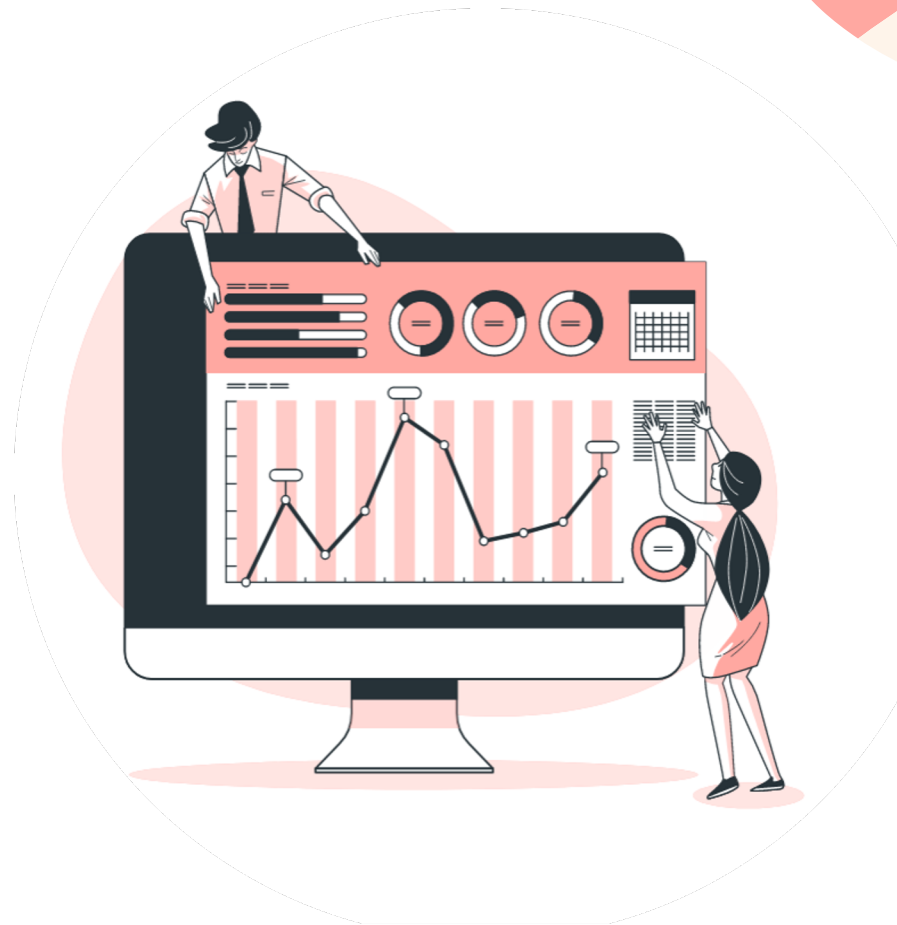


# Bank Marketing Prediction

Hernan Trujillo

July 2021



# 01



## Introduction

# Goal



Predict if a client will  
subscribe, or not, to a  
term deposit account

# Data Source



## Target

Regular clients of the bank

## Predict Target

Potential clients to subscribe.

## Data

UCI Machine Learning Repository

Instances: 41.188      Attributes: 20

## Method

Phone calls gathered through direct marketing campaigns.

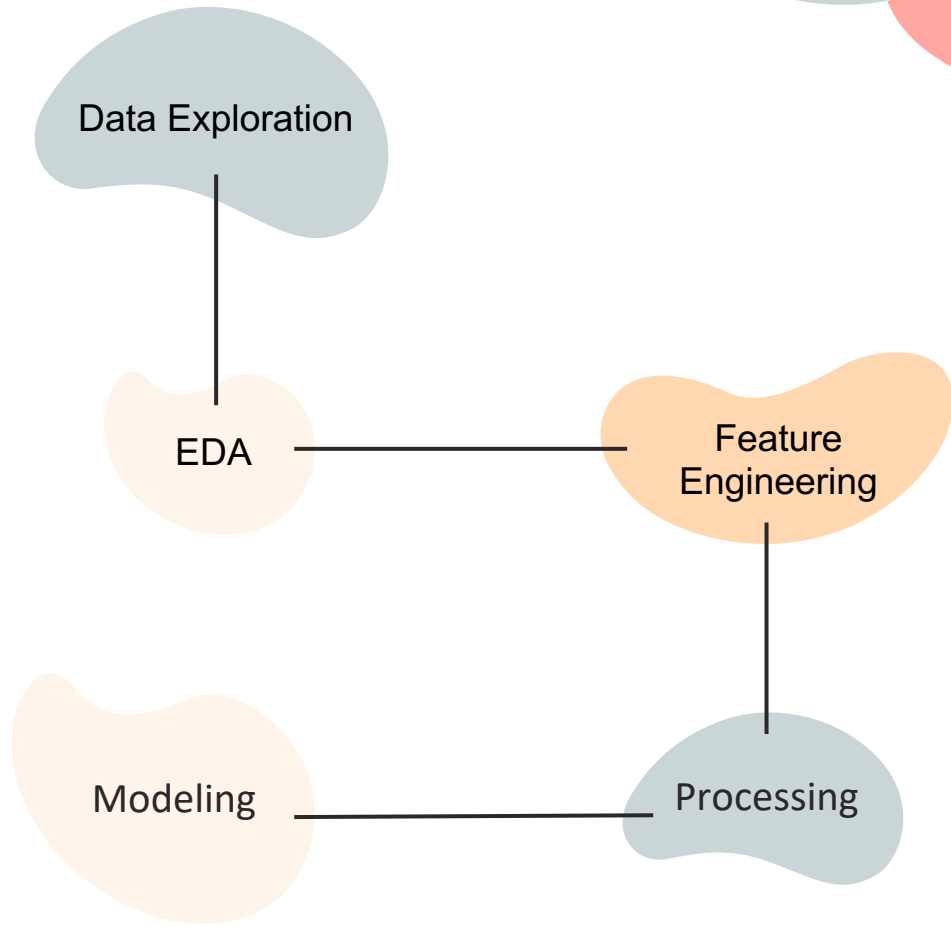
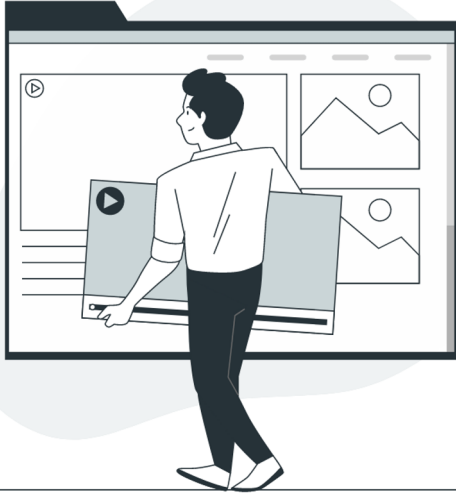
# 02

## Approach

Classification Model



# Classification Workflow

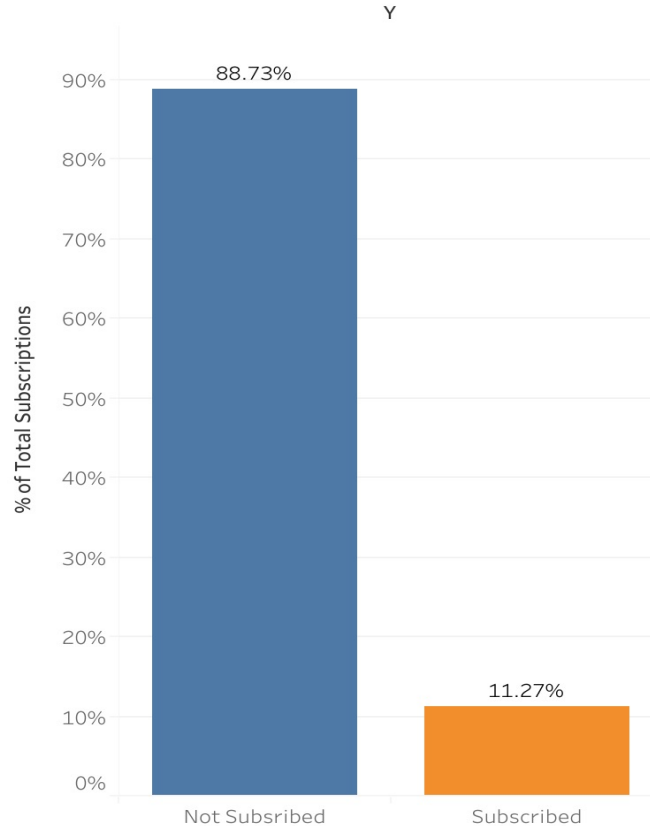


# Data Exploration

## Imbalanced Dataset

- 88.73% Not Subscribed
- 11.27% Subscribed

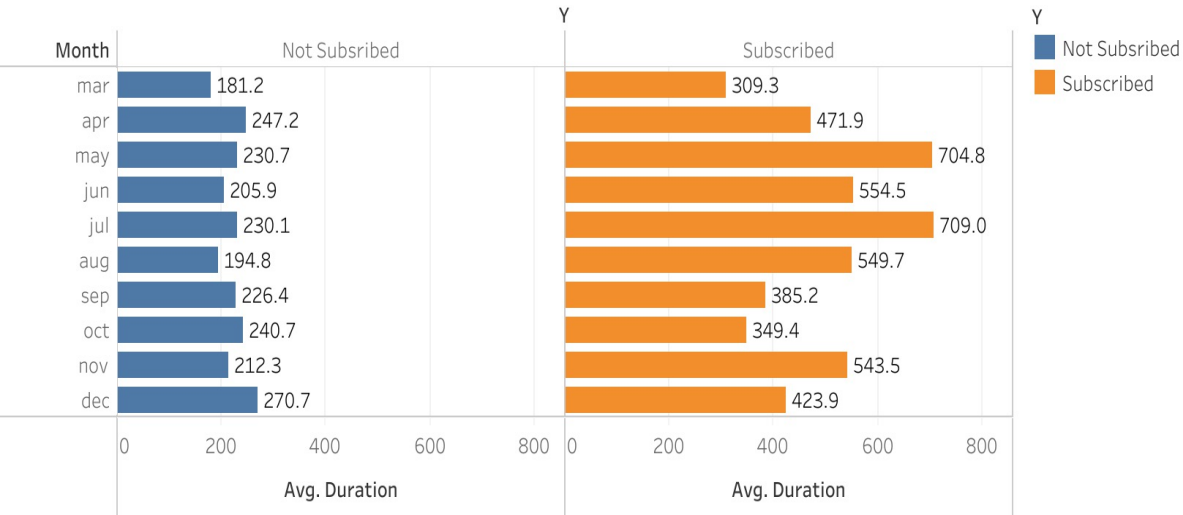
Subscription Outcome



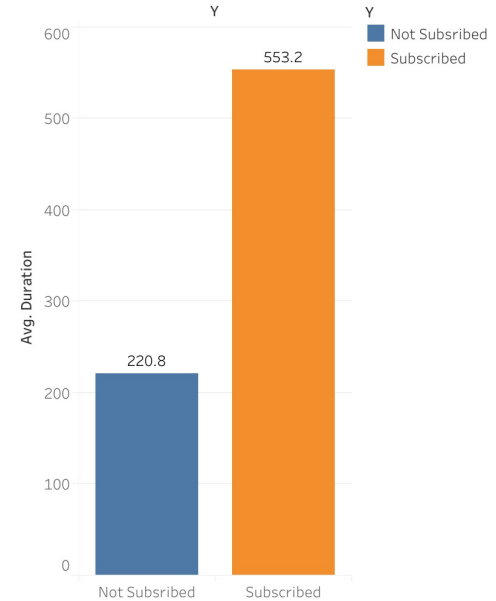
# Exploratory Data Analysis (EDA)



## AVG phone call duration by month



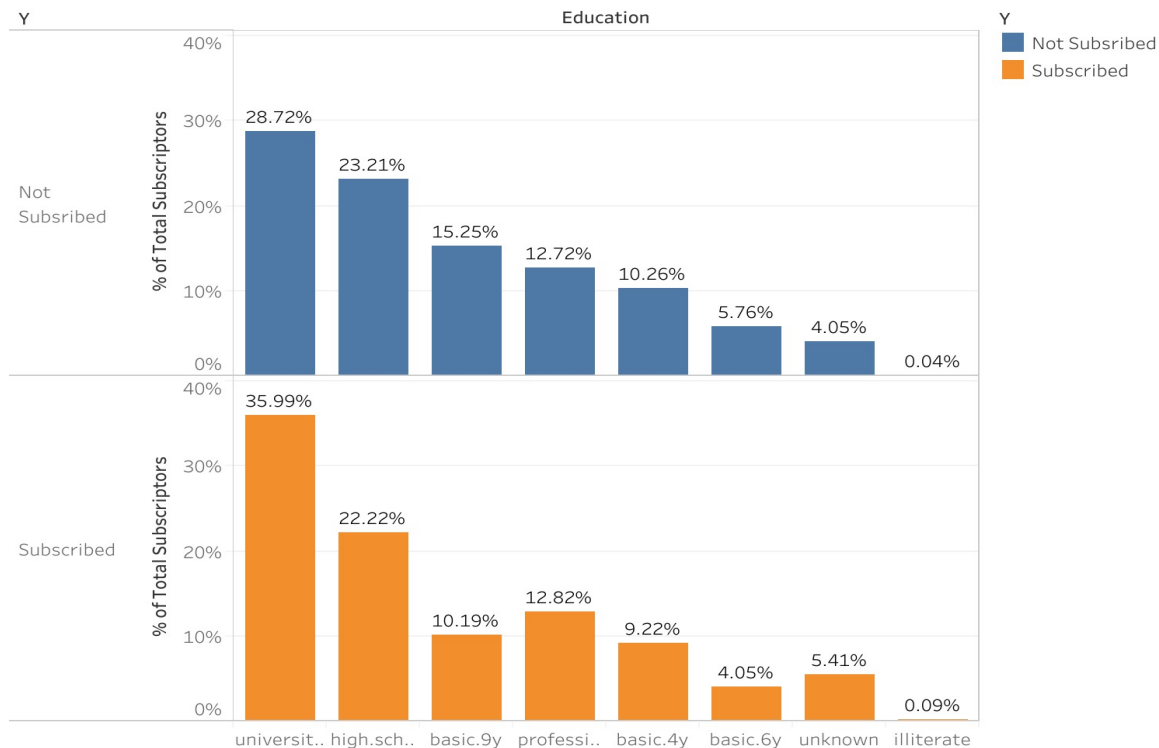
## AVG phone call duration





# Exploratory Data Analysis (EDA)

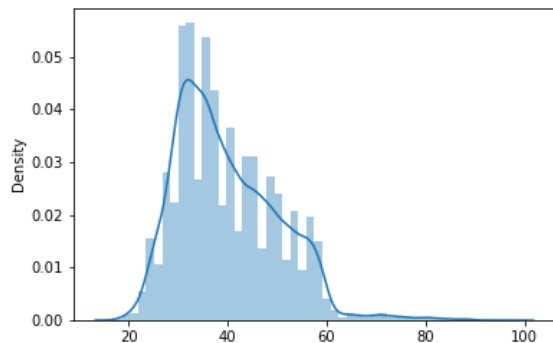
Subscribersn by Education



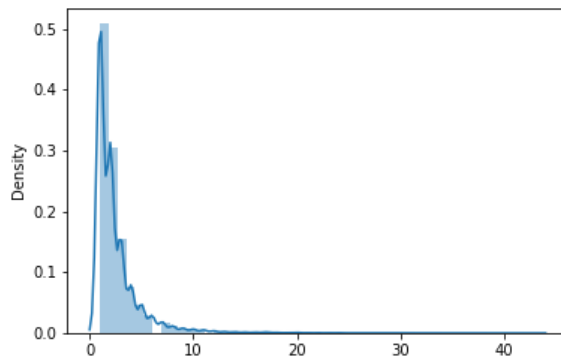
Focus on  
highly  
educated  
target

# Feature Engineering

## Outliers



Age



Campaign



	age	campaign
count	38205.000000	38205.000000
mean	39.855935	2.567334
std	10.286042	2.768519
min	17.000000	1.000000
25%	32.000000	1.000000
50%	38.000000	2.000000
75%	47.000000	3.000000
max	98.000000	43.000000

# Feature Correlations



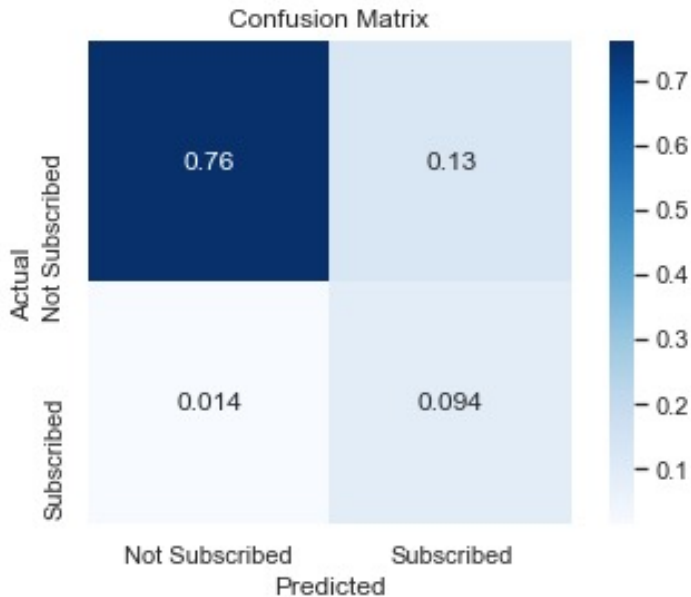
Dropping highly correlated features for:

- Avoid overfitting
- Easy for interpretation

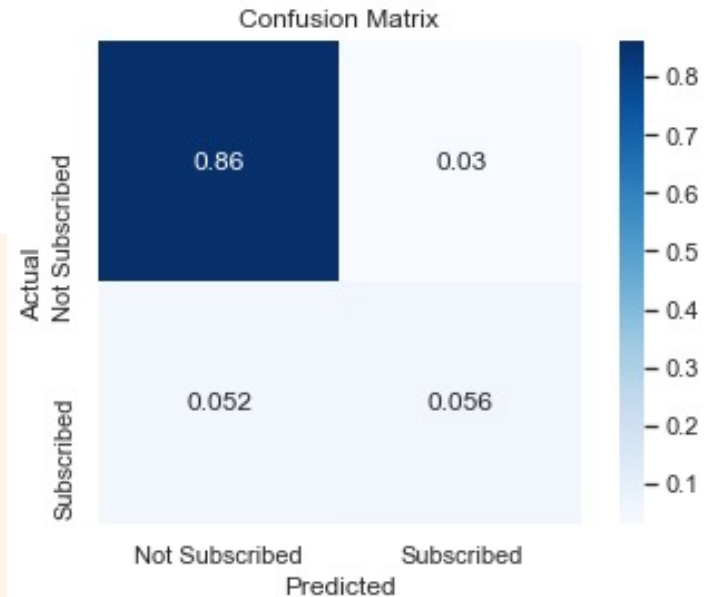
Keeping “euribor3m”

# Confusion Matrix

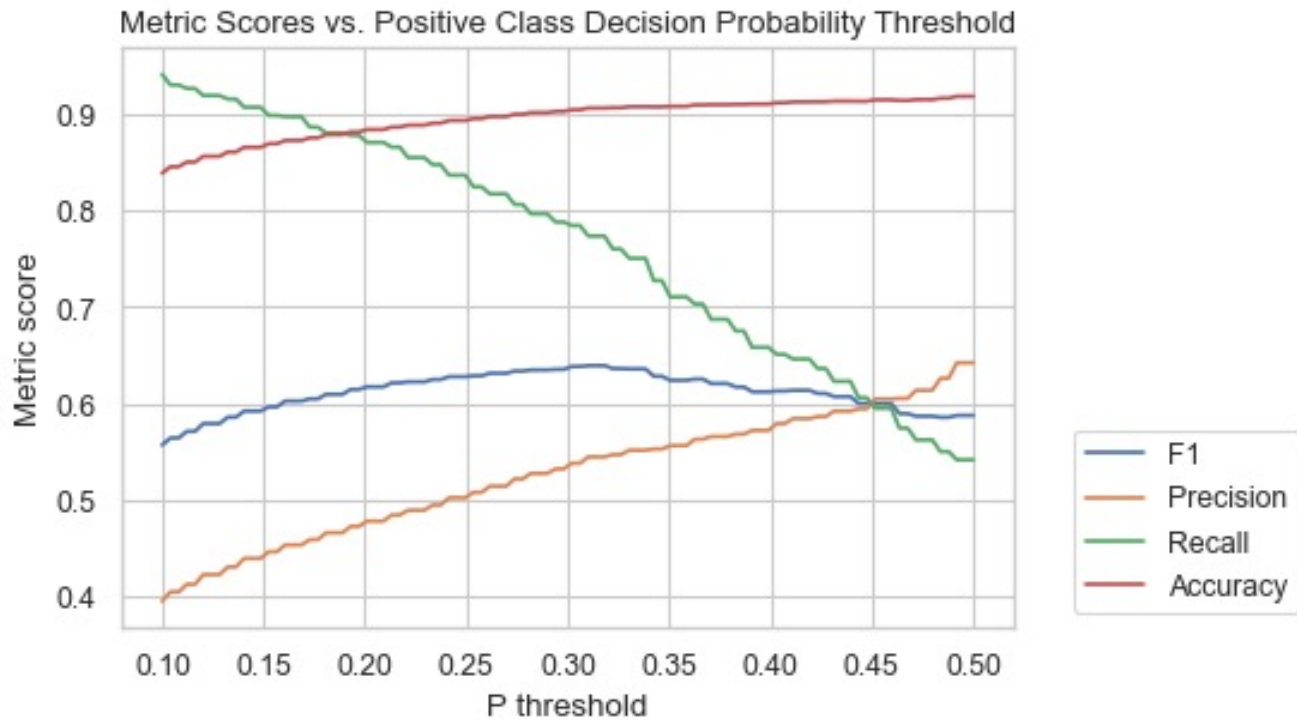
## Logistic Classification



## Random Forest Classification



# Processing



# 03



## Results

Modeling

# Classification Models Scores

Base Model: Logistic Regression	F1 0.594
Logistic Regression (Class Weight)	F1 0.589
Random Forest	F1 0.635



# $F1=0.63$

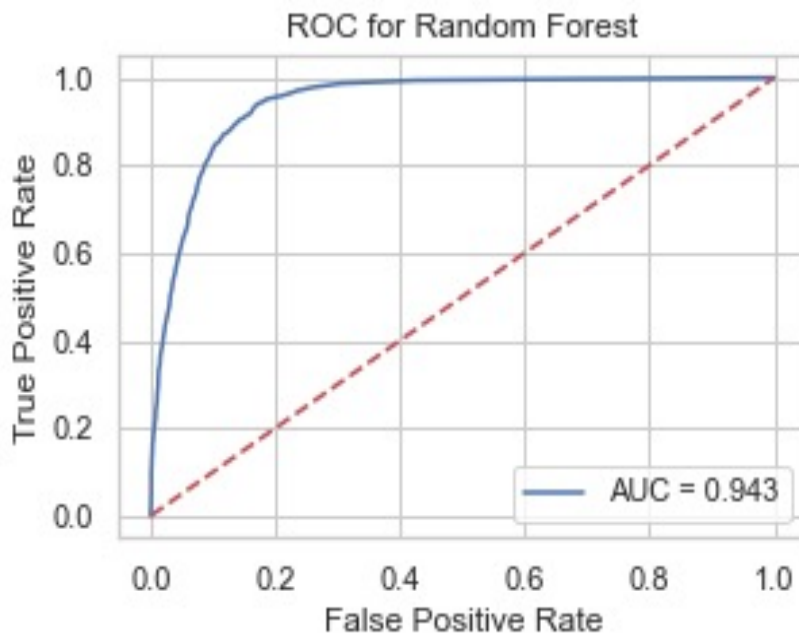
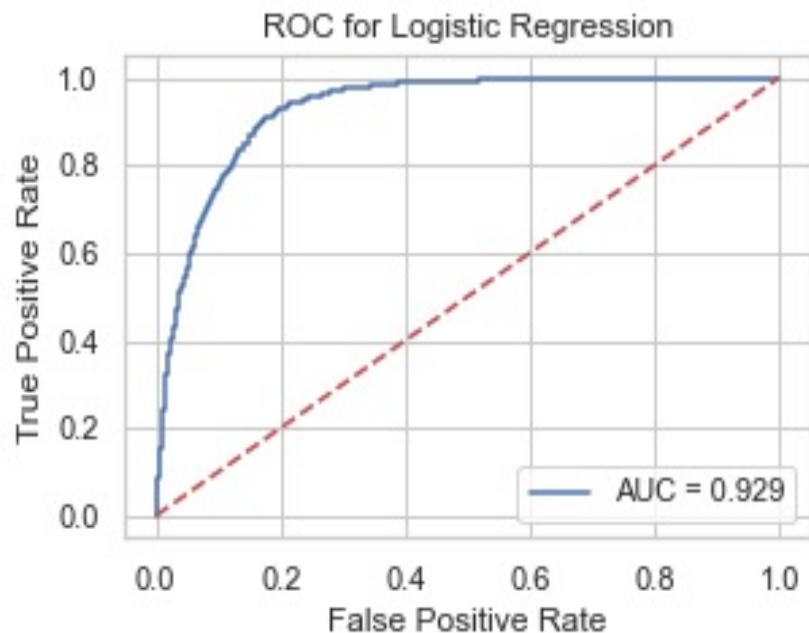
Conclusion:

Random Forest Model



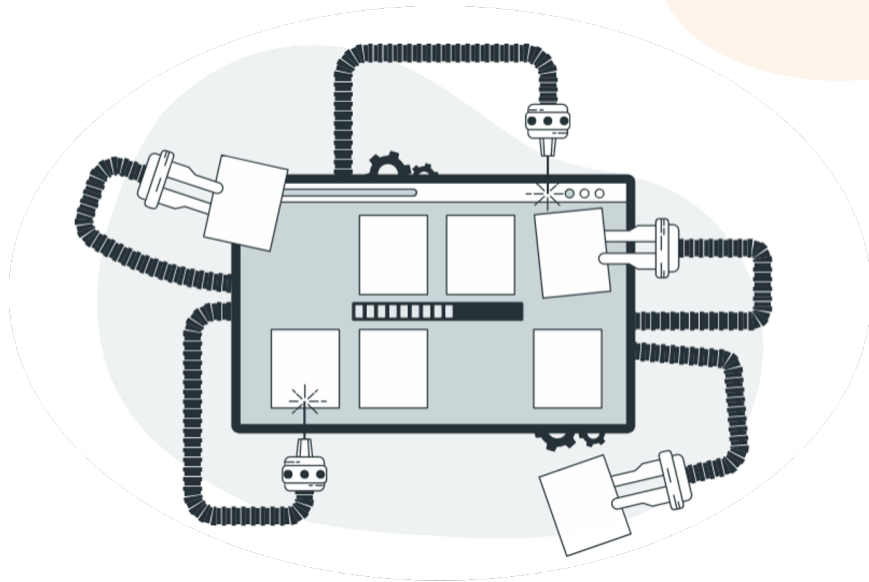


# ROC Comparison



# Future work

Try more sophisticated models



Model 1

Gradient Boosting  
Machine

Model 2

XGBoost

# Thanks!

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<https://public.tableau.com/app/profile/hernan.trujillo/viz/BankMarketing>

[https://github.com/hernantru943/CLS\\_PROJECT](https://github.com/hernantru943/CLS_PROJECT)

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