Analyzing Bank Marketing Campaigns

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Introduction

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- The Data | Cleaning
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- Modeling
- Interpret | Analyze
  - Features: Age & Number of Employees
  - Features: Campaign Contact & Days Since Last Contact
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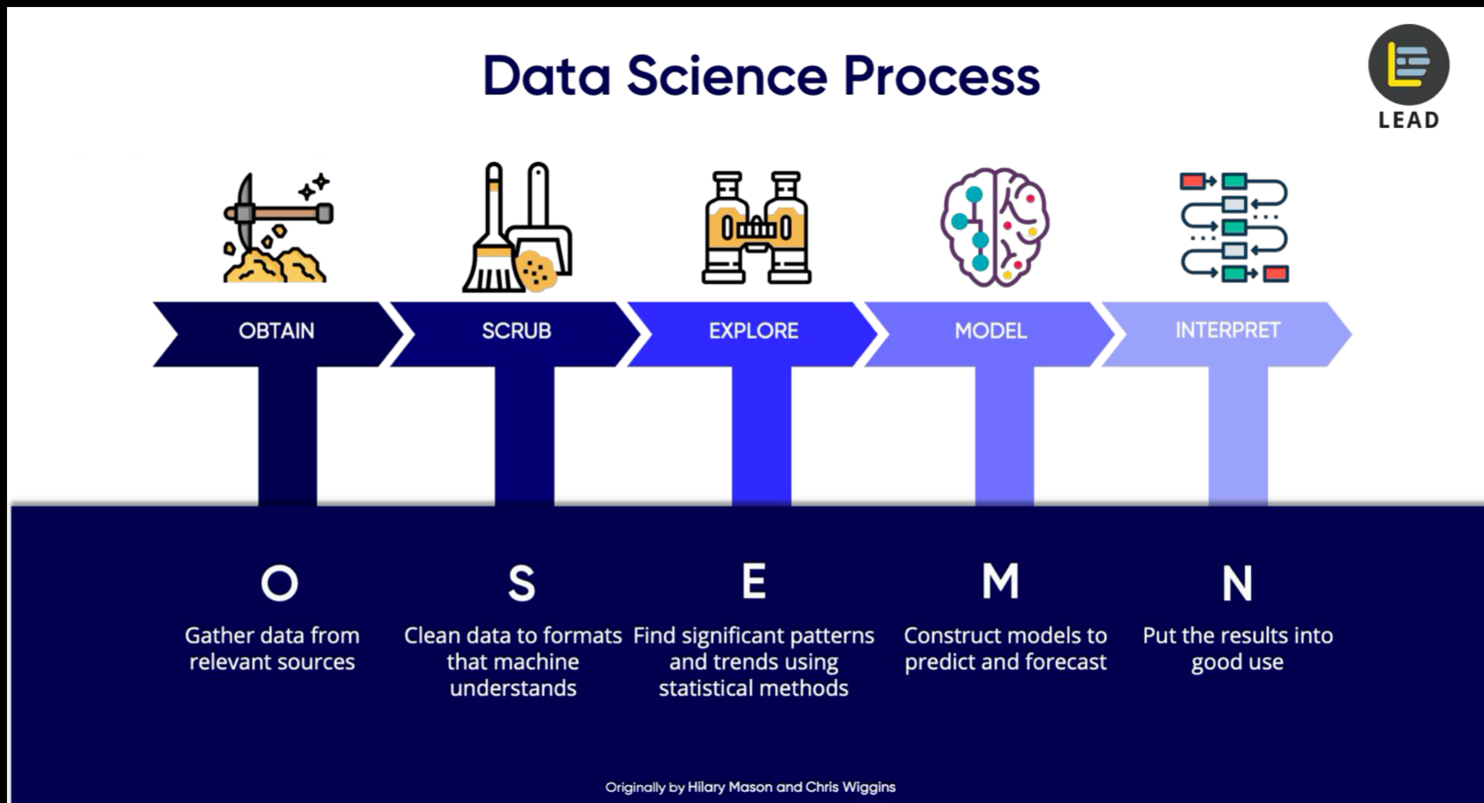
- Thank you

Methodology

- A Portuguese financial institution provided telemarketing data concerning marketing campaigns with the goal of predicting subscriber term deposits.
- Dataset included client, campaign, social and economic data
- Leveraged OSEMN framework to analyze the dataset and make key business recommendations



OSEMN Framework

The Data | Cleaning

Available via UCI's Machine Learning Archive and Kaggle

- http://archive.ics.uci.edu/ml/datasets/Bank+Marketing#
- https://www.kaggle.com/henriqueyamahata/bank-marketing

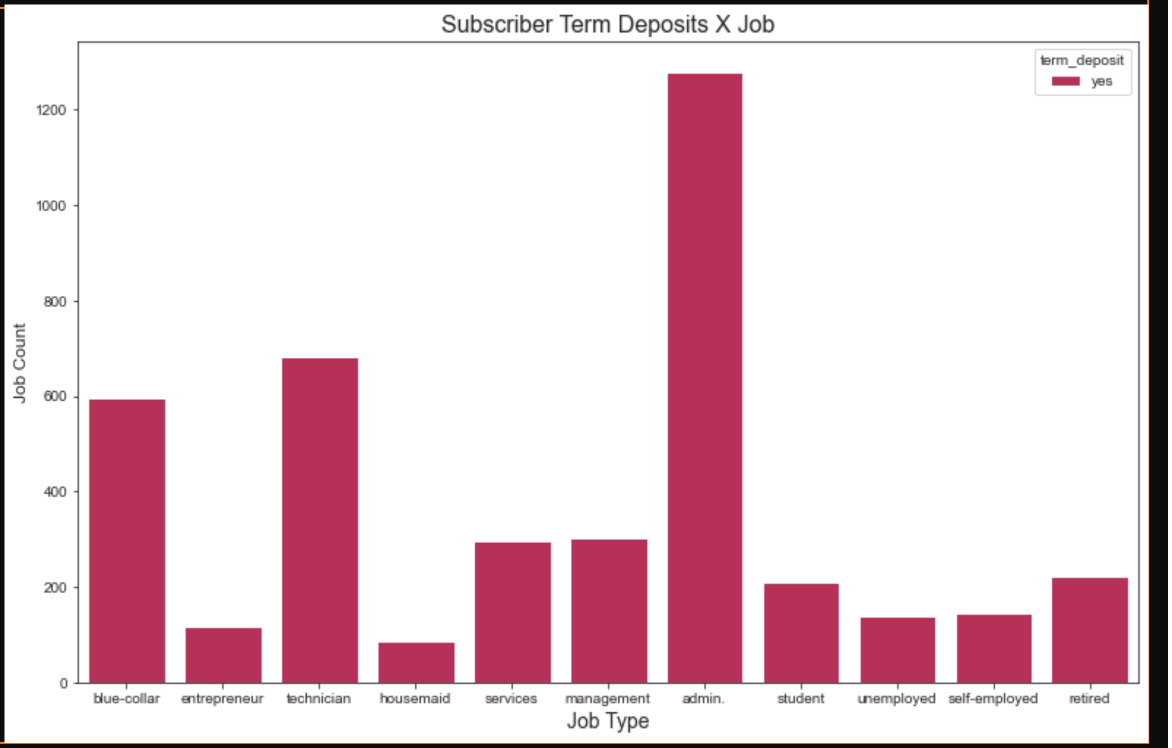
Cleaning the data

- Addressing "unknown" values
- Focused on consumers who provided customer profile answers
- Removed Outliers
  - Age
- Feature Selection

EXPLORATORY DATA ANALYSIS

Most Common Client Features

- Job Type: admin
- Age: early thirties
- Education Level: university degree
  (see appendix for education)



Modeling

Machine Learning Algorithms

- Gradient Boosting Classifier
- AdaBoost Classifier
- Logistic Regression
- Support Vector Machine
- K-Nearest Neighbors
- Random Forest
- Guassian Naïve Bayes
- Decision Tree

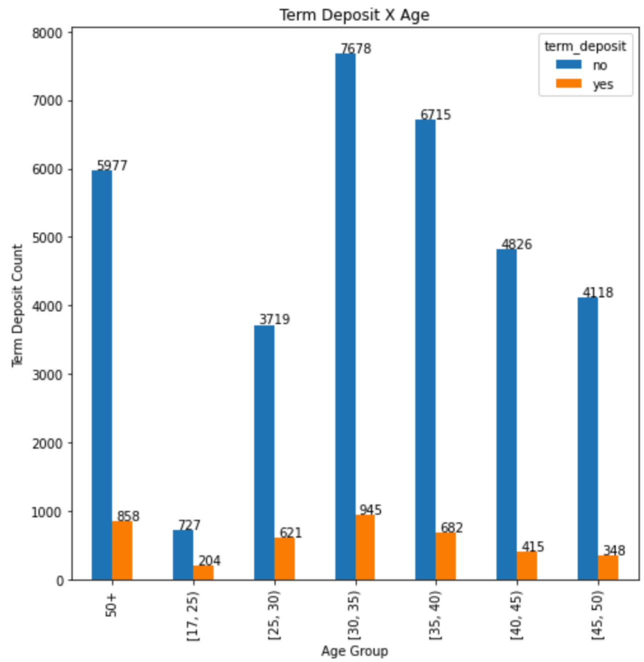
Accuracy Score

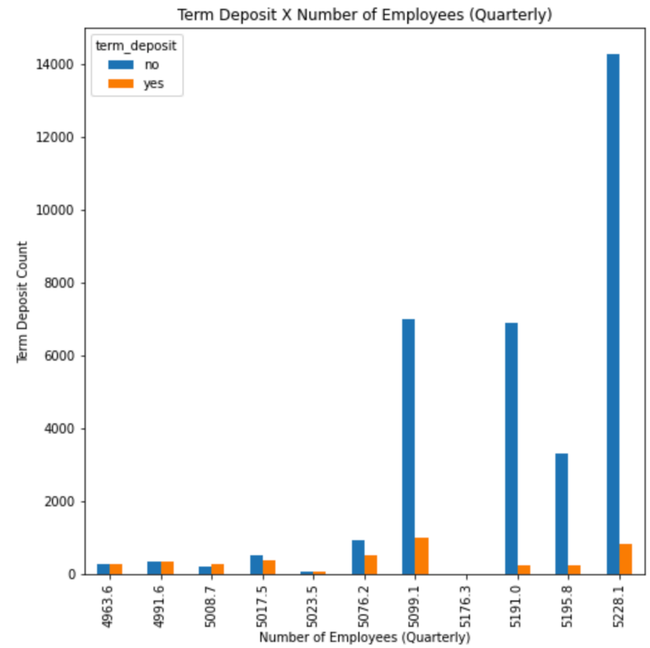
- 90.92%
- 90.70%
- 90.58%
- 90.30%
- 89.92%
- 89.73%
- 88.19%
- 84.47%

The top models selected for feature evaluation were Gradient Boosting Classifier and Adaboost Classifier

Interpret | Analyze

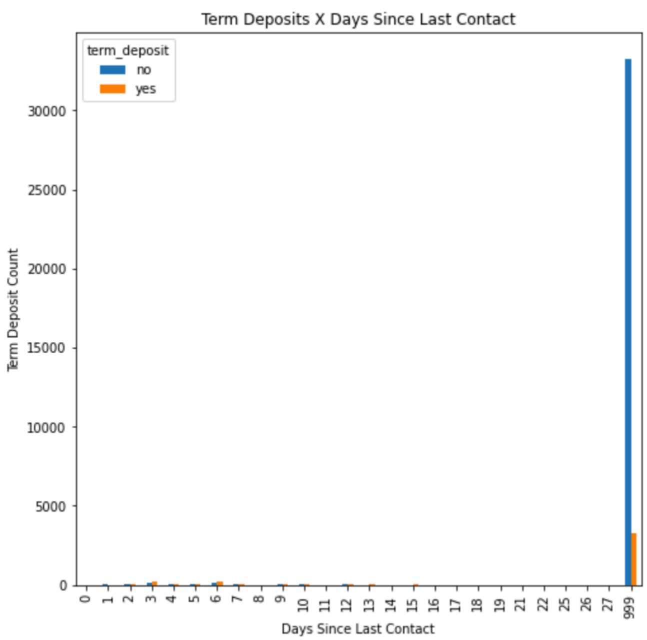
- Generated top 25 features (per model)
- Observed overlap | selected features
- Selected Top Features
  - Age
  - Number of Employees
  - Number of times contacted during the current campaign
  - Number of days since last contact (999 = no contact)

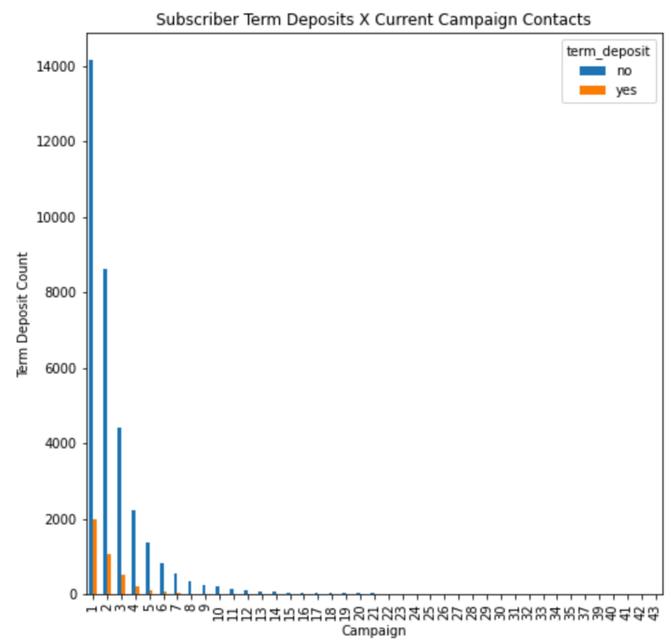




Features: Age & Number of Employees

Features: Campaign Contact & Days Since Last Contact





Business Recommendations

- 1) Observe current marketing on consumers age 17-25. Use similarly structured marketing on consumers age 30-40.
- 2) Maintain an average employee level of 5076 or lower. Focus on productivity when employee levels go over 5076.
- 3) Deploy an A team to handle first 3 telemarketing contacts per customer.
- 4) Deploy B team to handle new callers and first-time bank clients.

Conclusions & Limitations

Conclusions

- Feature trends illustrate high subscriber counts but higher non-subscriber counts as volume increases.
- Employee effectiveness decreases as additional employees are hired (over 5076 quarterly) and volume increases.

Limited to consumers that:

- Cite job type, marital status and education level
- Between the ages of 17 and 69

Future Work

- Observe Portuguese cultural customs that may influence the reception of marketing strategies
- Obtain and review additional marketing (non-telemarketing) to identify trends
  - Social Media
  - Internet
  - In office marketing
- Analyze employee performance metrics

THANK YOU!

Questions? Miguel Santana | contact: msantana269@gmail.com

Github Repo: https://github.com/msantana269/Module-3-Project

Appendix

Appendix: Educational Trends