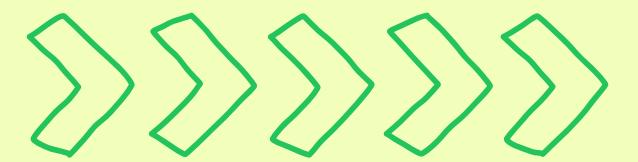
EXPLORATORY DATA ANALYSIS

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

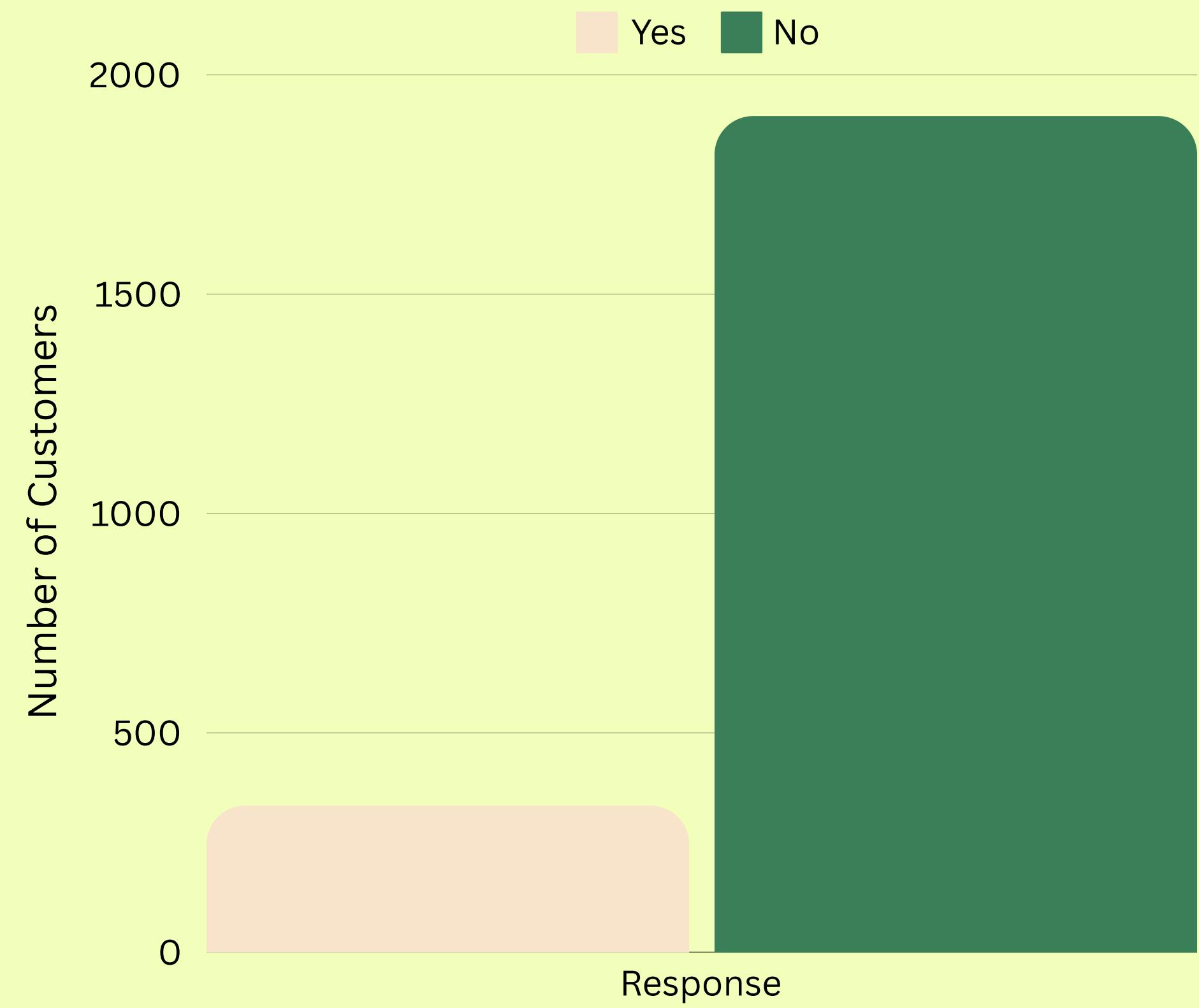


RESPONSES CAMPAIGN	ABOUT CUSTOMER	PRODUCT TYPE	NUMBER OF PURCHASES
ACCEPTEDCMP1	DTCUSTOMER	MNTFISHPRODUCTS	NUMDEALSPURCHASES
ACCEPTEDCMP2	EDUCATION	MNTMEATPRODUCTS	NUMCATALOGPURCHASES
ACCEPTEDCMP3	MARITAL	MNTFRUITS	NUMSTOREPURCHASES
ACCEPTEDCMP4	KIDHOME	MNTSWEETPRODUCTS	NUMWEBPURCHASES
ACCEPTEDCMP5	TEENHOME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



Business Insights

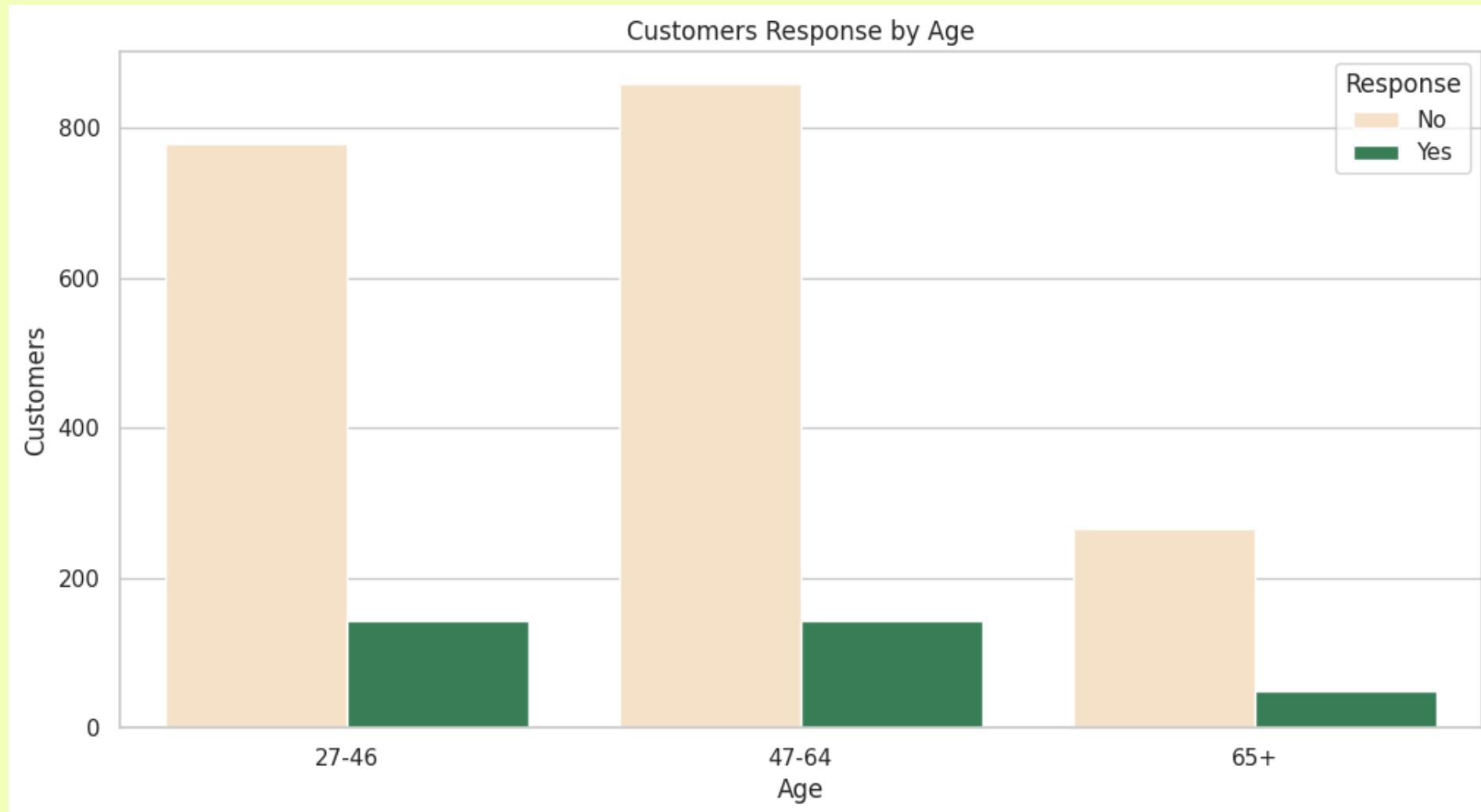
RESPONSE TO CAMPAIGN



Only 334 of 2240 customers who responded to marketing campaign

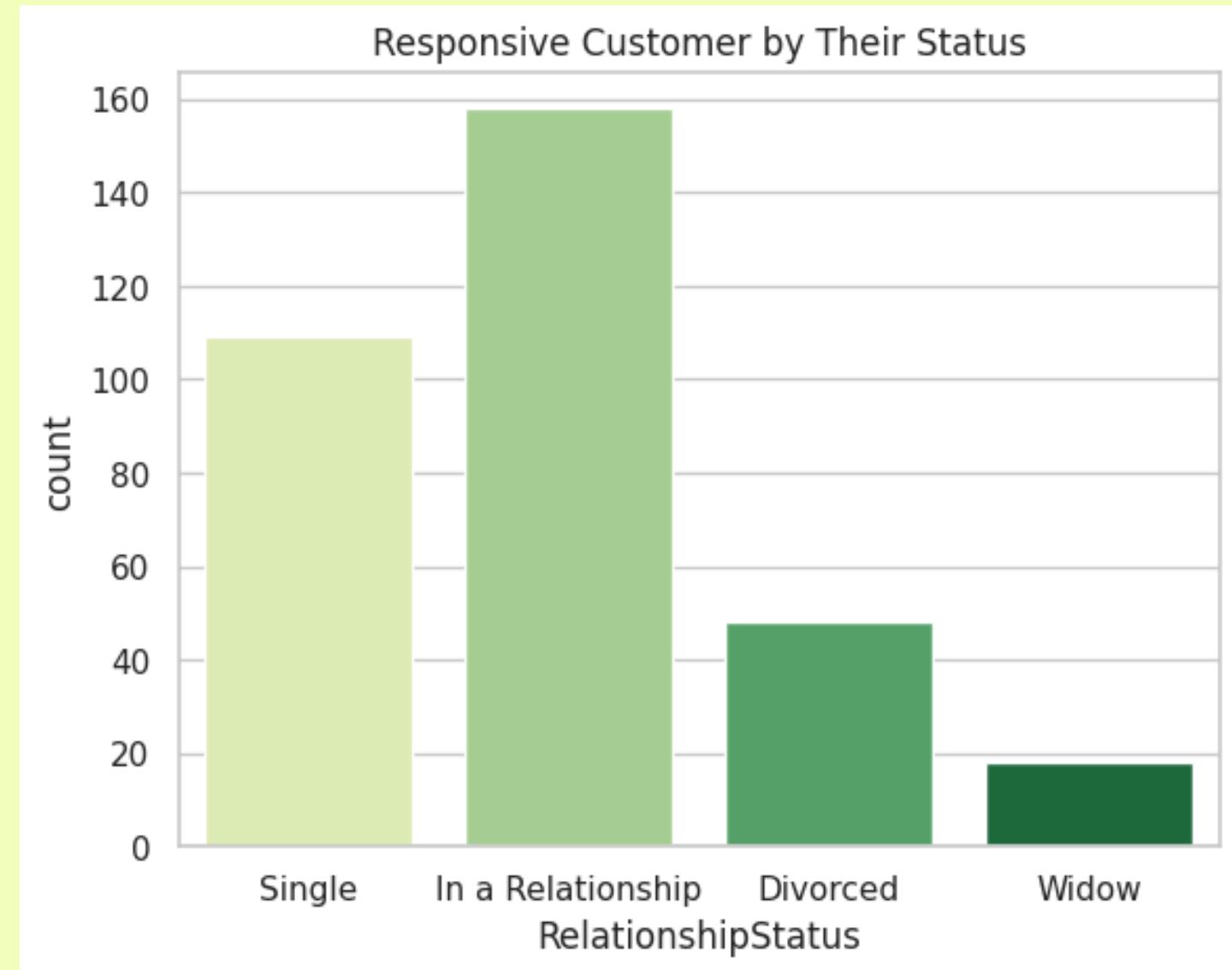
Business Insights

Response by Age



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

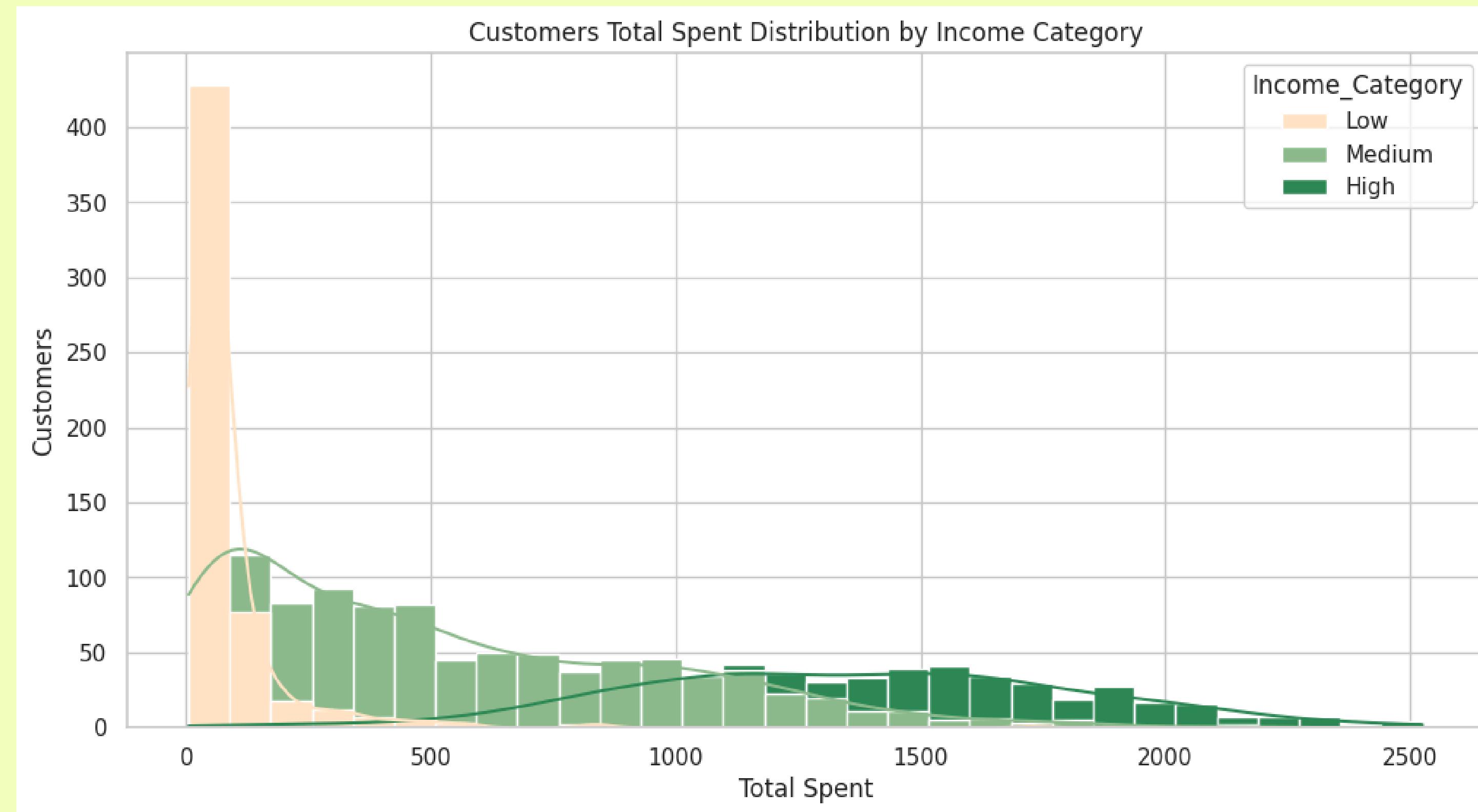
Status of Responsive Customer



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

Income-Total Spend

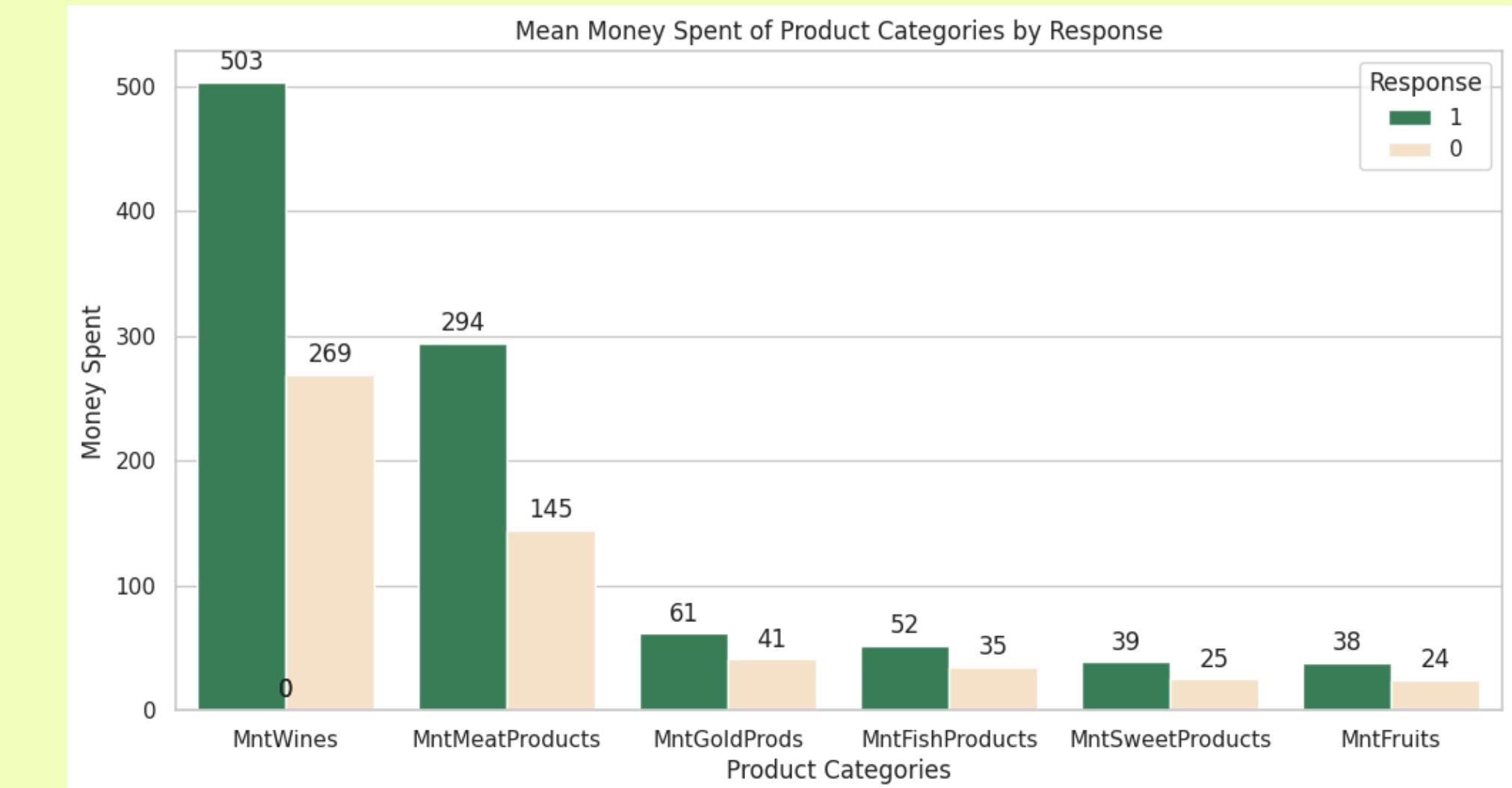
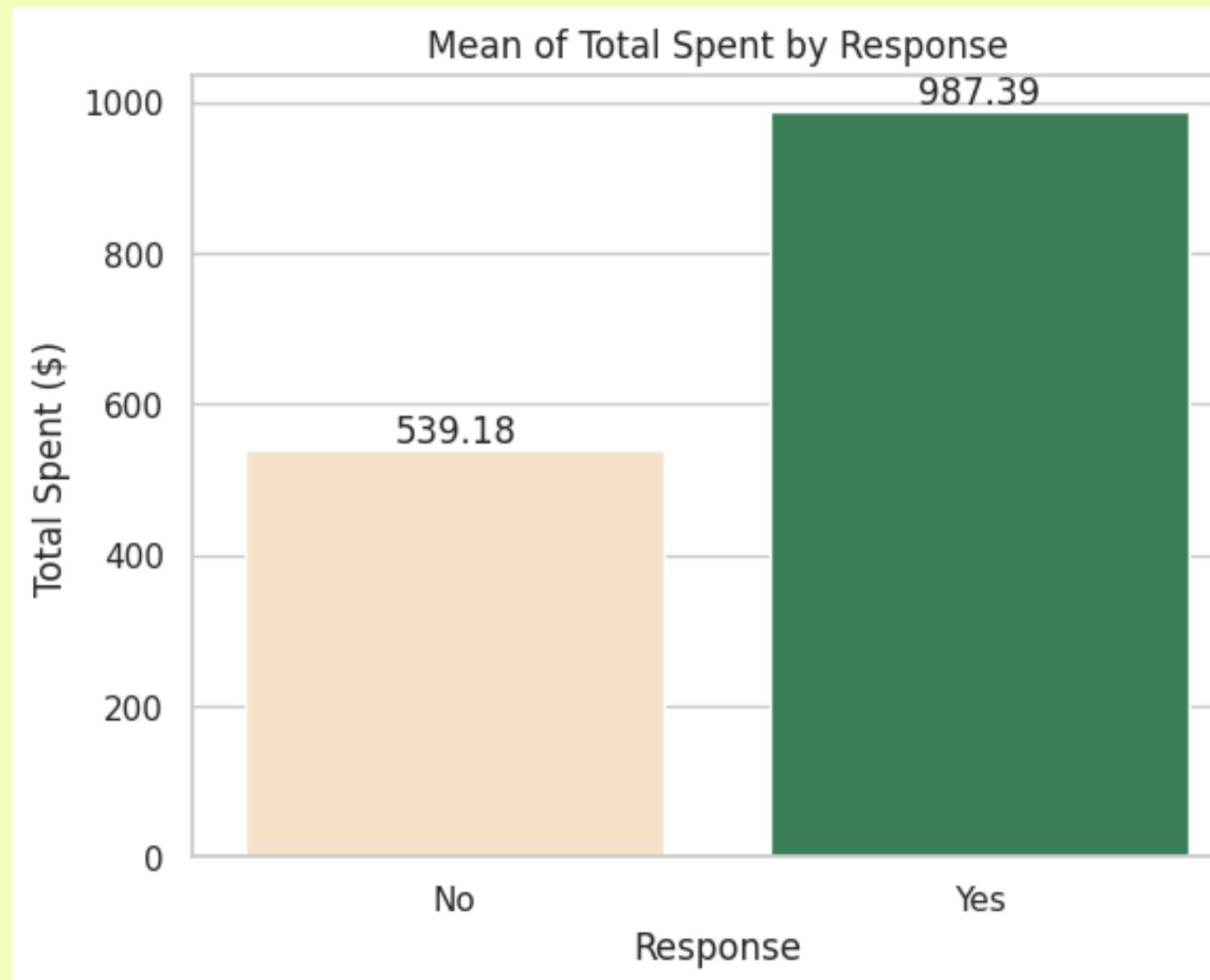
Business Insights



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

Total Spent by Response

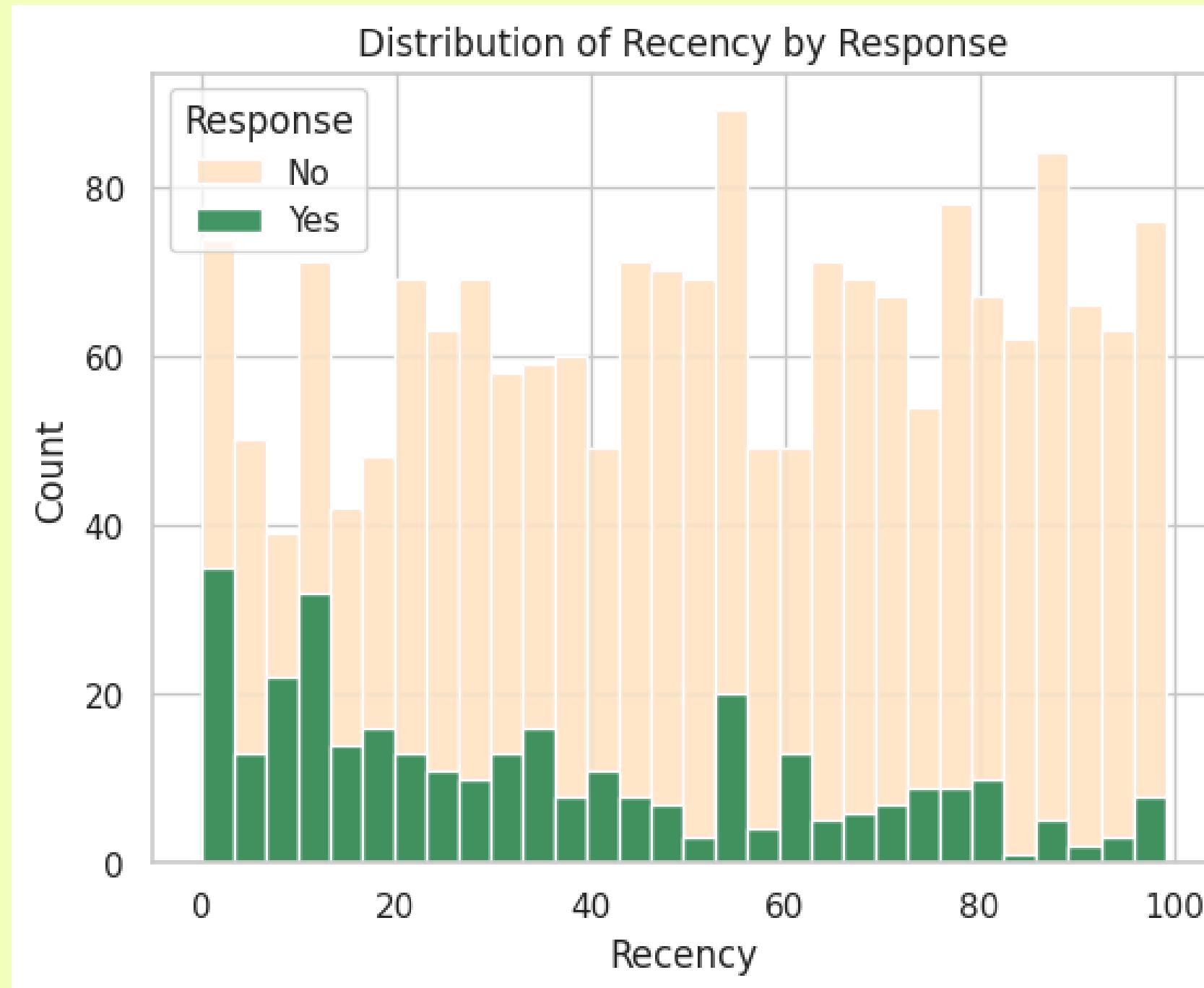
Business Insights



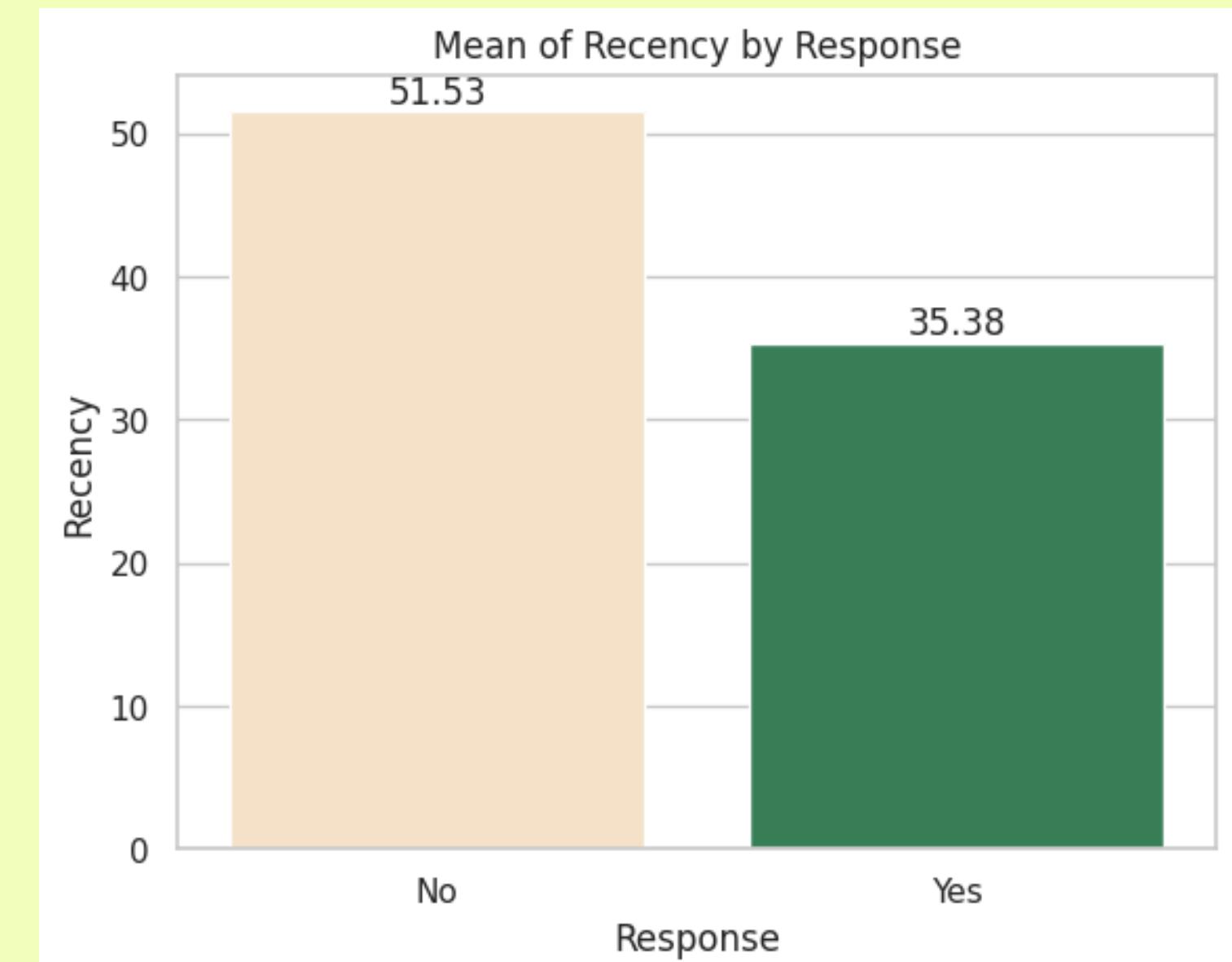
- Customers who response campaign spent more money than customers who didn't response the marketing campaign
- Wines and Meat Products have a highest sales compared by others
- Fruits product have a lowest sales.

Days to Recent Purchase by Response

Business Insights

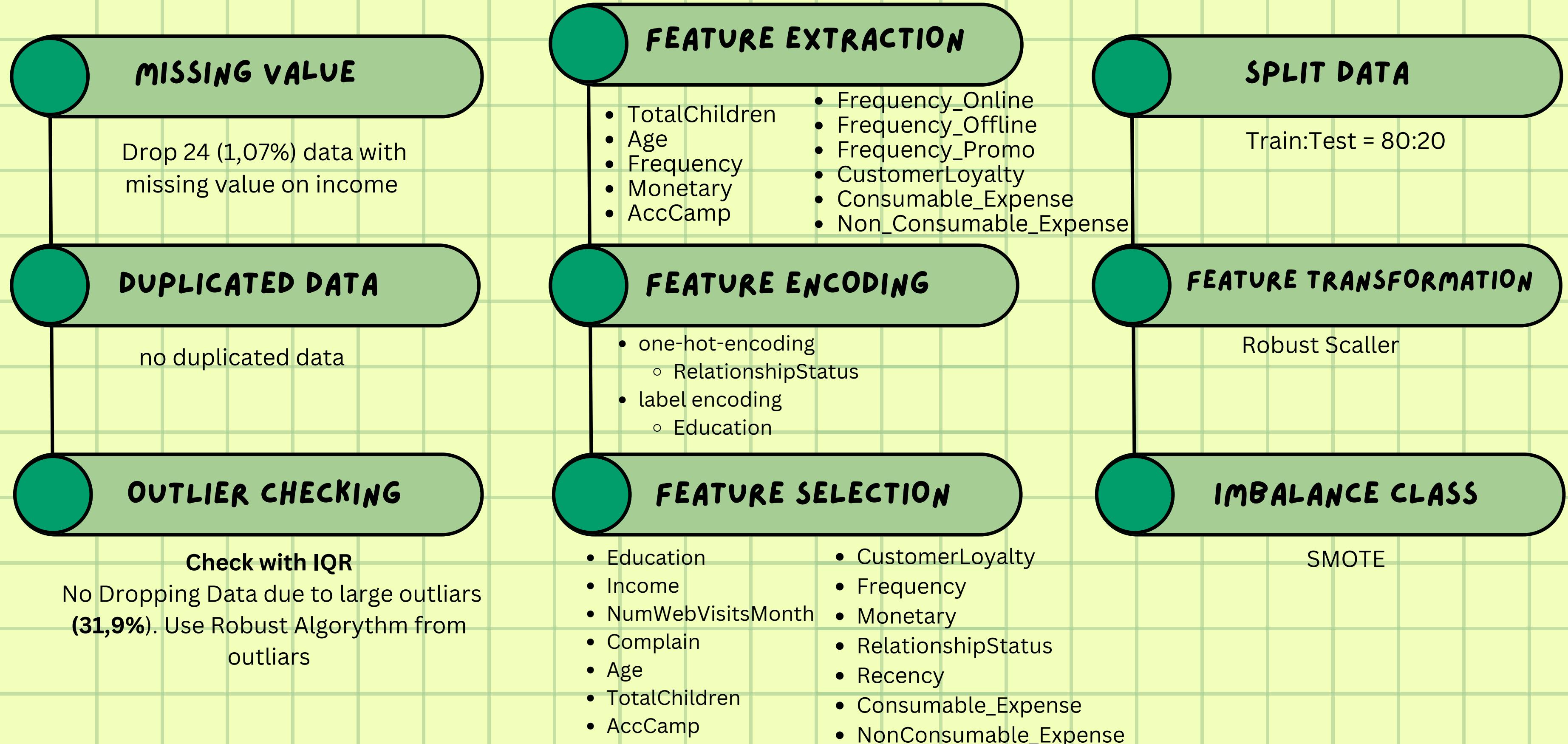


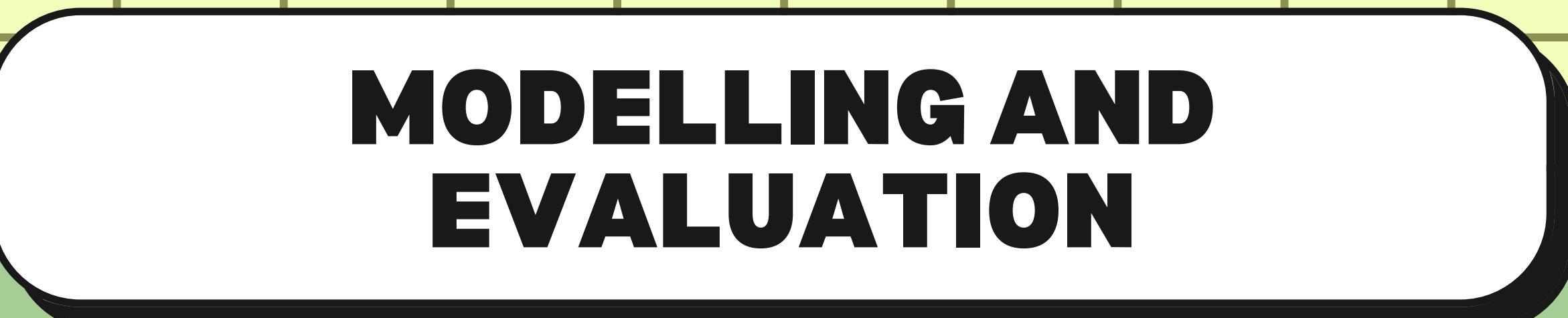
Customers with lower days of last purchase more likely to response the marketing campaign



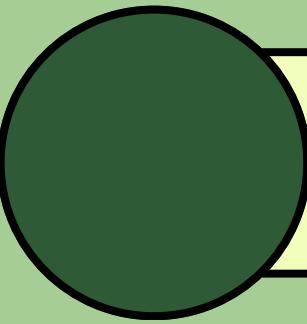
Customers who response campaign have lower days of purchase recency

DATA PREPROCESSING

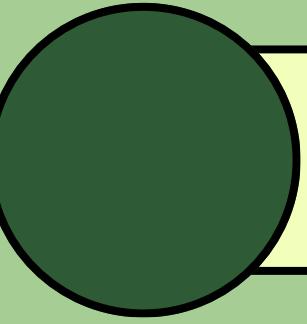




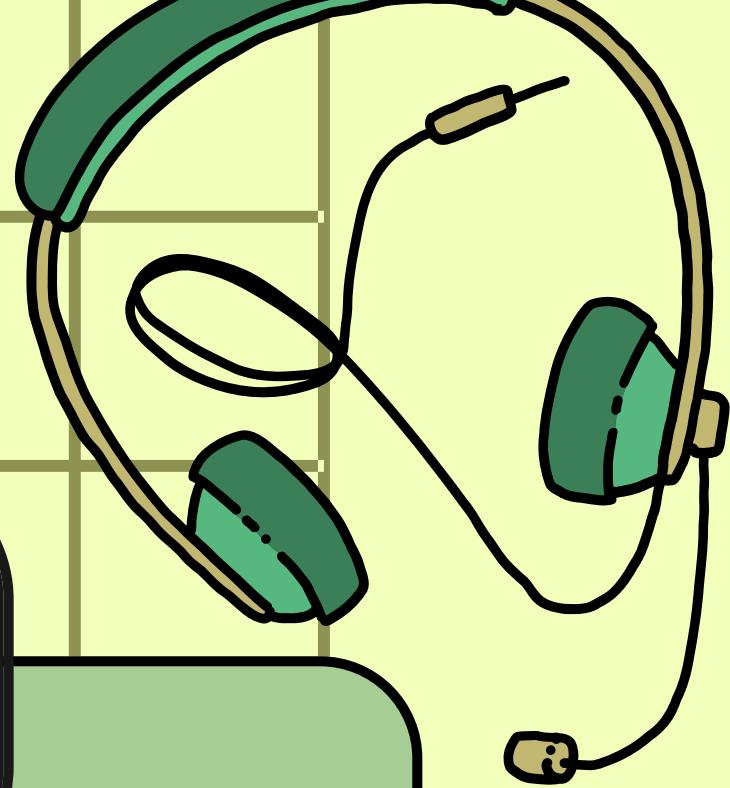
MODELLING AND EVALUATION



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

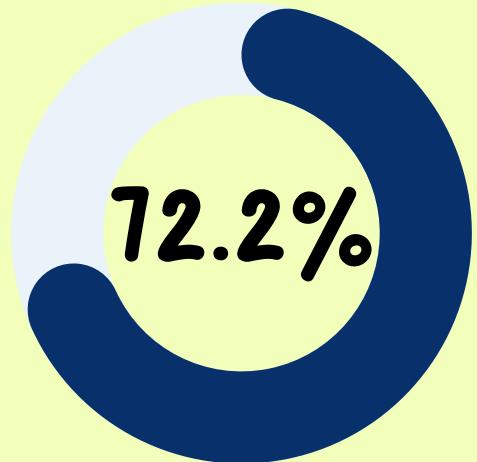
index	Models	Train Accuracy	CV Accuracy	Test Accuracy	Train Precision	CV Precision	Test Precision	Train Recall	CV Recall	Test Recall	Train F1- Score	CV F1-Score	Test F1-Score
0	RandomForestClassifier	99.76	90.89	88.79	100.00	87.21	67.80	99.29	80.83	48.19	99.64	83.52	56.34
1	LGBMClassifier	99.76	91.37	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

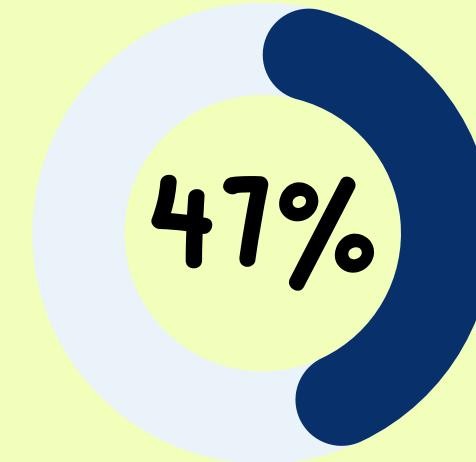
Hyperparameter Tuning (rf_tuned)

max_features=3, min_samples_split=2, n_estimators=300

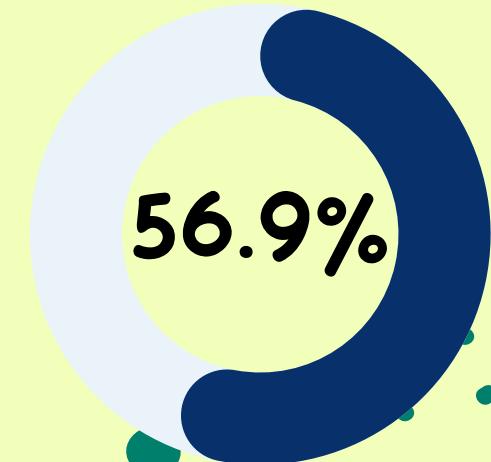
Precision



Recall



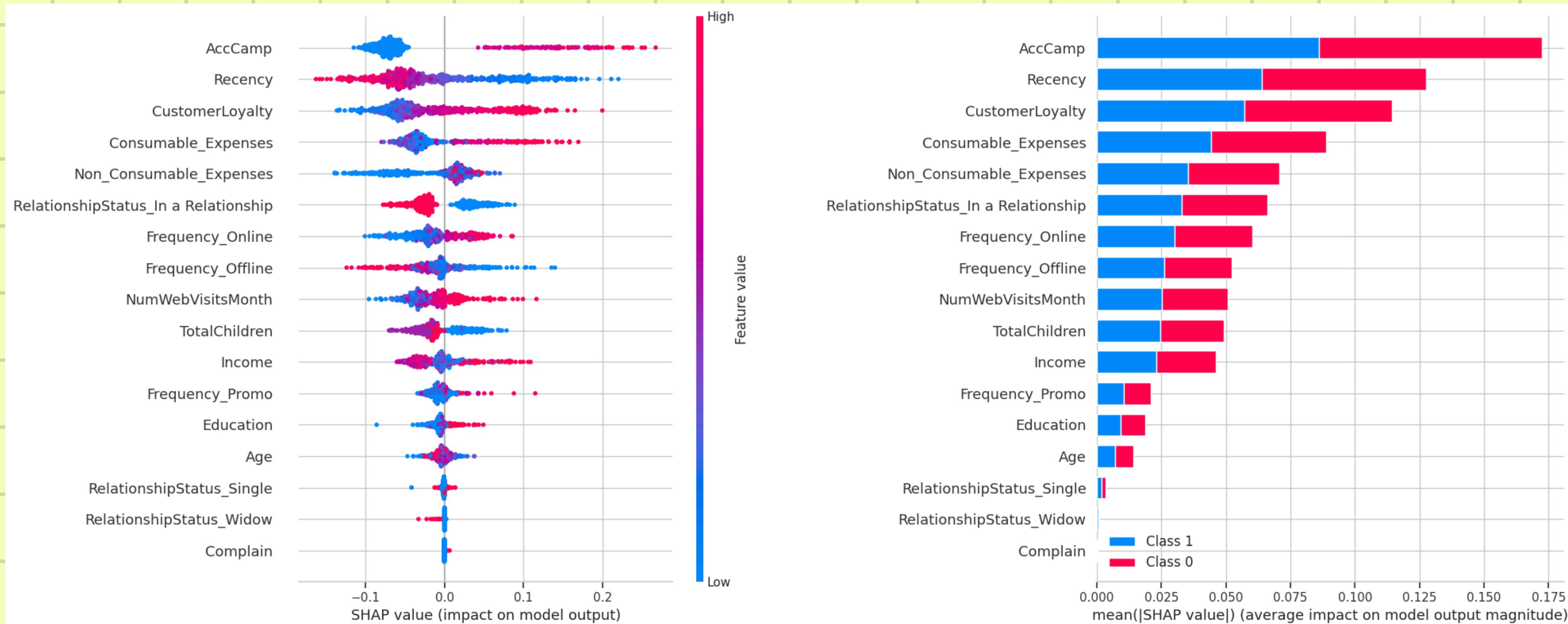
F1-Score



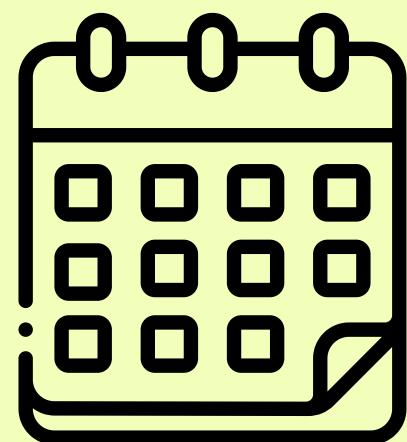
Confusion Matrix

		Predicted	
		Not Response	Response
Actual	Not Response	True Negative 455 82.28%	False Positive 15 2.71%
	Response	False Negative 44 7.96%	True Positive 39 7.05%

Feature importance

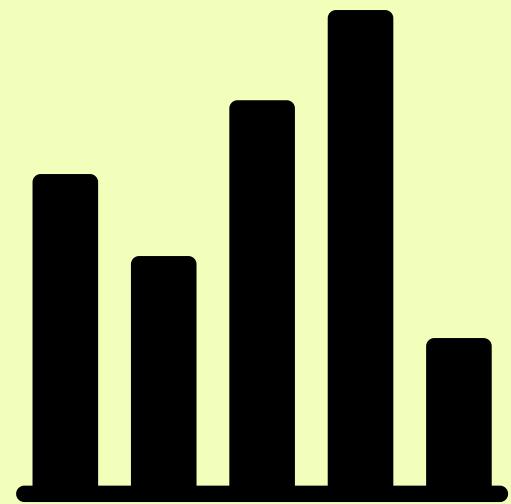


RFM ANALYSIS



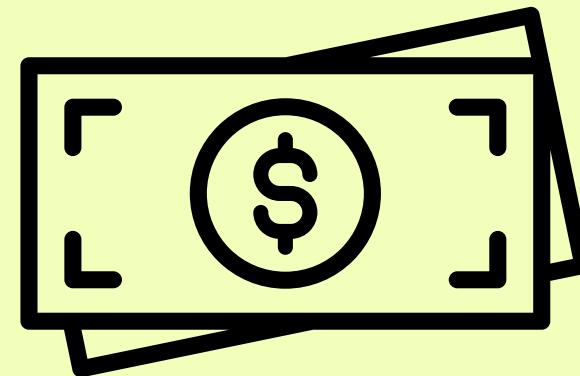
RECENCY

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**.

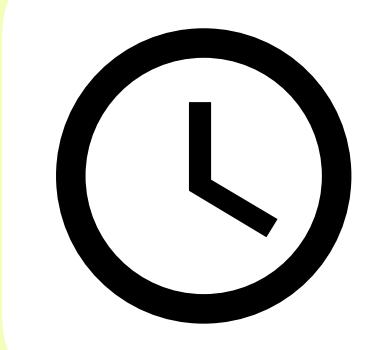
RFM ANALYSIS

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.

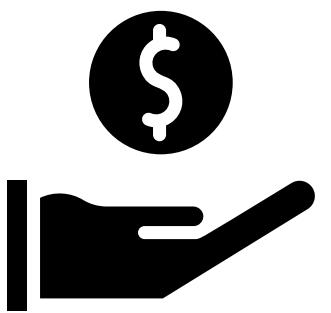
RFM ANALYSIS

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



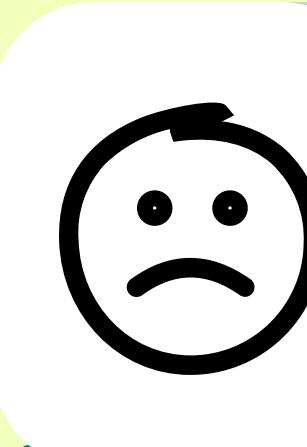
Customers who show signs of inactivity in the near future. This includes customers who may have had a drop in Frequency or Monetary, but still made a purchase relatively recently.

CAN'T LOSE THEM



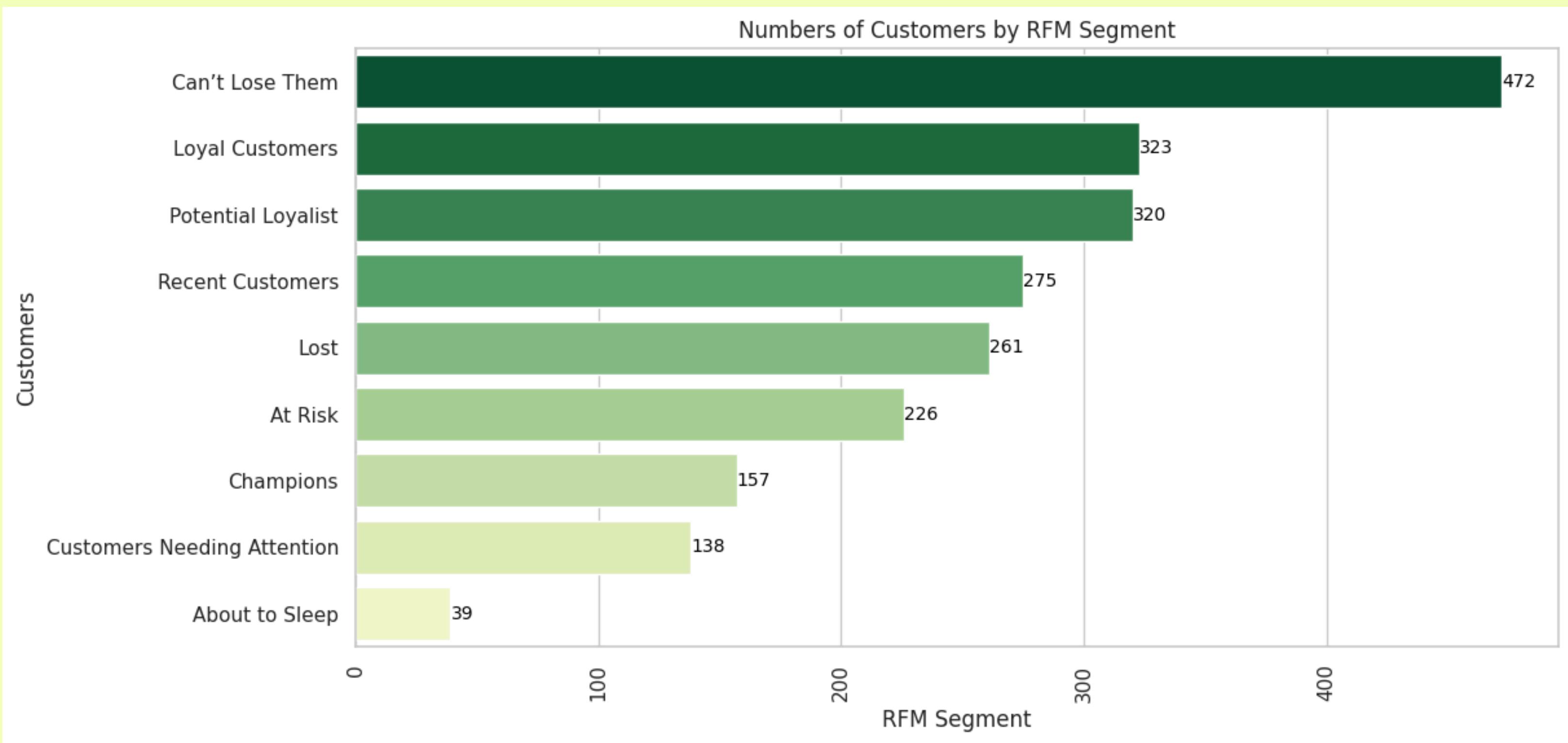
Customers who, although no longer as optimal as before, are still important to retain. They may show a decline in one or two RFM components.

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 =15%

After Machine Learning		
Marketing Budget	=54*3	162
Marketing Budget For Targeted Customer	=39*3	117
Marketing Budget Efficiency		=117/162 =72%

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