

PREDICTIVE MODELING OF BANK MARKETING TARGETS

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MODULE 3 PROJECT

BANKS: INCREASE
SALES AND REACH
MORE CUSTOMERS

TELEMARKETING:
REACH CUSTOMERS &
RELEVANT DATA

MACHINE LEARNING:
PREDICTIVE
MODELLING

EFFICIENT AND
EFFECTIVE MARKETING
CAMPAIGNS &
LOWER COSTS

MAXIMIZE CUSTOMER
LIFETIME VALUE

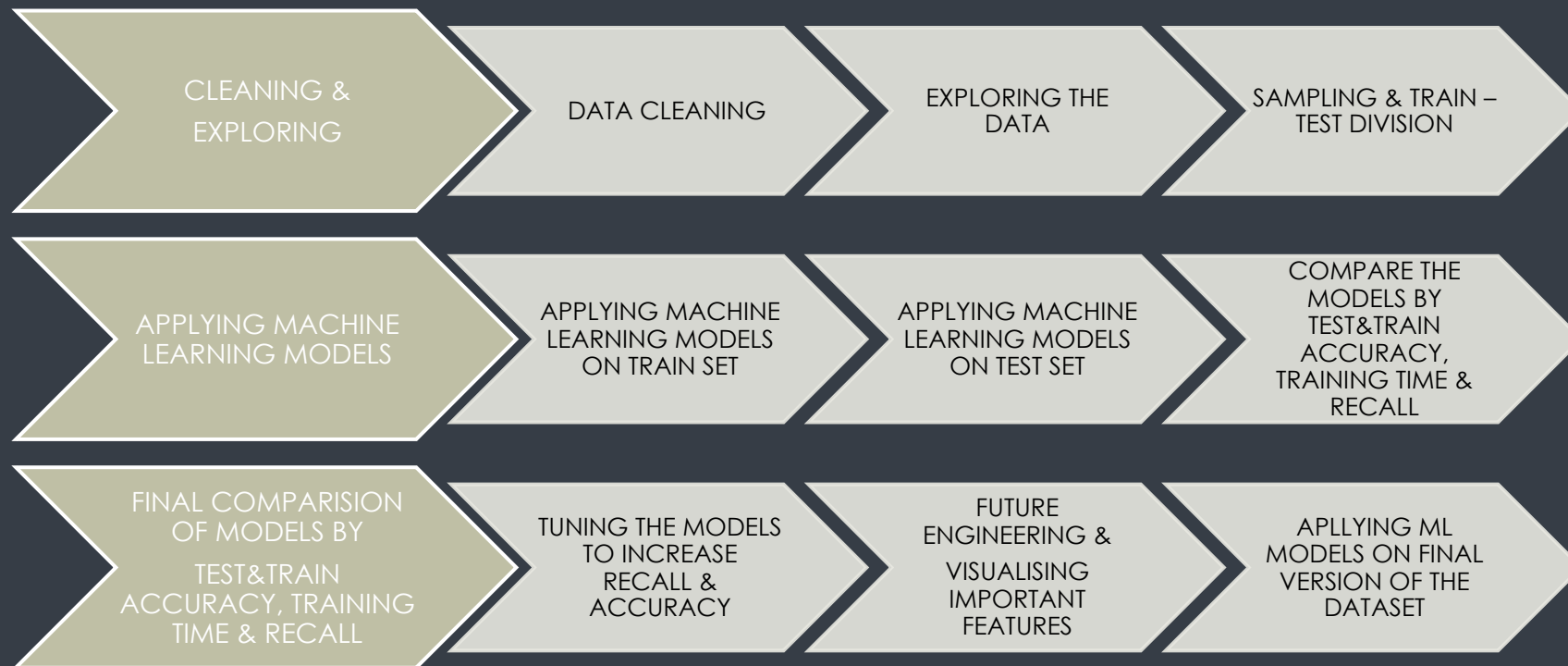
BUSINESS
CASE

DATA

THE DATASET CONSISTS OF 41118 DATAPOINTS AND 21 FEATURES

- PERSONAL : JOB, AGE, MARITAL STATUS, EDUCATION ETC.
- FINANCIAL : DEFAULT CREDIT, HOUSING LOAN, PERSONAL LOAN ETC.
- CAMPAIGN : FREQUENCY OF CALLS, CONTACT NUMBER, CONTACT DATE & MONTH, CONTACT DURATION ETC.
- ECONOMIC INDICATORS: CONSUMER CONFIDENCE INDEX, EMPLOYMENT VARIATION RATE, CONSUMER PRICE INDEX, EURIBOR3M(INTEREST RATE)
- TARGET: SUBSCRIBING A TERM DEPOSIT

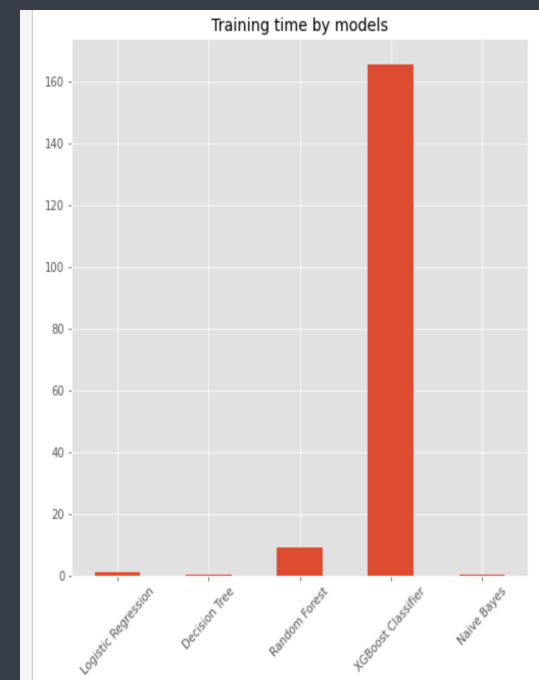
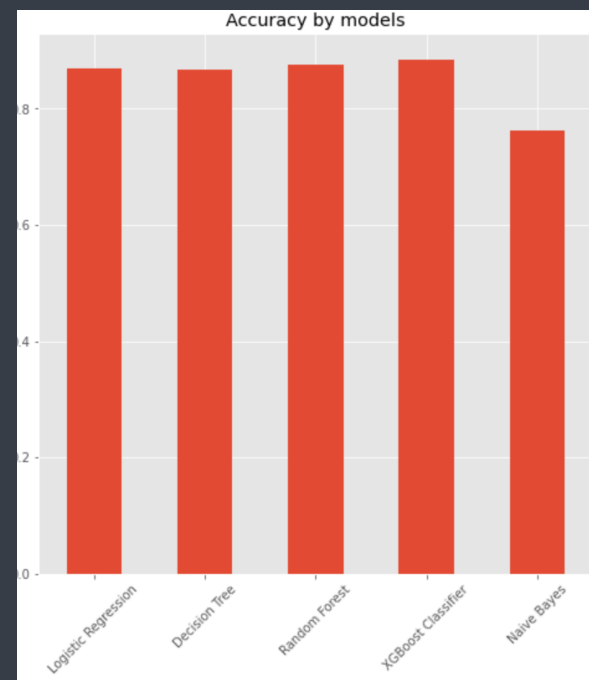
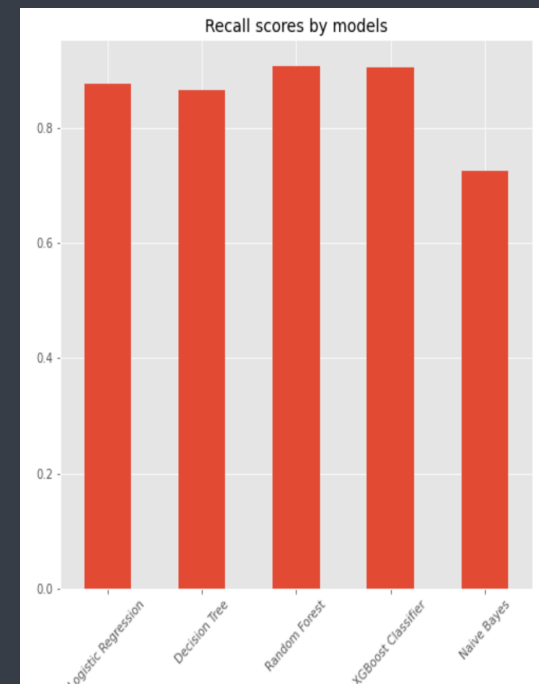
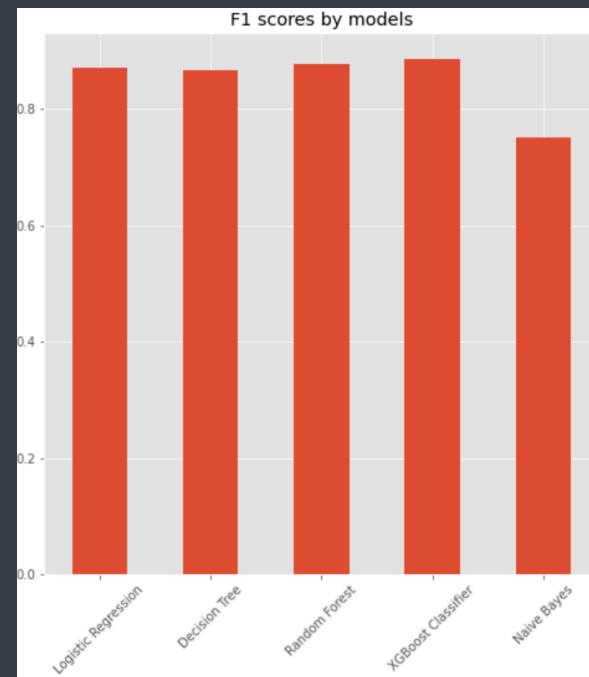
MODELING METHODOLOGY



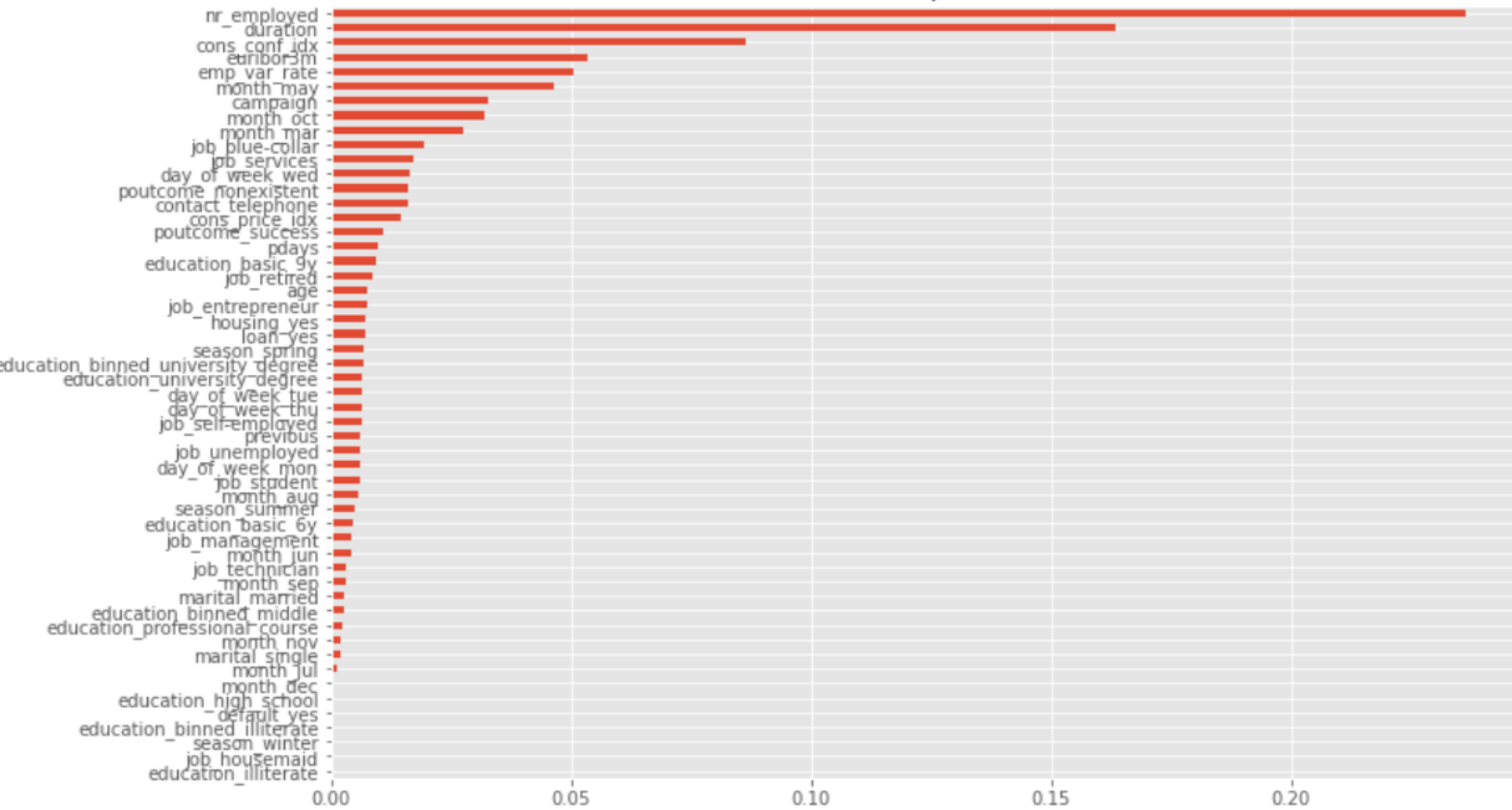
MODEL COMPARISON

♠ Training time ♠ Training score ♠ Test score ♠ f1 Score ♠ Recall Score ♠

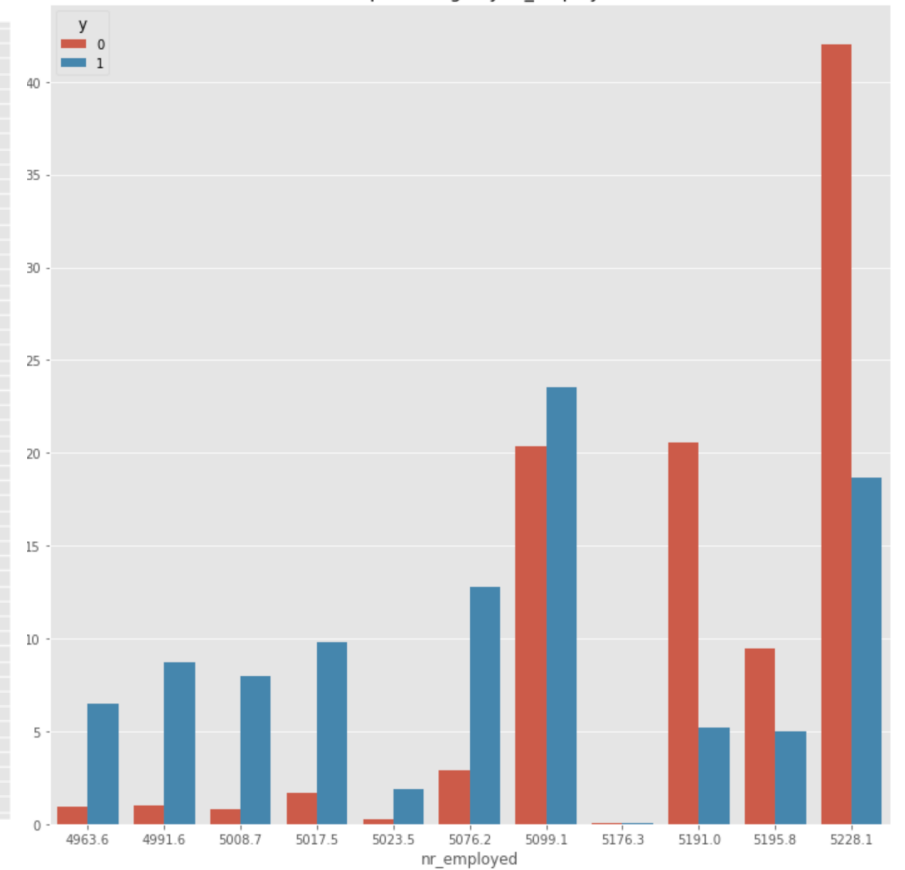
Logistic Regression	1.089384	0.886490	0.870018	0.870655	0.874945
Decision Tree	0.565084	0.890301	0.866623	0.866286	0.864104
Random Forest	9.143574	0.899511	0.875000	0.878867	0.906921
XGBoost Classifier	165.490196	0.909870	0.884691	0.886884	0.904074
Naive Bayes	0.365406	0.759392	0.761662	0.752347	0.724047



Feature Importances



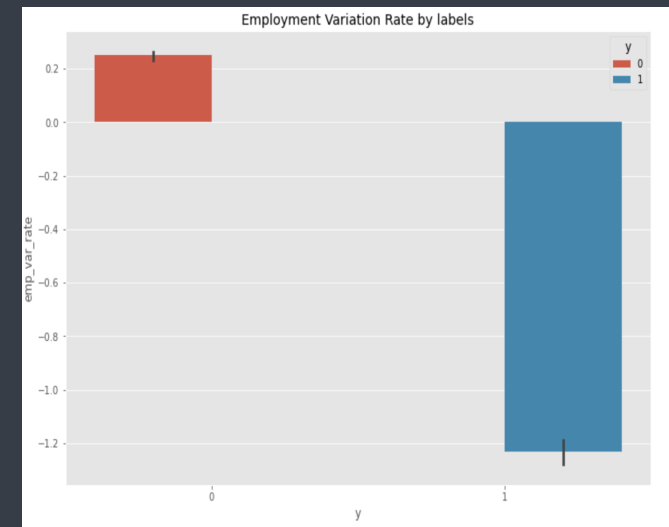
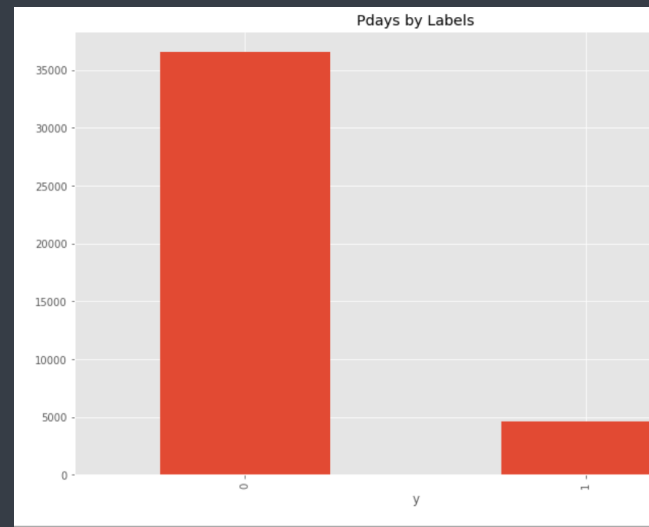
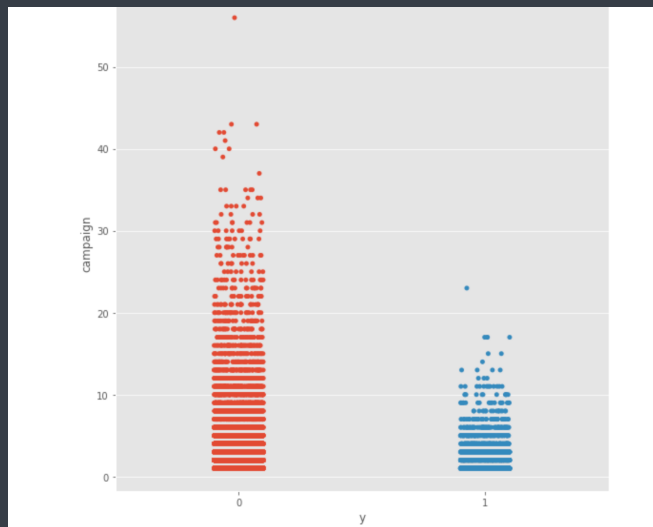
Label percentage by nr_employed



BEST FEATURES

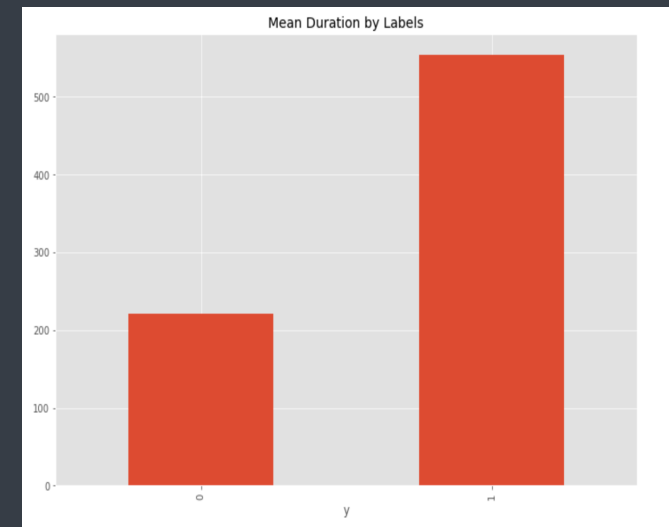
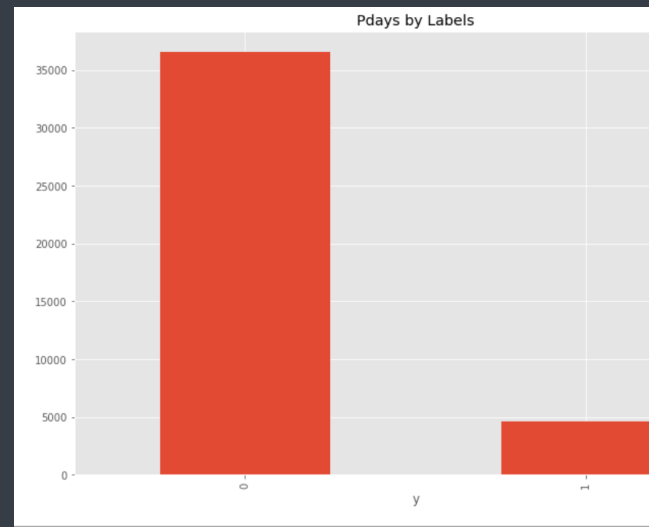
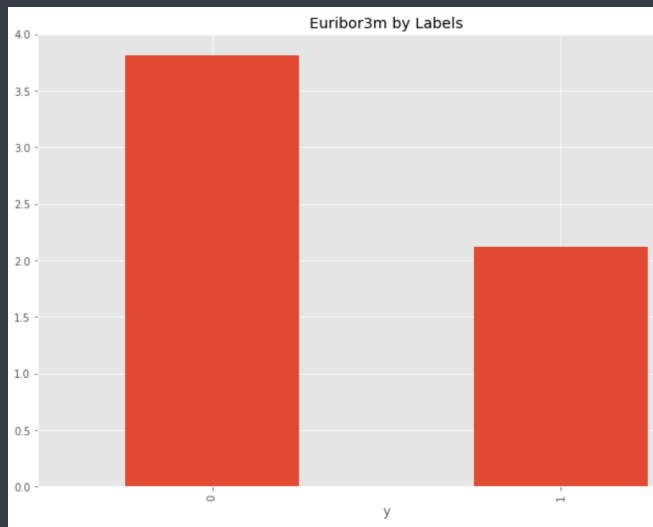
INSIGHTS

- CUSTOMERS WHO ARE NEVER CONTACTED OR CONTACTED AFTER HIGH PDAYS ARE MORE LIKELY TO REFUSE TERM DEPOSIT OFFER.
- AS THE NUMBER OF CAMPAIGN CALLS PASSES 10 CUSTOMERS ARE MORE LIKELY TO REJECT TERM DEPOSIT OFFER.
- LOWER EURIBOR3M RATES LEADS TO POSITIVE RESPONSE FROM CUSTOMERS.
- LOWER EMP_VAR_RATE RESULT WITH POSITIVE RESPONSE FROM CUSTOMERS.
- CUSTOMERS CONTACTED AFTER HIGH PDAYS OR NEVER CONTACTED BEFORE ARE MORE LIKELY TO REFUSE TERM DEPOSIT OFFER.
- BETWEEN THE NR_EMPLOYED RATES 4963.6 AND 5099.1 PEOPLE ARE LIKELY TO ACCEPT TERM DEPOSIT OFFERS, BETWEEN 5191.0 AND 5228.1 THEY ARE LIKELY TO REJECT THE OFFER.
- ECONOMIC INDICATORS ARE INFLUENTIAL ON PEOPLE'S FINANCIAL DECISIONS.



RECOMMENDATIONS

- CUSTOMERS ARE MORE LIKELY TO SUBSCRIBE TERM DEPOSITS UNDER GOOD ECONOMIC CONDITIONS.
- CUSTOMERS CONTACTED AFTER LOW PDAYS ARE MORE LIKELY TO ACCEPT TERM DEPOSIT OFFER.
- OVER FOCUSED TELEMARKETING CAMPAIGNS MAY AFFECT CUSTOMERS NEGATIVELY. NUMBER OF CAMPAIGN SHOULDN'T BE EXCEEDING 10.
- LONGER DURATION INDICATES POSITIVE RESPONSE FROM CUSTOMERS IN TERMS OF TERM DEPOSITS.



XGBoost type performance models works best with larger datasets.

The machine learning dataset relies on existing dataset, in real scenario result may differ.

With further analysis on consumer behaviour and broader datasets more insights could be gained.

Regression models can be applied to predict duration as future work.

LIMITATIONS & FUTURE WORK

THANK YOU

