Banking on Data: Marketing Analysis

Benjamin Gerber

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OUR MISSION

Analyze the marketing campaign of a bank to find actionable insights for improvement

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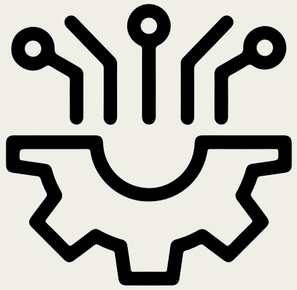
HOW ARE WE GOING TO DO IT?

1

Data Analysis



2

Machine Learning

3

Visualization

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OUR DATASET

11,162 Rows

17 Features

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TARGET VARIABLE

Deposit: Whether someone deposited money into their account during the marketing campaign period

WHY DOES THIS MATTER?

- Banks need money from deposits to invest in order to make money
- The effectiveness of this marketing campaign is to get people to deposit
    - The dataset did not measure amount deposited

EDA

EXPLORATORY DATA ANALYSIS

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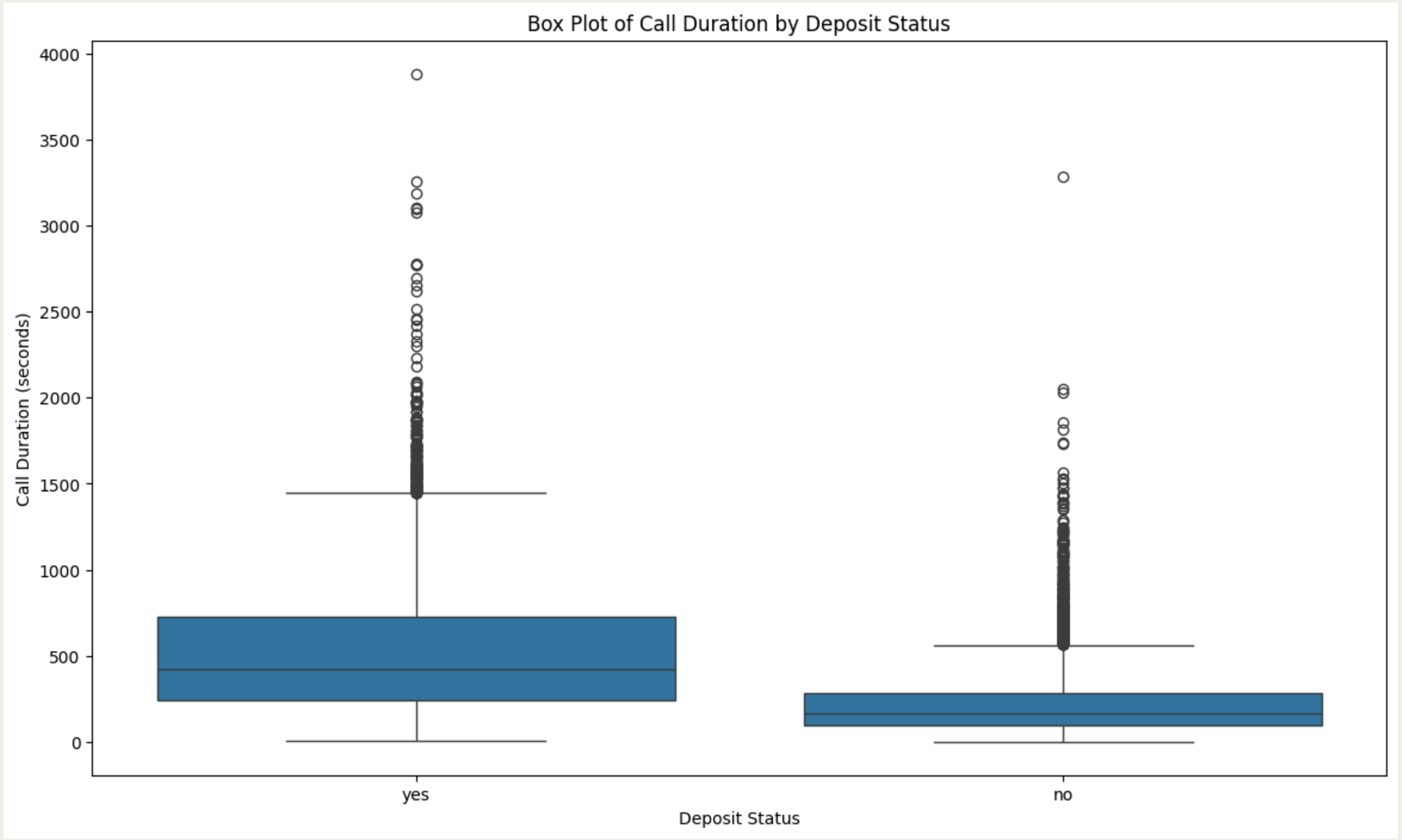
CALL DURATION (SECONDS) VS DEPOSIT



CALL DURATION (SECONDS) VS DEPOSIT

Deposit?	Min	25%	Median	Mean	75%	Max
No	2.0	94.0	163.0	223.1	282.0	3284.0
Yes	8.0	244.0	426.0	537.2	725.0	3881.0

Longer Calls are More Likely to Deposit

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BALANCE ($) VS DEPOSIT

Deposit?	Min	25%	Median	Mean	75%	Max
No	-$6847.00	$64.00	$414.00	$1280.23	$1324.00	$66653.00
Yes	-$3058.00	$210.00	$733.00	$1804.27	$2159.00	$81204.00

Higher Balances are More Likely to Deposit

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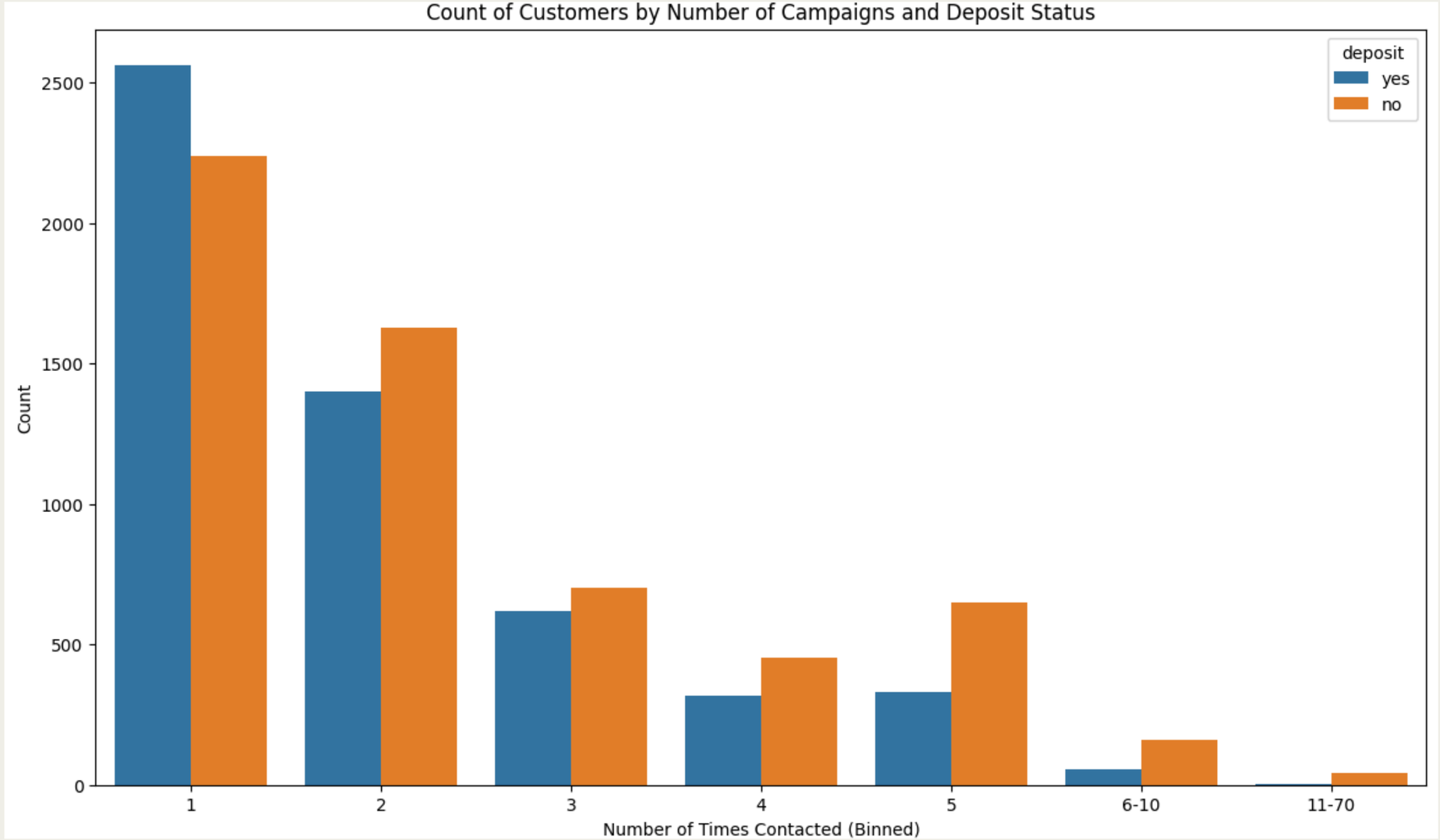
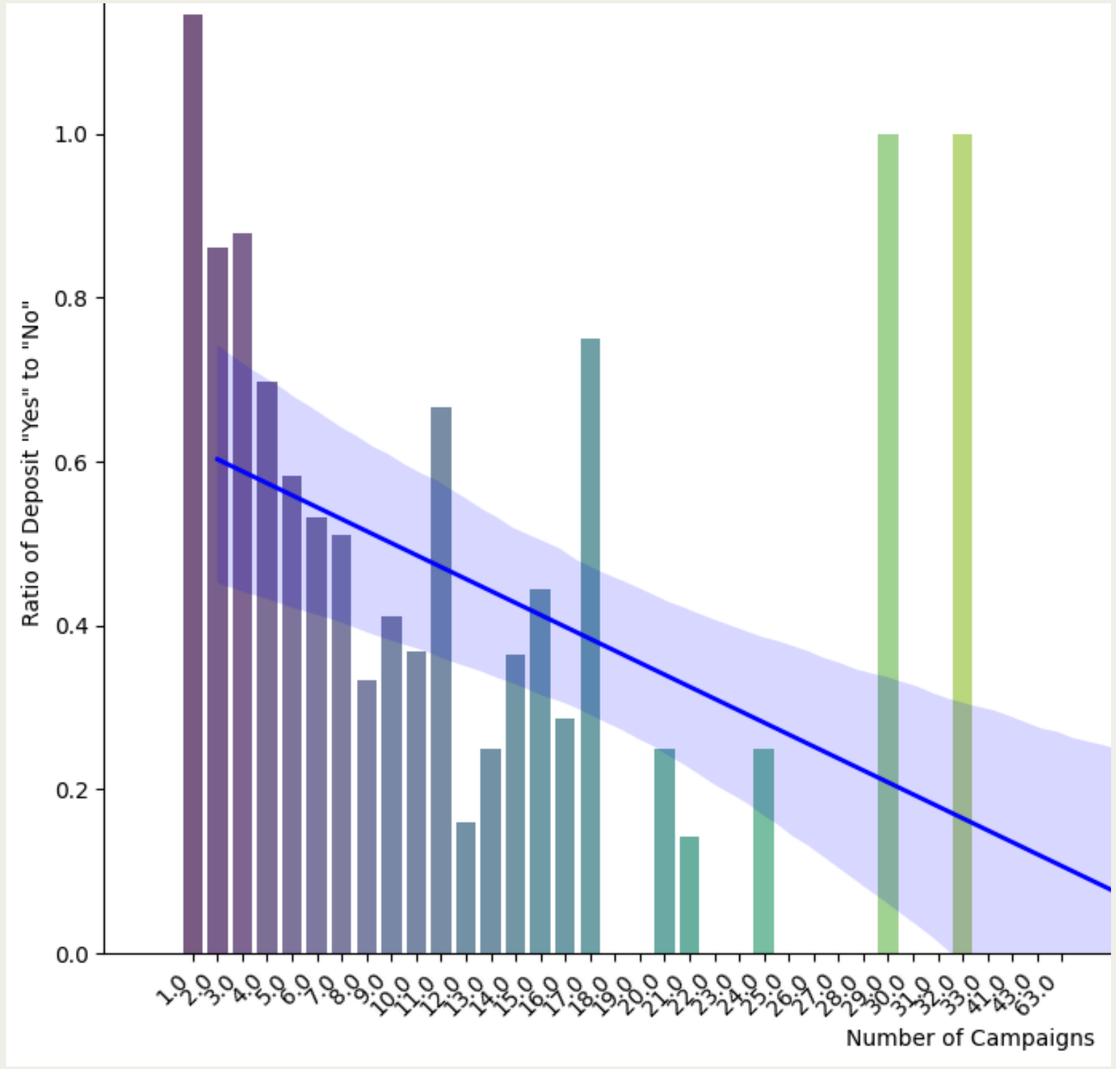
CAMPAIGN VS DEPOSIT

Campaign: The number of marketing calls made to a customer during the marketing campaign

CAMPAIGN VS DEPOSIT



CAMPAIGN VS DEPOSIT



When people are contacted more, they tend to not deposit.

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THREE ACTIONABLE INSIGHTS

1

EXTEND THE CALL

2

TARGET ACCOUNTS WITH HIGH BALANCES

3

LESS IS MORE

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Machine Learning

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OUR MODELS

Decision Tree Classifier

- Advantages
  - Step By Step Model
  - Interpretable
- Disadvantages
  - Possible Overfitting
  - Tree Pruning / Simplifying Model

Logistic Regression

- Advantages
  - Provides Probability for Output
  - Low Training Time
- Disadvantages
  - Struggles With Multicollinearity (when different features are correlated)

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Both Models Have One Goal:

Accurately predict whether or not someone will deposit during the marketing campaign

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DECISION TREE ANALYSIS

Deposit?	Precision	Recall	F-1 Score	Accuracy
No	0.86	0.75	0.80	0.80
Yes	0.75	0.87	0.81	

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Is this Accuracy Good?

Random Guessing

- 1 Guess = 50% Chance

Decision Tree

- 1 Guess = 80% Chance
- 2 Guesses = 64% Chance
- 3 Guesses* = 51.2% Chance

*Chance of getting all 3 predictions correct

It take our model four predictions (and getting all correct) before random guessing has a higher chance of just getting one guess correct.

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Does the Model Back the EDA Insight?

- The model includes these variables to make decisions:
  - Duration
  - Balance
  - Campaign
- Although those variables are in the model, we don’t know how impactful they are on the effect to deposit

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So, we create a second model to try to gain more insight.

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LOGISTIC REGRESSION ANALYSIS

1

CREATE MODEL WITH ALL FEATURES

2

SIMPLIFY MODEL TO GAIN DEEPER INSIGHT

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LOGISTIC REGRESSION ANALYSIS

Initial Model

- 42 Features
- Accuracy: 83.0%

Simplified Model

- 10 Features
- Accuracy: 79.2%

Our simplified model is much more interpretable while being nearly just as accurate!

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LOGISTIC REGRESSION ANALYSIS

DURATION OF CALLS IS BY FAR THE MOST IMPACTFUL THING ON DEPOSIT LIKELIHOOD

PEOPLE THAT DEPOSITED IN EARLIER CAMPAIGNS ARE MUCH MORE LIKELY TO DEPOSIT AGAIN

PEOPLE WITH HOUSING LOANS ARE MUCH LESS LIKELY TO DEPOSIT

THE NUMBER OF CALLS (CAMPAIGN) HAS A STRONG NEGATIVE IMPACT ON DEPOSIT

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LOGISTIC REGRESSION ANALYSIS

GOAL 1: KEEP CALLS LONG!

GOAL 2: CONTACT PEOPLE WHO DEPOSITED IN PREVIOUS CAMPAIGNS

GOAL 3: AVOID PEOPLE WITH HOUSING LOANS

GOAL 4: LESS IS MORE, DON'T WASTE TIME CONTINUOUSLY CALLING SOMEONE

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How long should calls be?

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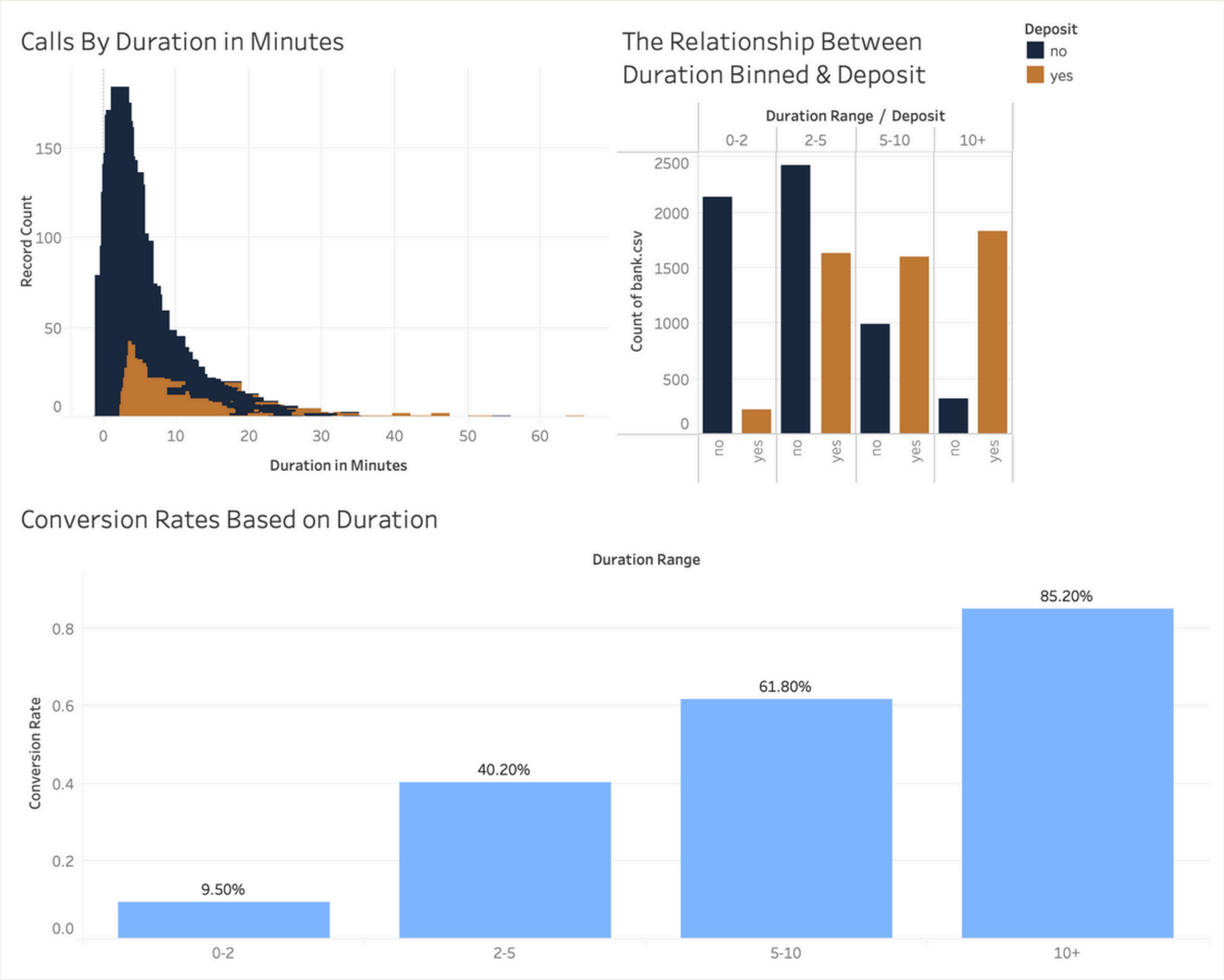
DASHBOARD ANALYSIS



> 5 Minutes

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WHAT NEXT?

Time-Series Analysis

- Which months are we more successful during?
- What days of the week result in longer calls?

A/B Testing

- Do certain scripts lead to longer calls?

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APPENDIX

GitHub Repository for Full Code (Link)