



Data Driven Strategy of Bank Marketing

- by Carol C

Business Background

Portuguese banking institution was launching a direct marketing campaign.

The campaign:

- Based on **phone calls**.
- The product was a **term deposit**.
- Clients were contacted to access if the product would be **('yes') or not ('no') subscribed**.





Problem Statement

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Base on the dataset, only **11%** of the clients subscribed the product.

That means, by randomly contact the clients, average **9 clients** need to be contacted to get **1 successful subscription**.



Can we launch the campaign in a **more cost effective** way by **accurately targeting the clients**?

Solutions(Goals)

1. Targeting existing clients

Provide the campaign a list of clients that most of them will subscribe the term deposit.

- Create a model to accurately predict whether or not a client will subscribe the term deposit.



Solutions(Goals)

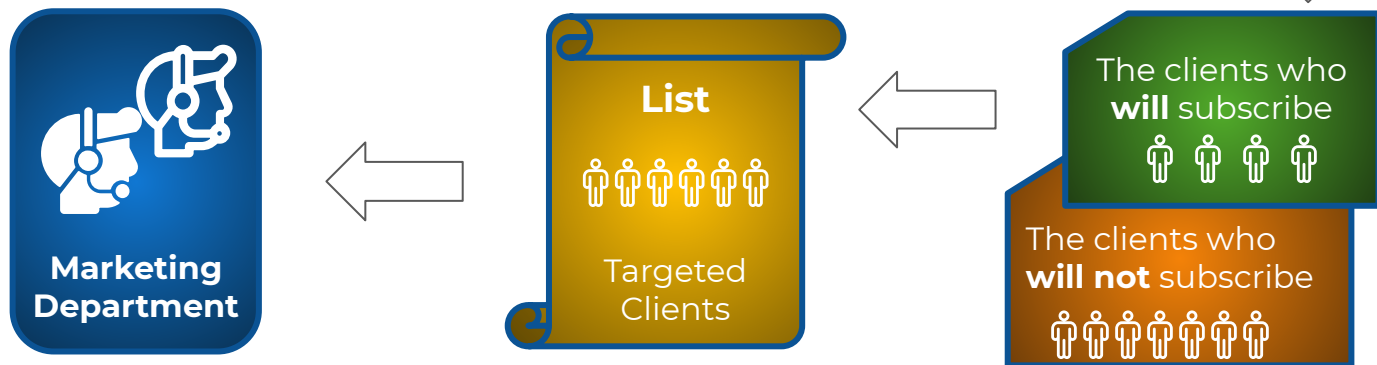
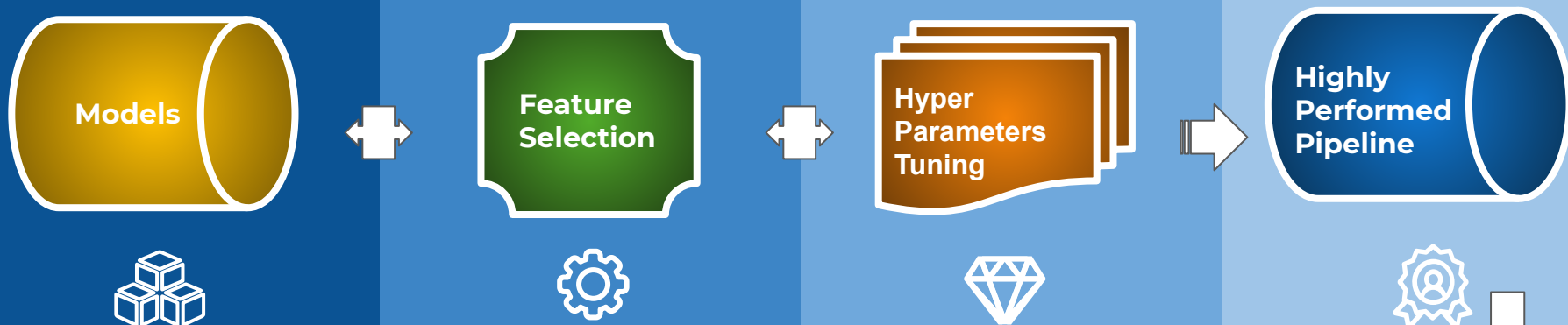
2. Targeting potential clients

Advice will be provided to the campaign on:

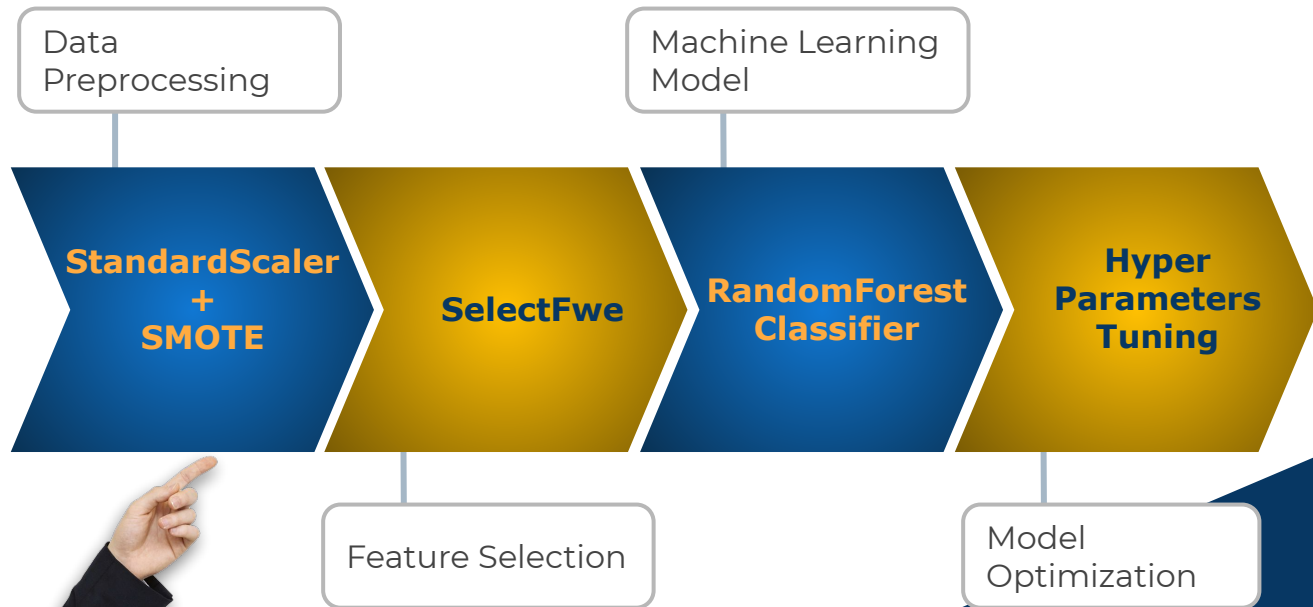
- what kind of people more tend to subscribe the term deposit?
- What factors has influence on people's decision on the subscription?



TARGETING EXISTING CLIENTS



Pipeline



MODEL PERFORMANCE

Key Metrics

Precision

(How accurate the model predict)

0.67

0.51

Recall

(How well the model detect positive sample)

0.50

0.89



F1-Score

(How balance the model is)

0.57

0.65



AUC

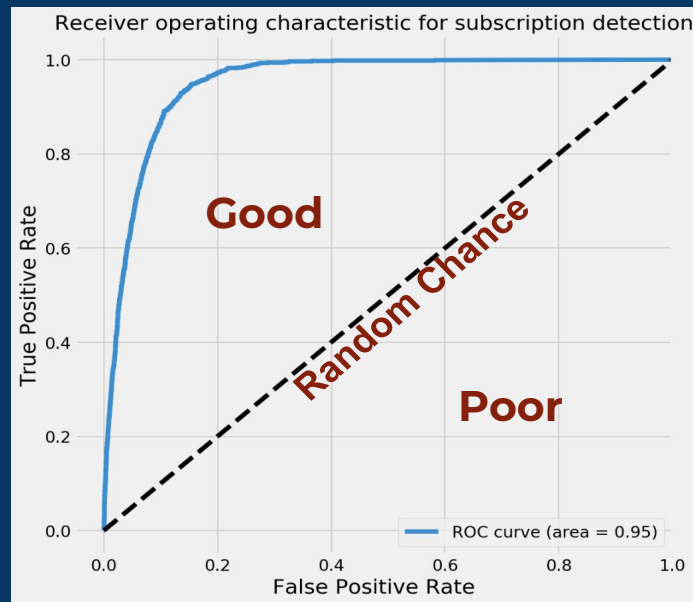
(Overall performance of the model)

0.73

0.89



ROC curve



VALUE TO BUSINESS

Random Call

9.1 Calls



1 subscription

VS

Targeted Call

1.1 Calls



1 subscription

Save 88%
Workforce



FLEXIBILITY TO SUIT DIFFERENT BUSINESS NEEDS

If the business priority is to launch the campaign with a limit budget, we can classify the client as “will subscribe” only when probability larger than 50% or higher. This will decrease false positive rate so there won't be too many extra calls to make.

Instead, if the business priority is to get as many subscriptions as possible, we can set the probability threshold to a lower number such as 10%. This will make sure almost all the clients who will subscribe be detected.

Less Cost



More Sales



Adjust the predicted probability threshold to meet different business needs

	predicted_subscribe	predicted_not_subscribe
will_subscribe	1008	121
will_not_subscribe	979	7917

	predicted_subscribe	predicted_not_subscribe
will_subscribe	1072	57
will_not_subscribe	1426	7470

	predicted_subscribe	predicted_not_subscribe
will_subscribe	1111	18
will_not_subscribe	2194	6702

2. TARGETING POTENTIAL CLIENTS



PICTURING
POTENTIAL
CLIENT



“

**What kind of people
more tend to subscribe
a term deposit? ”**

IMPORTANT FACTORS

Marital

Education

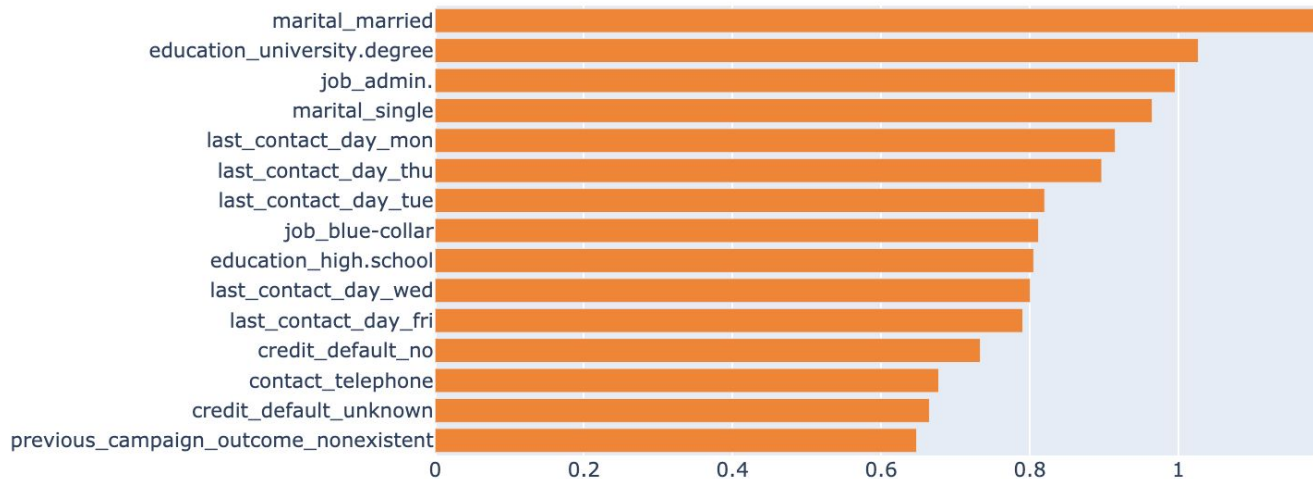
Job

Contact

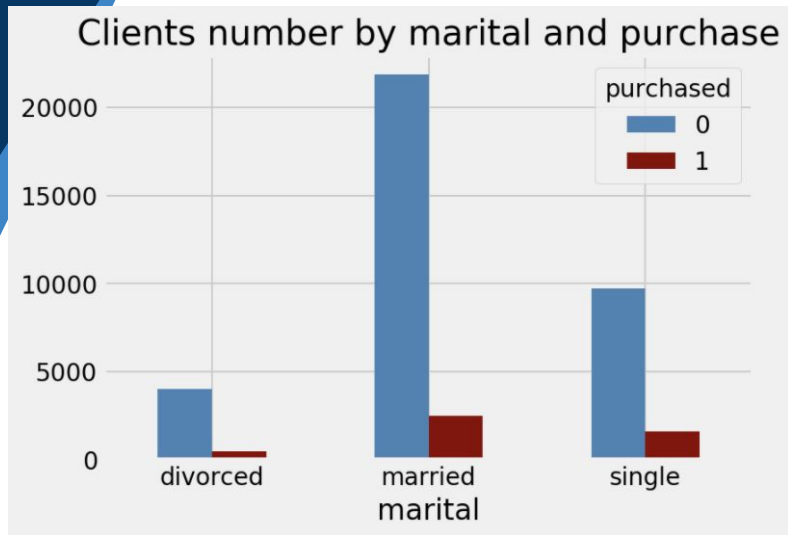
Credit Default

Contact Method

Overall Importance:
Mean Absolute Score



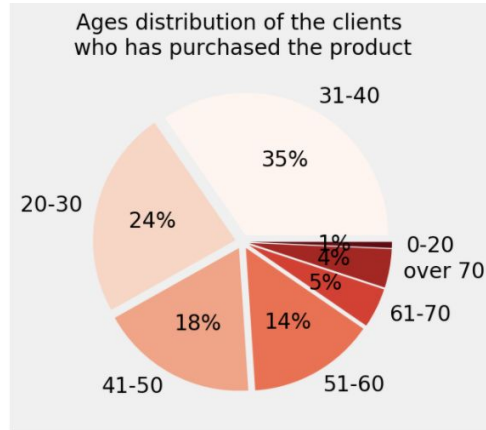
FEATURE ANALYSIS - MARITAL



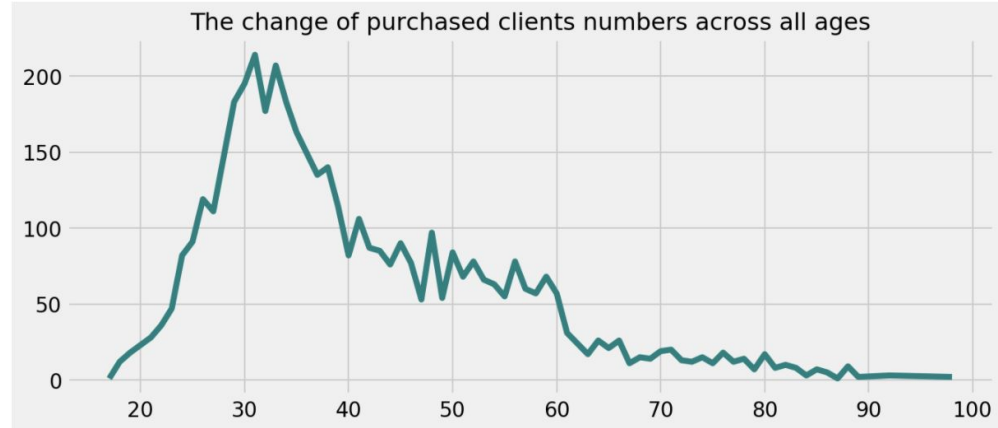
Single: 14% purchased
Married: 10% purchased
Divorced: 10% purchased



FEATURE ANALYSIS - AGE

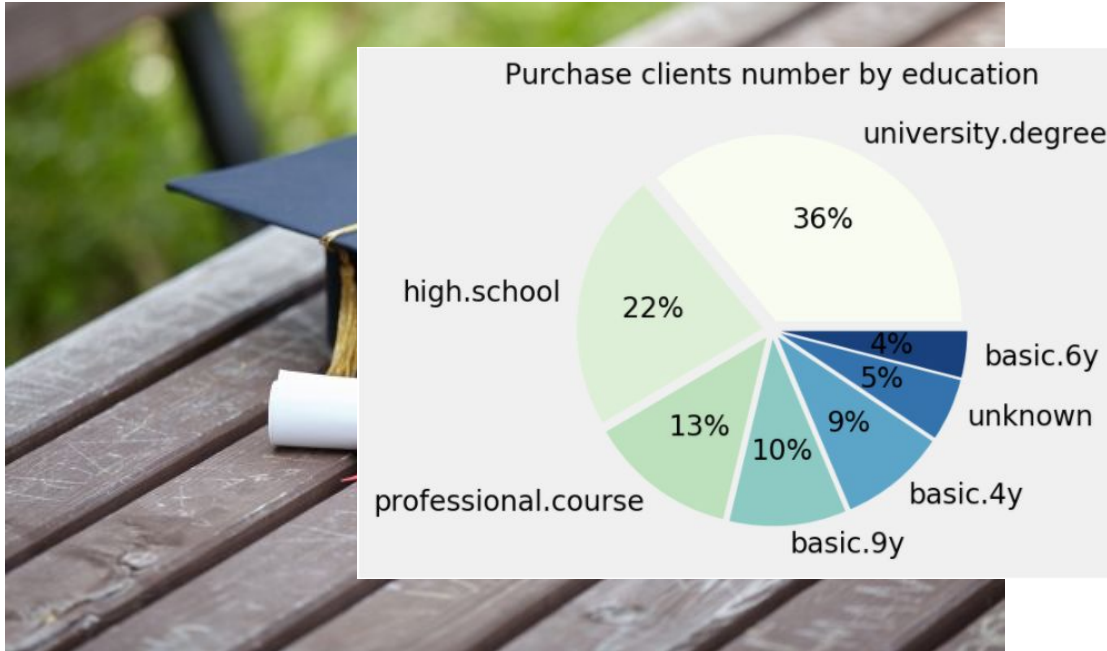


Around 70 % of purchasers were age from 25-45



The number of purchased clients increased quickly before age 31, and then dropped down after that.

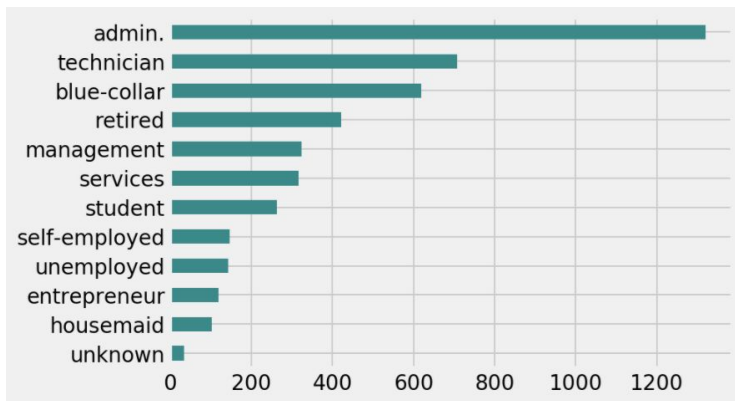
FEATURE ANALYSIS - EDUCATION



Highly educated people more tend to purchase term deposit

FEATURE ANALYSIS - JOB

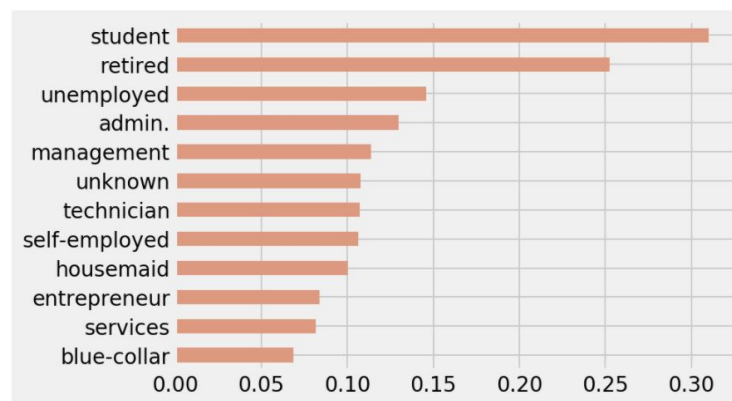
Absolute number of purchases by job



Top 3 (Absolute No.)

Admin,
Technician
Blue-collar

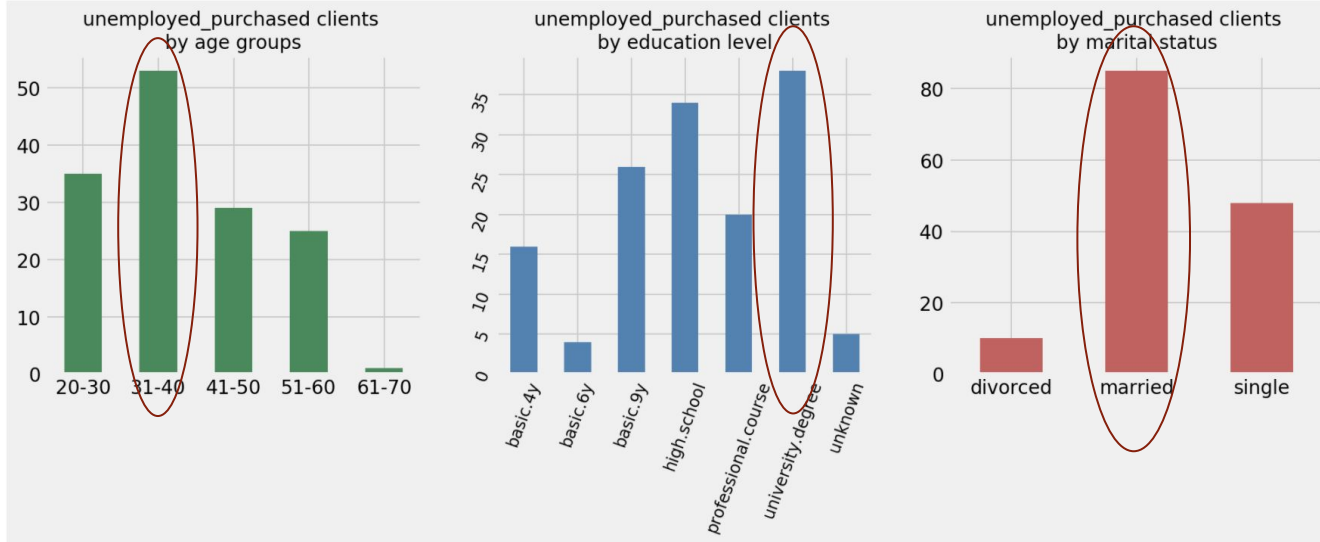
Percentage of purchases by job



Top 3 (Percentage)

Student
Retired
Unemployed

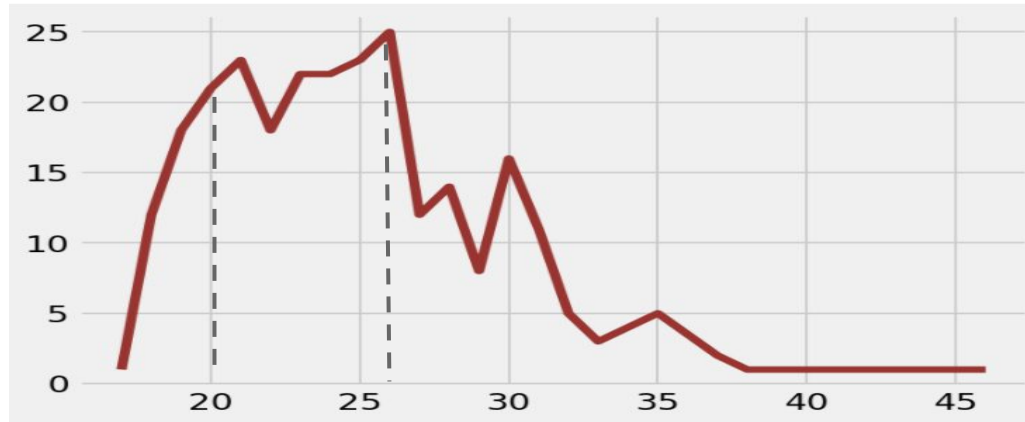
FEATURE ANALYSIS - JOB(Unemployed)



Interesting Fact: Term deposit was popular among the unemployed people who married, age between 31 to 40, and had university-degree of education.

FEATURE ANALYSIS - JOB(Student)

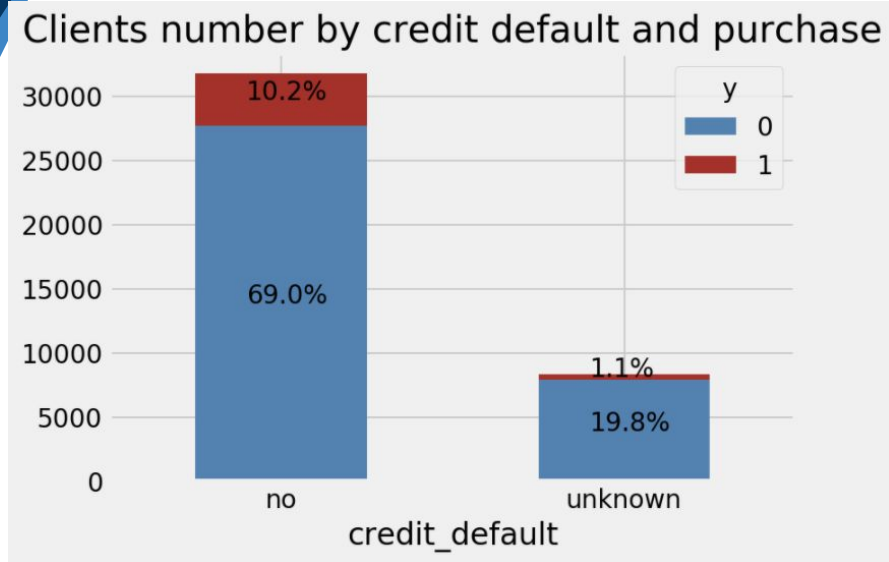
Student purchases by age



Interesting Fact: Over 30% of the student clients had purchased term deposit.

Possible Reasons: Students aged 20-26 usually are studying at university. They might have received financial support for their education and living from their parents. They might tend to put their unused fund into a term deposit for a higher interest rate.

FEATURE ANALYSIS - CREDIT DEFAULT

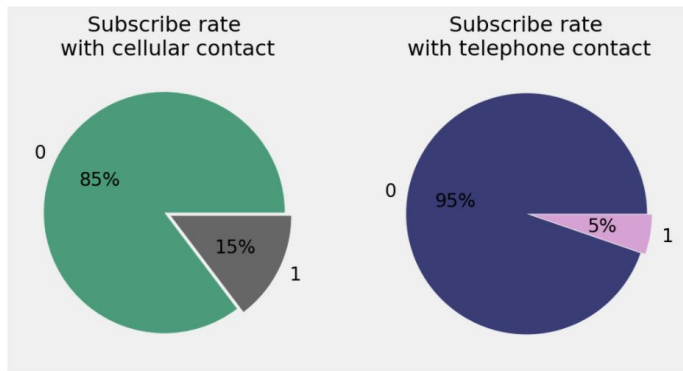


People without credit default was **9 times** more possible to subscribe a term deposit compare to people whose credit default was unknown .

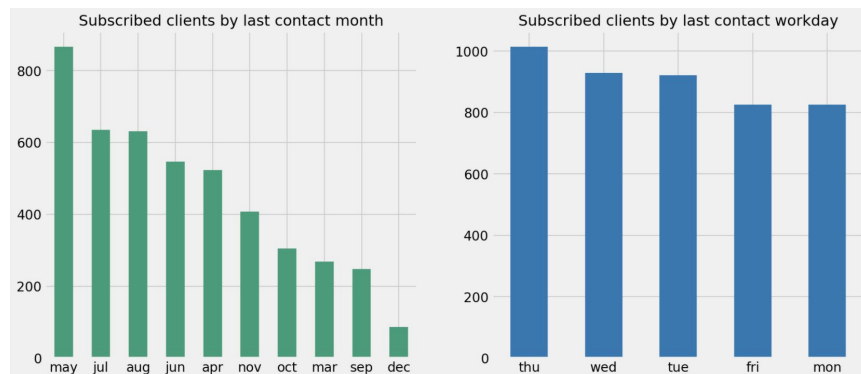


FEATURE ANALYSIS - CAMPAIGN CONTACT

- Contact via **cellular** had **3 times** higher chance of success than contact via telephone.



- Timing for launching the campaign:
Month: April to August were good.
Weekday: Thursday was the best.



PICTURING POTENTIAL CLIENT

Age 25-45

University education

Admin, Technician or Blue collar

Has no credit default

Has no personal loan



CAMPAIGN RELATED FACTORS TO CONSIDER



CONTACT METHOD

Cellular over Telephone

LAUNCHING MONTH

May is the best
April to August are good
Avoid the 4th quarter

WEEKDAY TO CALL

Thursday is the best
Avoid Monday and Friday

NEXTS

FOR THIS PROJECT

- Explore applying neural network for the classification
- Explore clustering the clients

FOR MY CAREER

- Continue learning of statistics, machine learning and deep learning
- Practice in analytics and contribute to resolving real world problems
- Interests: Retail, Financial Service, Energy, Technology

Thanks!

Do you have any questions?

Mobile: +61 406 341 058

Email: carolcheng.au@gmail.com

Linkedin: linkedin.com/in/carolcheng3

Github: github.com/carolchenghq

Credits

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