Analysis of Bank Telemarketing and Decision Support

By Zhi Chen and Daniel Mocombe

Business Case

- Commercial Banks use telemarketing as their main approach for promotions
- Term Deposits - safe way to invest savings to earn a guaranteed rate of interest
- Calling clients can be time-consuming
- Important to know which clients to focus on

Our Objectives for the Data

- Marketing campaign for a Portuguese banking institution
- Over 40,000 clients called between May 2008 - November 2010
- Target - Yes/No response to term deposit campaign
- Goal #1 - Understand which features can influence responses to the campaign
- Goal #2 - Develop models that can help banks predict campaign response depending on their resources
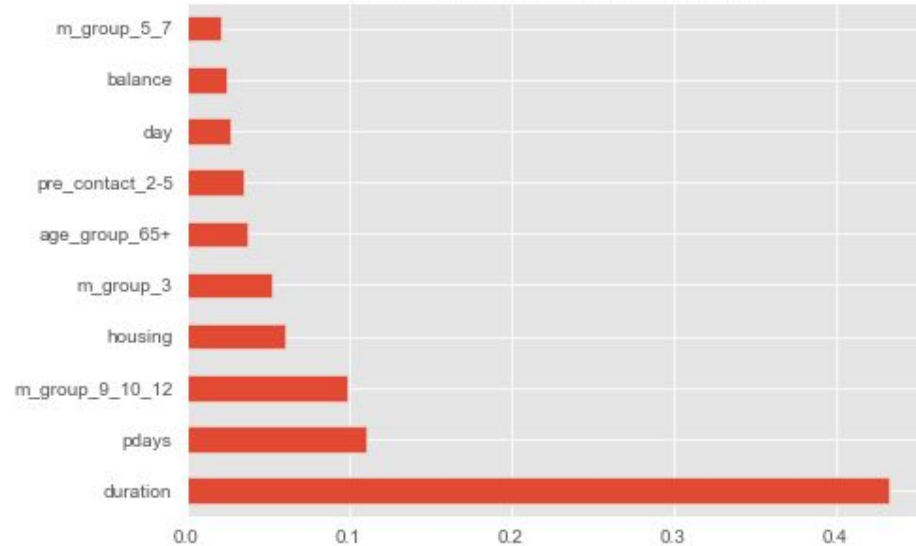
Final Models

Tried KNN, Logistic Regression, Random Forest, Voting Classifier
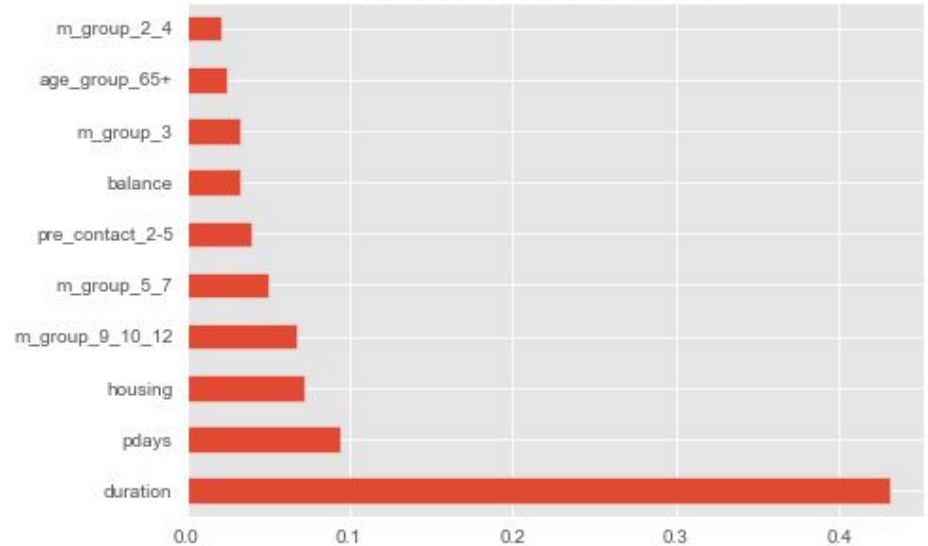
Random Forests (Using GridSearch)

- Metric: Precision
- Max_depth: 6
- Max_featiures: 15%
- N_estimators: 450
- Class weight: None
- Score: 0.80

- Metric: Sensitivity
- Max_depth: 6
- Max_featiures: 10%
- N_estimators: 400
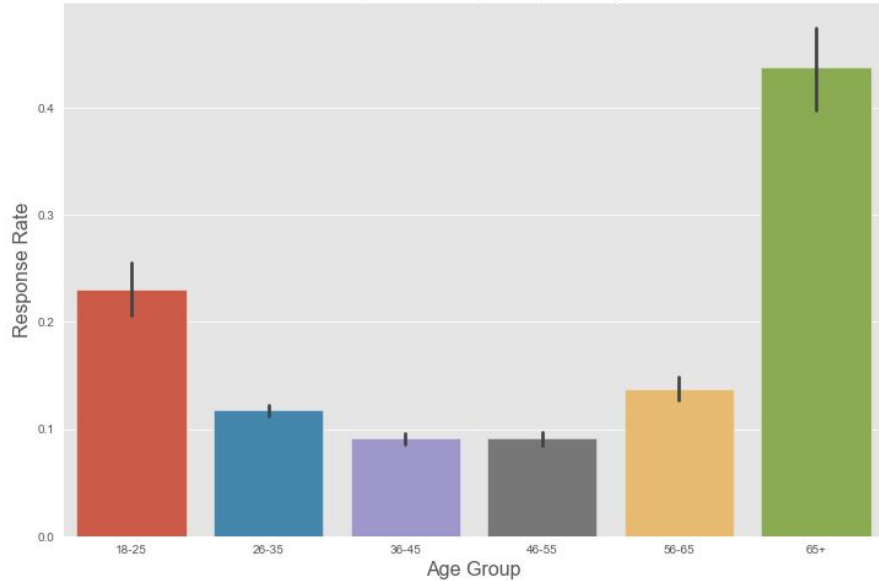- Class weight: balanced
- Score: 0.88

Important Features

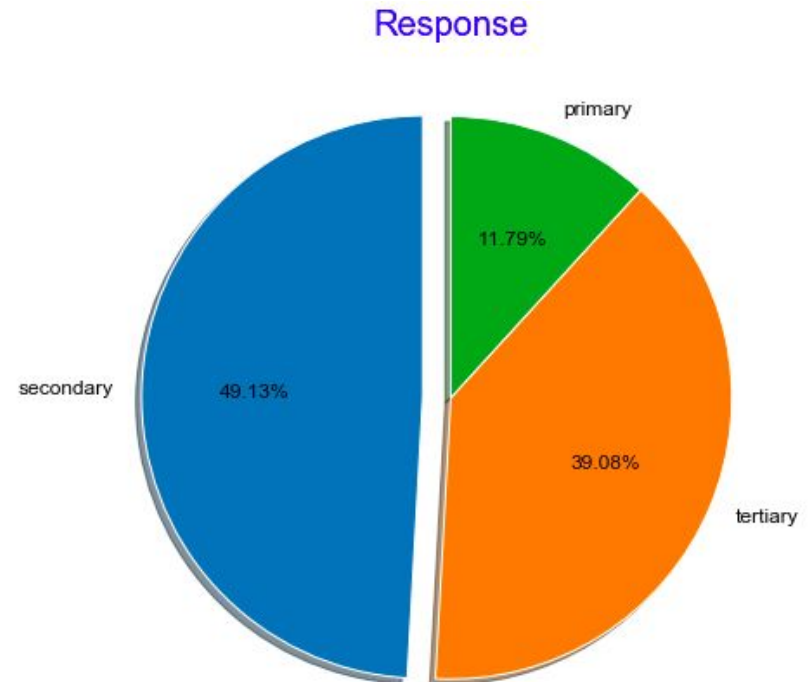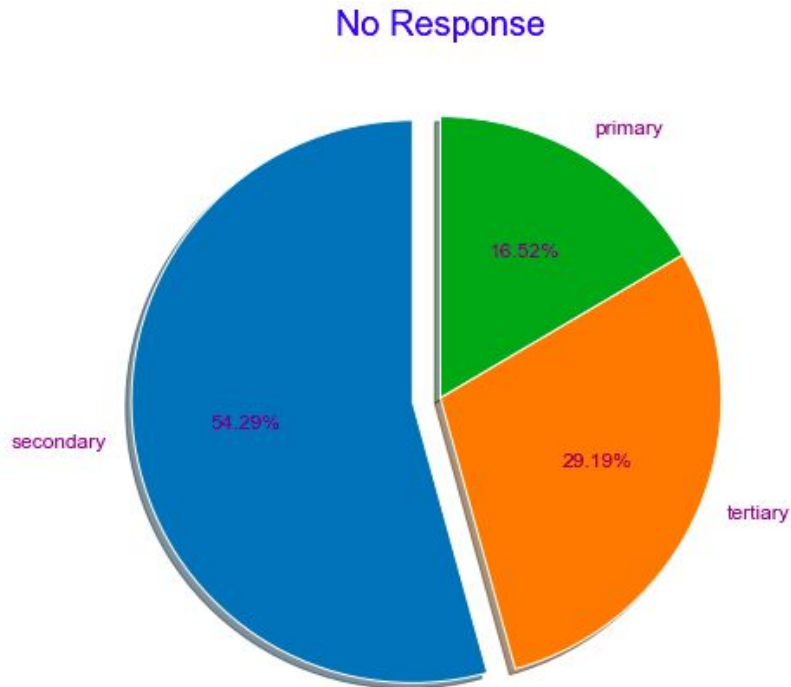# Response Rates

- Rate of responses (Yes) for term deposit subscriptions

Response Rates
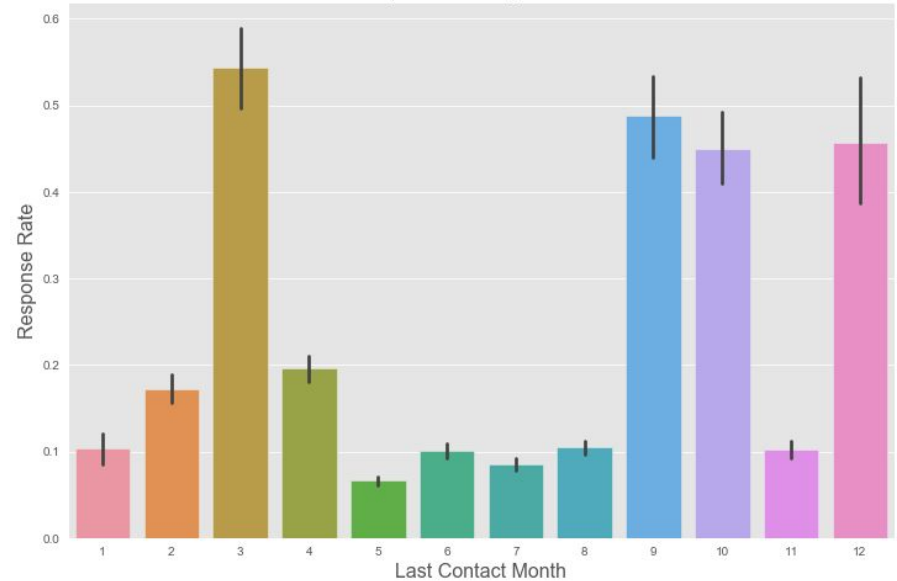
- Rate of responses (Yes) for term deposit subscriptions

Statistical Tests

ANOVA

- Account Balance and Job Type
- Blue-collar, management, student, etc.
- Significant differences in account balance shown between job types

Chi Square

- Response and Marital Status
- Single, Married, Divorced
- Significant differences in the response rate shown between marital status

Modeling

- Many features were removed at first (Lasso Regulation, Logistic L1 penalty)
- Used KNN, Logistic, Decision Tree, Random Forest, and Voting Classifier
- Decreased our penalty to include more features which improved the scores
- Evaluated models using precision and recall for different directions

Term Deposit Confusion Matrix

Term Deposit Confusion Matrix
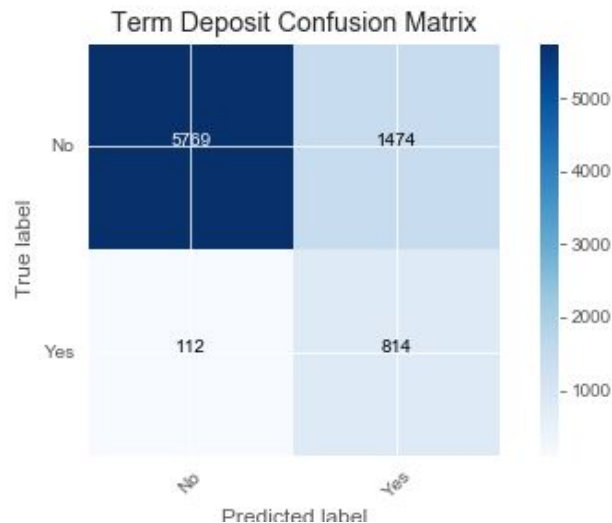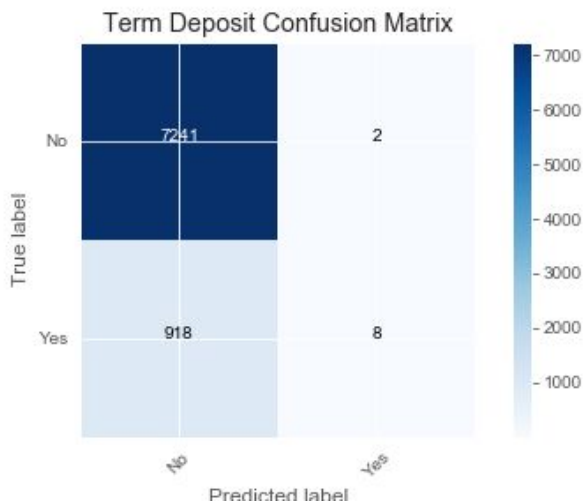
Conclusion and Recommendations

- Bank tellers shall focus on **certain clients group**
- - Prioritize elderly clients and younger adults
- - Prioritize highly educated clients
- - Reach out to clients in the Spring and Fall months
- **Tips** - Don't call people too many times
- - Balance is not super important
- **Which model to use**
- - Sensitivity and Precision are in tension
- - Commercial bank shall consider its marketing activity cost
- - If bank has abundant human resources - **Sensitivity**
- - Personnel shortage - **Precision**

Personal Suggestion: Sensitivity

Thank You!