

CHEE JUN HONG - PROJECT MANAGER

Bank Marketing →

VLC-SGITP25-21-0659



THESE ARE THE BROAD TOPICS THIS MEETING WILL COVER.



Points of Discussion

01 Introduction

02 Data

03 Results

04 Conclusion

Introduction



Two major objectives we're focusing

01 STREAMLING AND OPTIMIZING EFFICIENCY AND RESOURCES

With the introduction of new Machine Learning team, we can better optimize our budget and manpower by identifying customers with higher potential to sign on our services offered.

02 INCREASE OUR SALES REVENUE

Contact and engage with these customers and also upsell our current services.

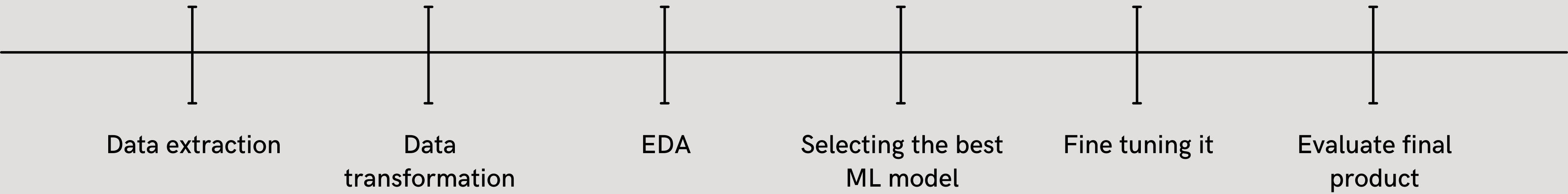


\$ 65,000,000



For a typical Fortune 1000 company, just a 10% increase in data accessibility will result in more than \$65 million additional net income. - Bernard Marr. Forbes

Timeline



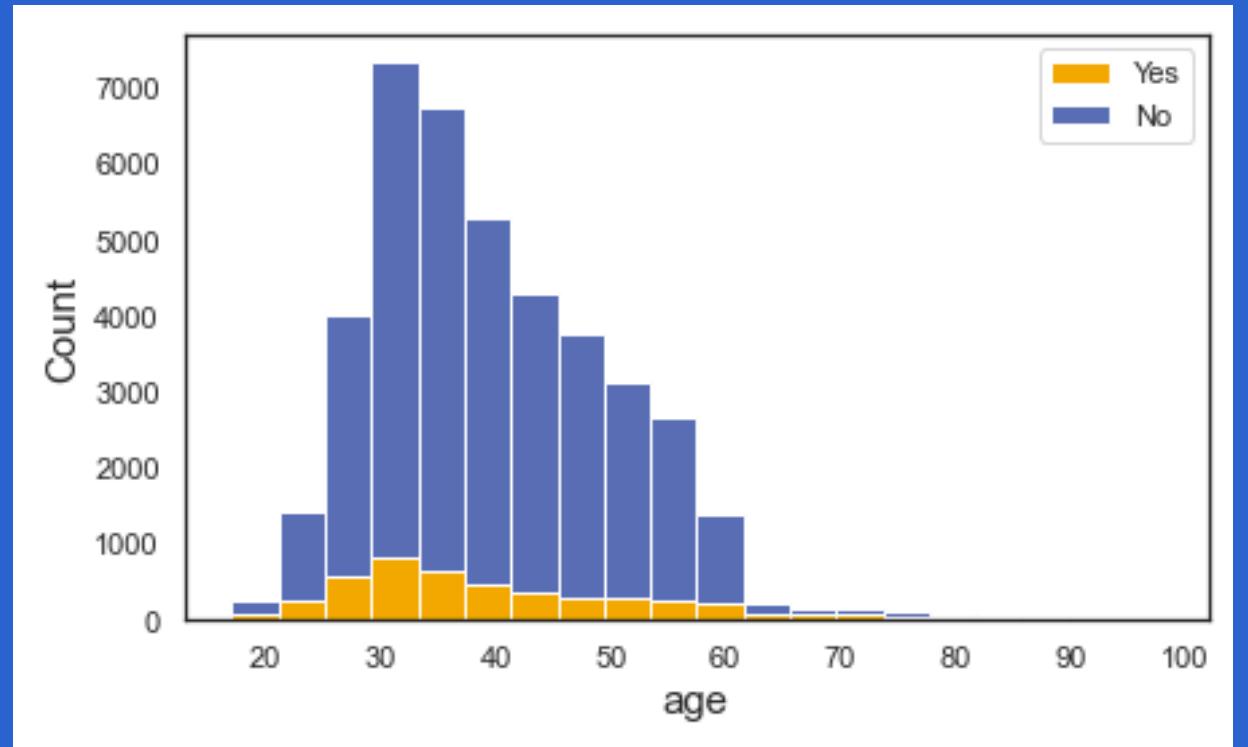


700%



The statistics show the banking sector generates unparalleled quantities of data. The amount of data generated each second in the financial industry will grow 700% in 2021. - Madeline Connall - Sigma

Data Information



The info of our Data selected

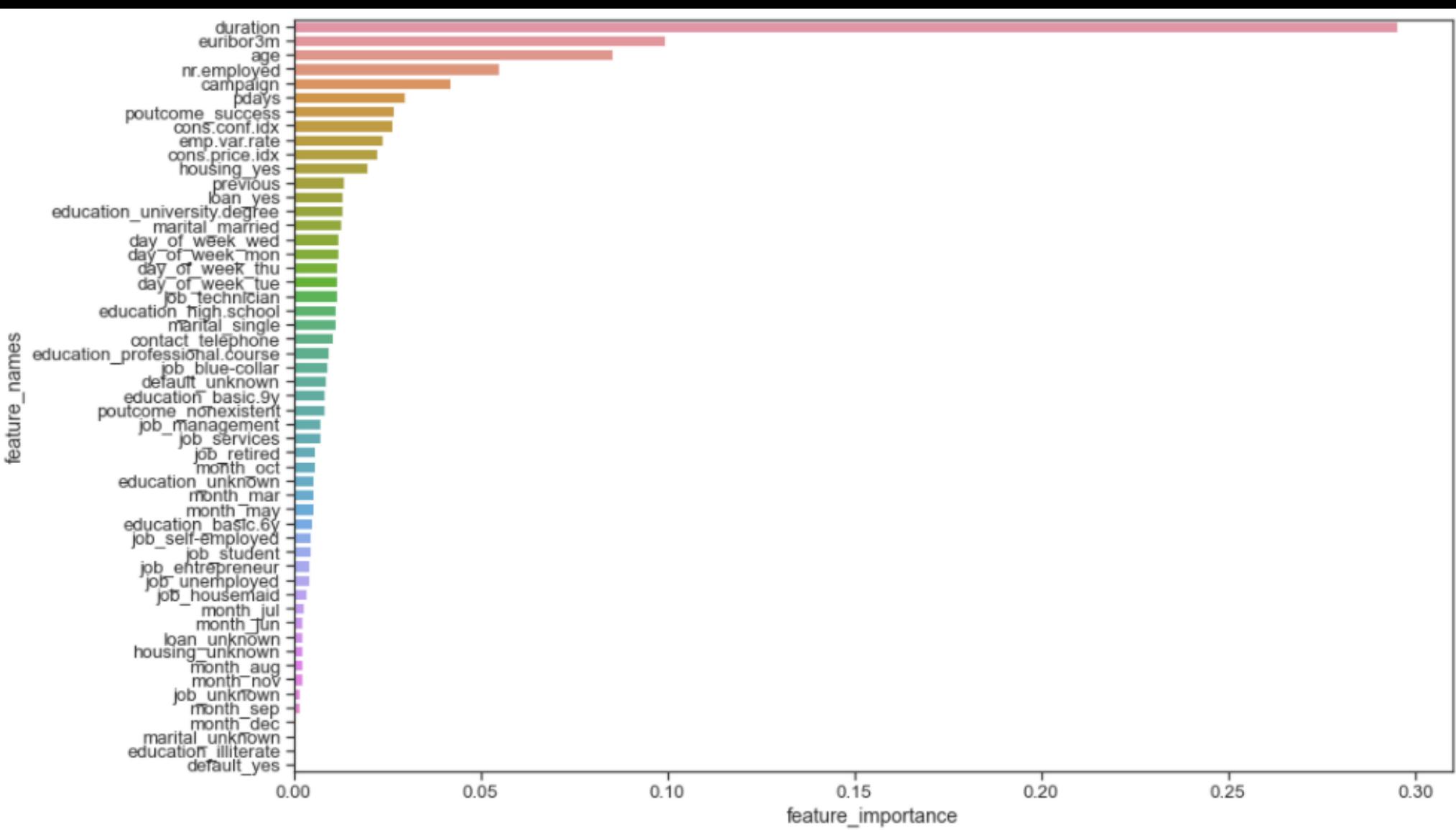
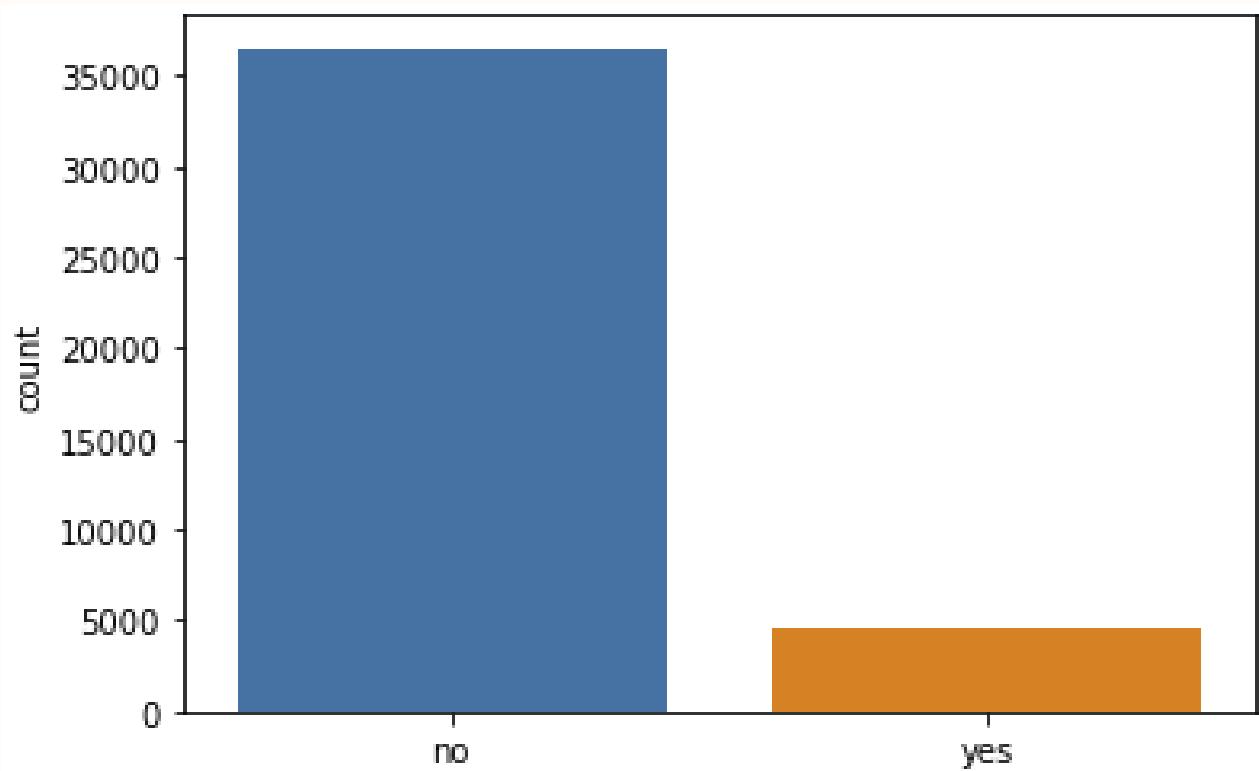
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 41188 entries, 0 to 41187
Data columns (total 21 columns):
 #   Column            Non-Null Count Dtype  
 --- 
 0   age               41188 non-null  int64  
 1   job               41188 non-null  object  
 2   marital           41188 non-null  object  
 3   education         41188 non-null  object  
 4   default           41188 non-null  object  
 5   housing           41188 non-null  object  
 6   loan              41188 non-null  object  
 7   contact            41188 non-null  object  
 8   month              41188 non-null  object  
 9   day_of_week        41188 non-null  object  
 10  duration          41188 non-null  int64  
 11  campaign          41188 non-null  int64  
 12  pdays             41188 non-null  int64  
 13  previous          41188 non-null  int64  
 14  poutcome          41188 non-null  object  
 15  emp.var.rate      41188 non-null  float64 
 16  cons.price.idx    41188 non-null  float64 
 17  cons.conf.idx     41188 non-null  float64 
 18  euribor3m         41188 non-null  float64 
 19  nr.employed       41188 non-null  float64 
 20  y                  41188 non-null  object  
dtypes: float64(5), int64(5), object(11)
memory usage: 6.6+ MB
```

```
df.shape
```

```
(41188, 21)
```

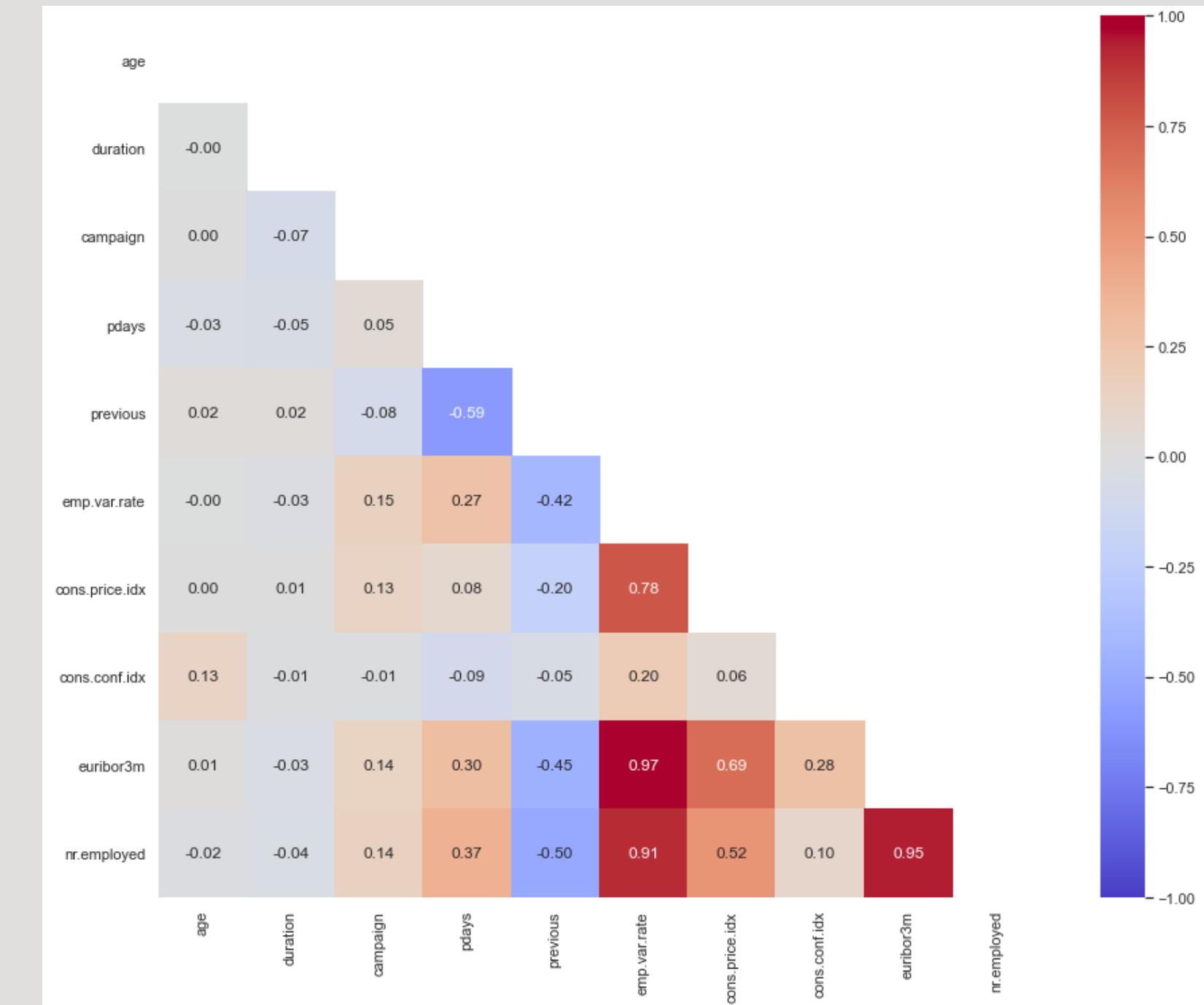
Desired Target

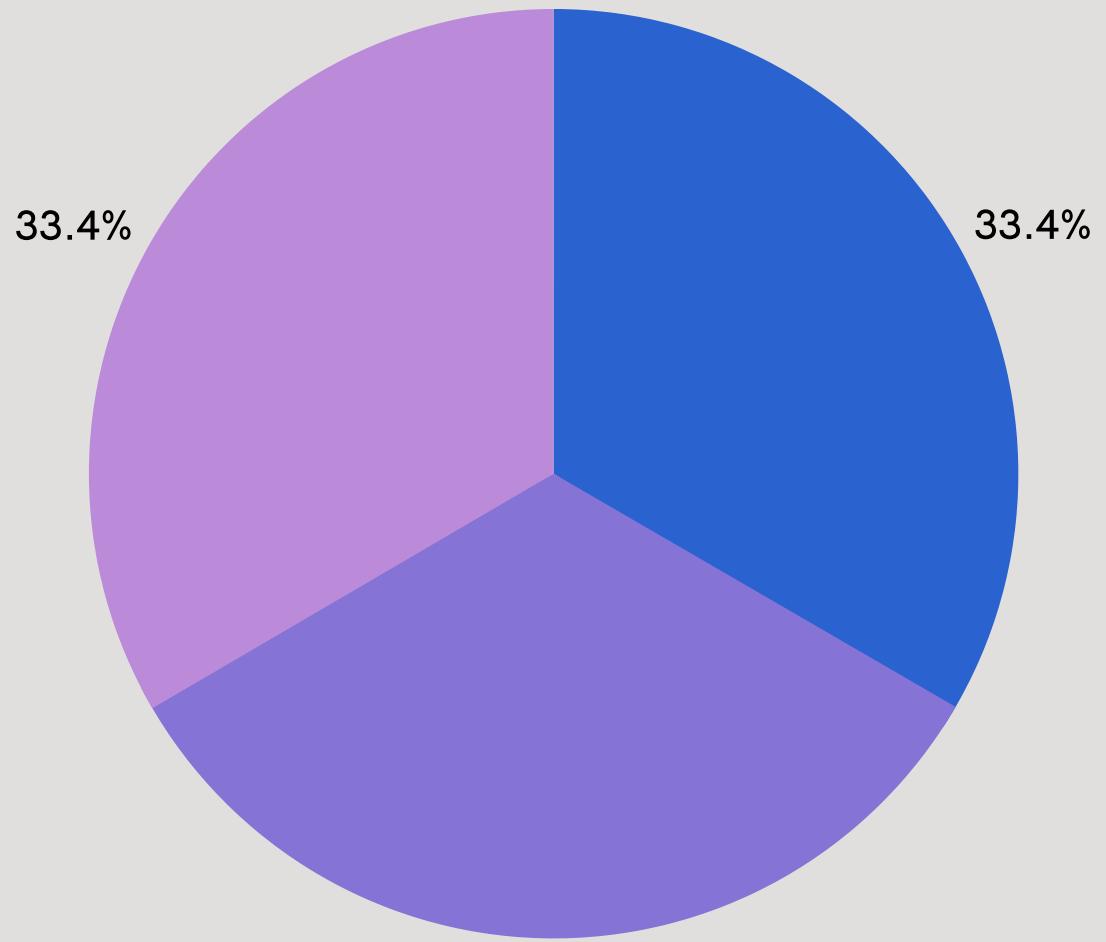


Has the client subscribed a term deposit?

Correlation Coefficient

High relationship between 3 months Euribor, the quarterly indicator of employment and number of employees





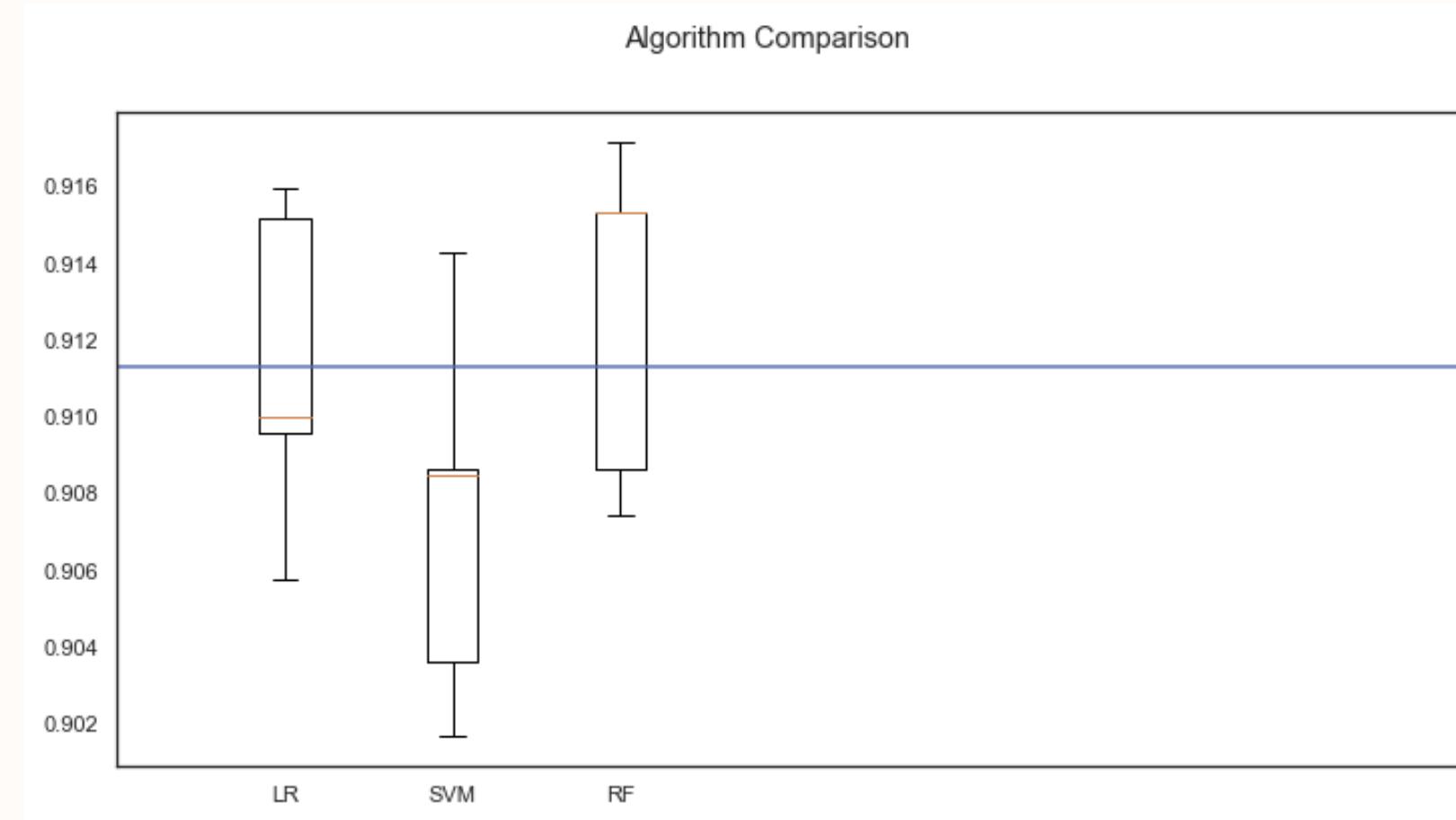
● Logistic Regression

● Support Vector Machine

● Random Forest

Models Selection

LR : Mean score 0.9113 (Std 0.0038)
SVM: Mean score 0.9073 (Std 0.0044)
RF : Mean score 0.9128 (Std 0.0039)
Wall time: 2min 10s



Model Improvement

Random Forest



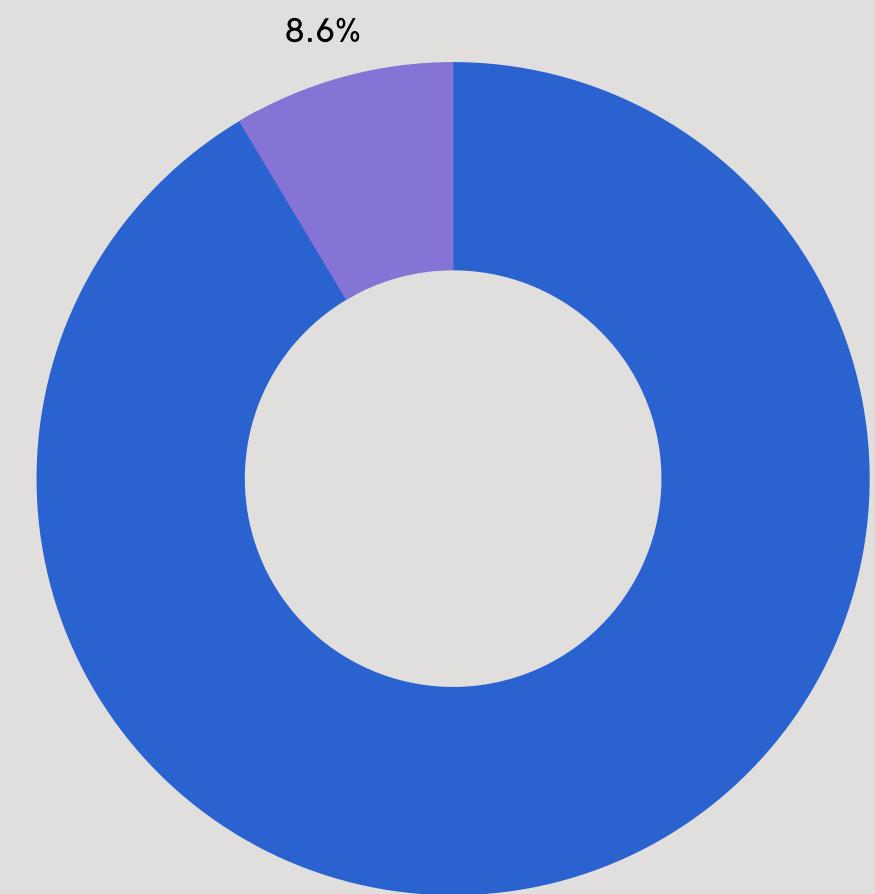
```
RandomForestClassifier(min_samples_split=10, n_estimators=1000, n_jobs=-1,  
                      oob_score=True, random_state=41)  
{'max_depth': None, 'min_samples_split': 10, 'n_estimators': 1000}  
0.9156904400606981  
Wall time: 15min 54s
```

Results

Final Model (RandomForestClassifier) Metrics -

Accuracy : 0.9141781985918912
Precision: 0.6687022900763359
Recall : 0.47198275862068967
F1 Score : 0.5533796588755528

	precision	recall	f1-score	support
0	0.94	0.97	0.95	7310
1	0.67	0.47	0.55	928
accuracy			0.91	8238
macro avg	0.80	0.72	0.75	8238
weighted avg	0.91	0.91	0.91	8238



- Accurate
- Not Accurate

Conclusion

01 GOOD ACCURACY

With over 91% accuracy, we will be more informed on our targeted customers.

02 COMFORTABLE FALSE POSITIVE

We would rather not pass up on the opportunity to get a customer onboard even with the slightest potential.

03 USEFULLNESS MOVING FORWARD

Utilizing this Machine Learning on dataset will improve everything from optimized resource allocation which will in turn increase our revenue.

Recommendations



INCREASE BRAND AND PRODUCT AWARENESS

Allocate more budget through traditional marketing and increase our digital presence. This is to engage the general population and let them feel aware and at the same time, more comfortable with our Bank....

STRECH THE LIMIT

Focus on customer retention, upselling and refinancing.

Future Opportunities



EXPANSION

To utilize data on more department. Eg, processing of job applications and cover letters.

COLLABORATION

Work with influences. More presence with the young working class.

THANK YOU!



Resource Page

Dataset from UCI Machine Learning Repository

<https://archive.ics.uci.edu/ml/datasets/bank+marketing>

Presentation template from Canva

Blue and Gray Swiss Gym Business Meeting Visual Charts Presentation

Bernard Marr. (2015). Forbes

<https://www.forbes.com/sites/bernardmarr/2015/09/30/big-data-20-mind-boggling-facts-everyone-must-read/?sh=2a32576b17b1>

Madeline Connall. (2020). Sigma

<https://www.sigmacomputing.com/blog/top-20-big-data-statistics/>