

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.

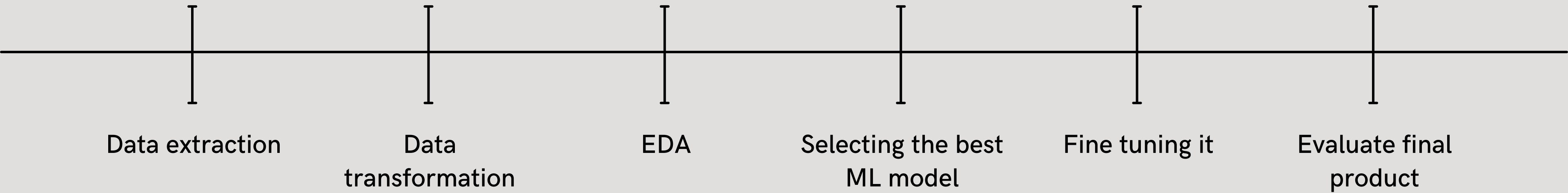


\$ 65,000,000



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



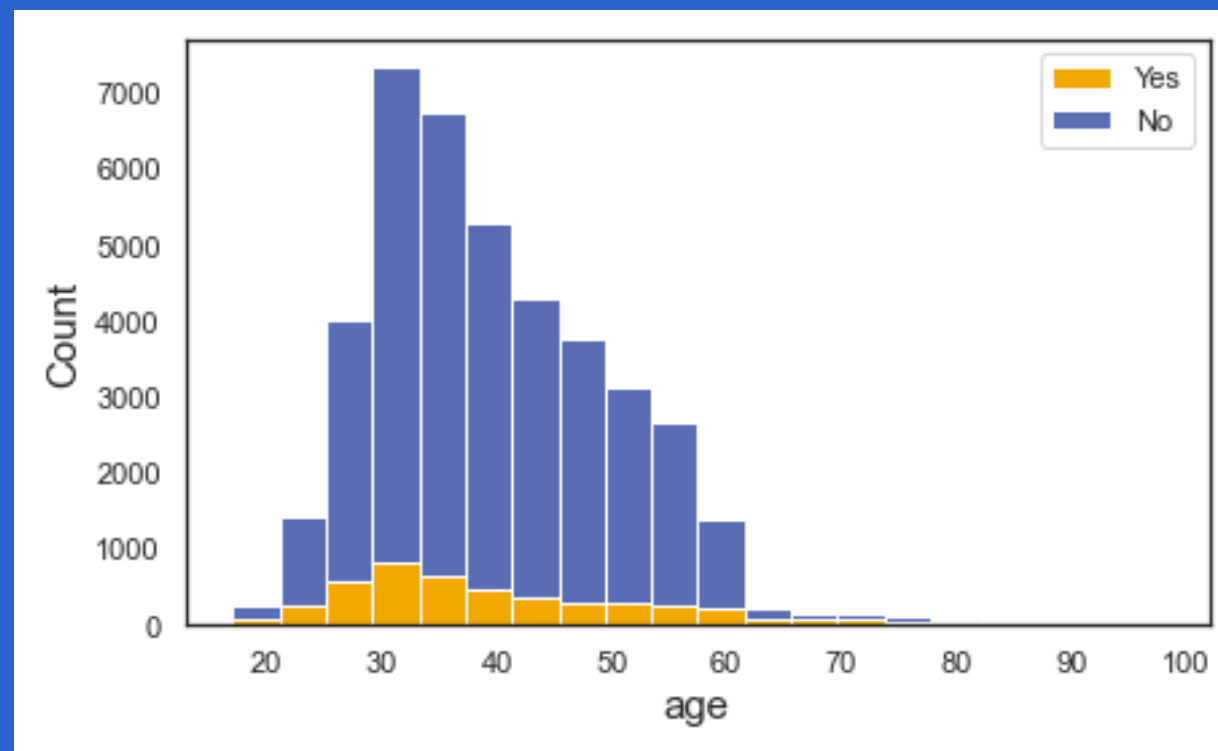


700%



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

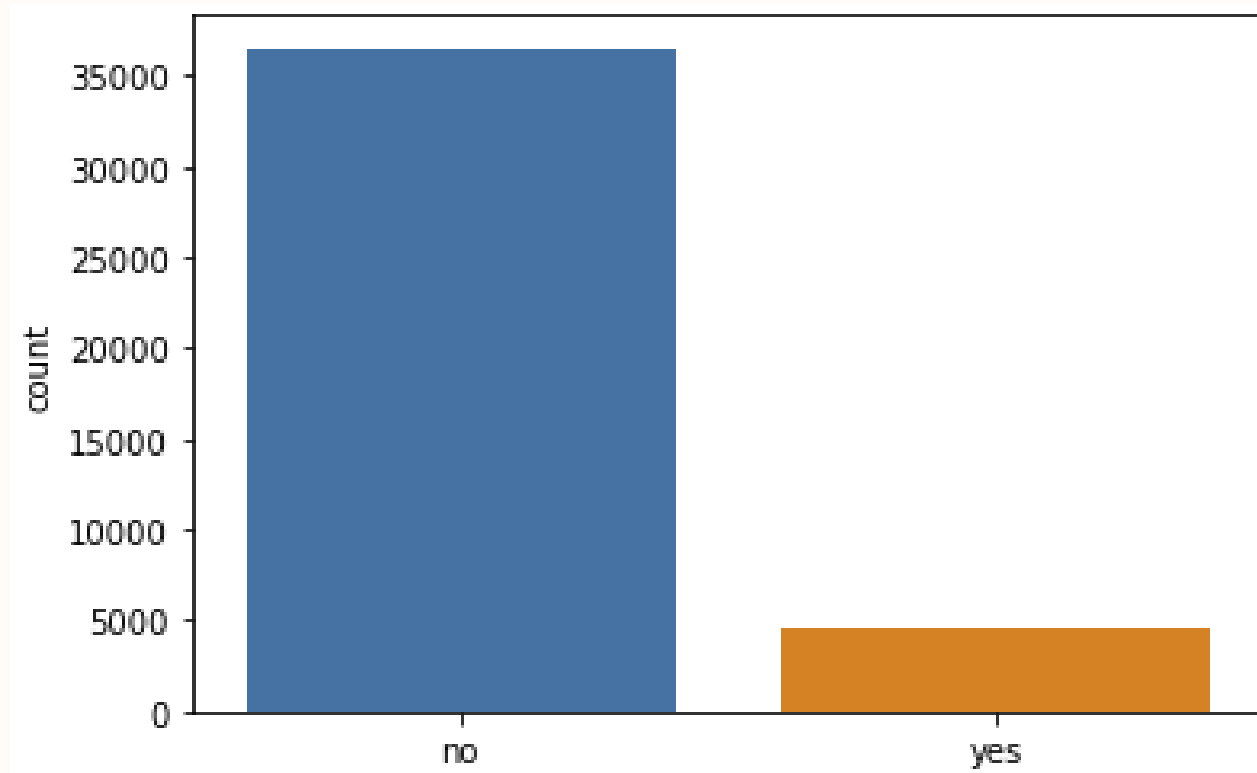
```
df.info()
```

```
<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
```

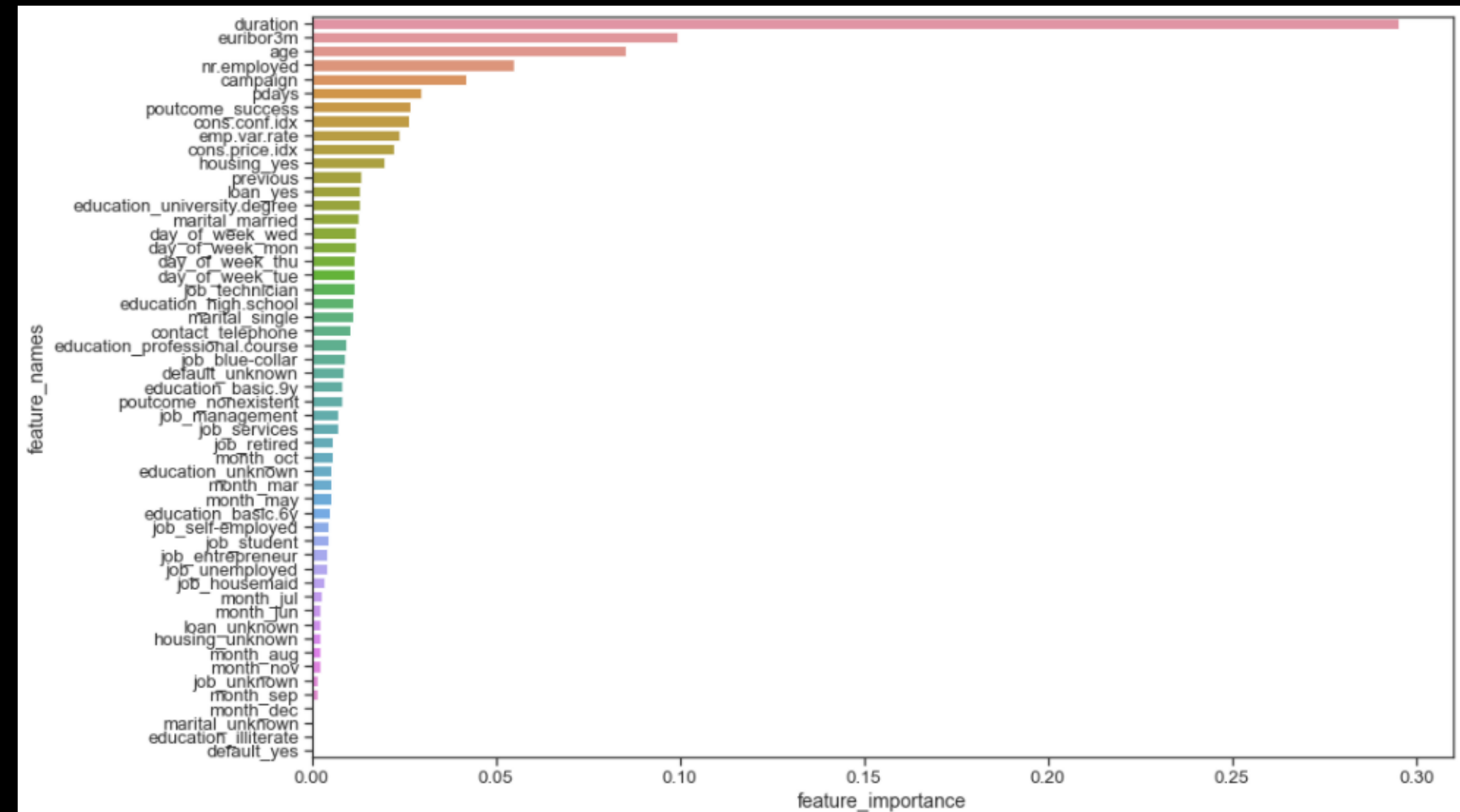
```
df.shape
```

```
(41188, 21)
```

Desired Target

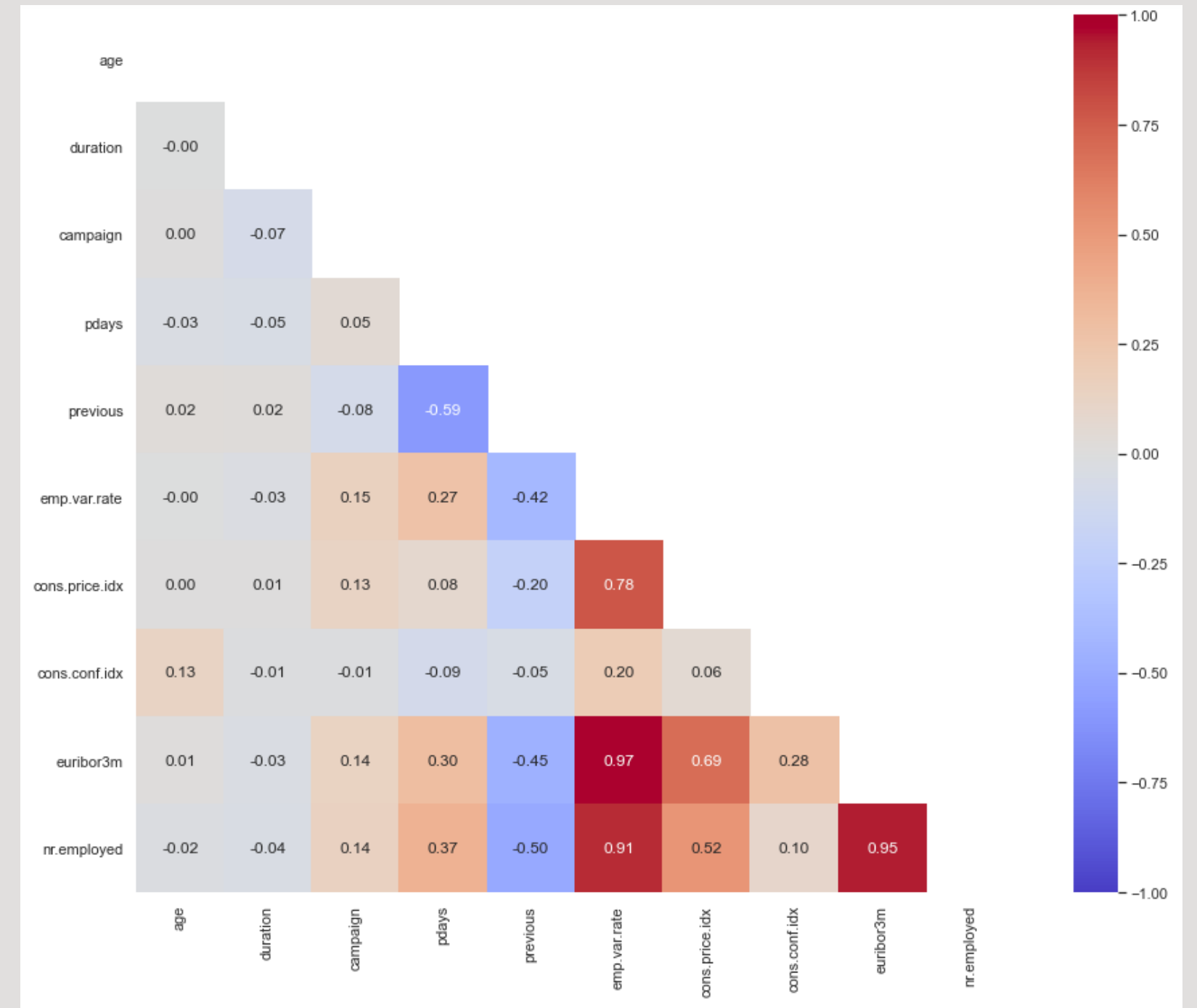


Has the client subscribed a term deposit?

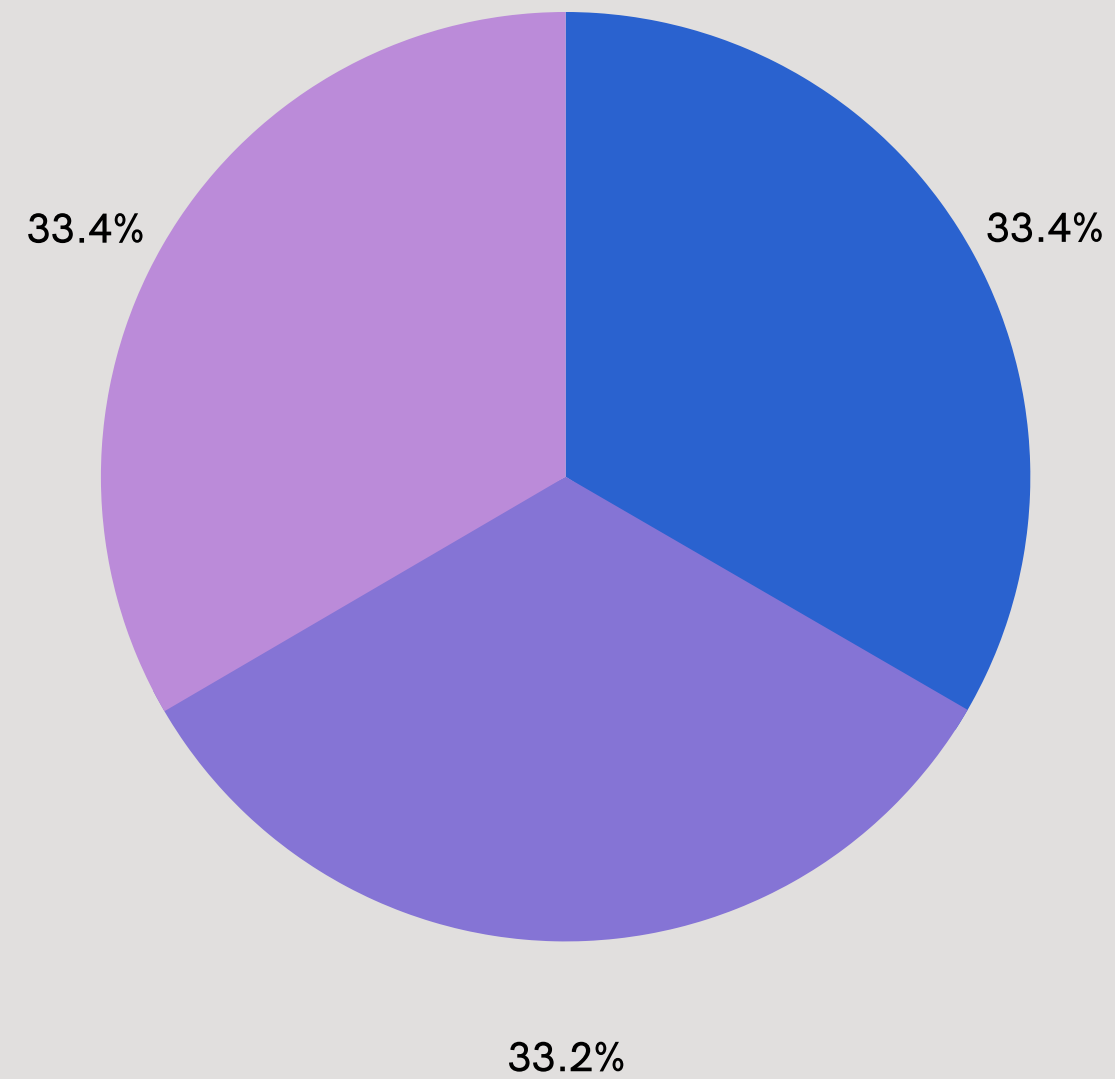


Correlation Coefficient

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



Models Selection

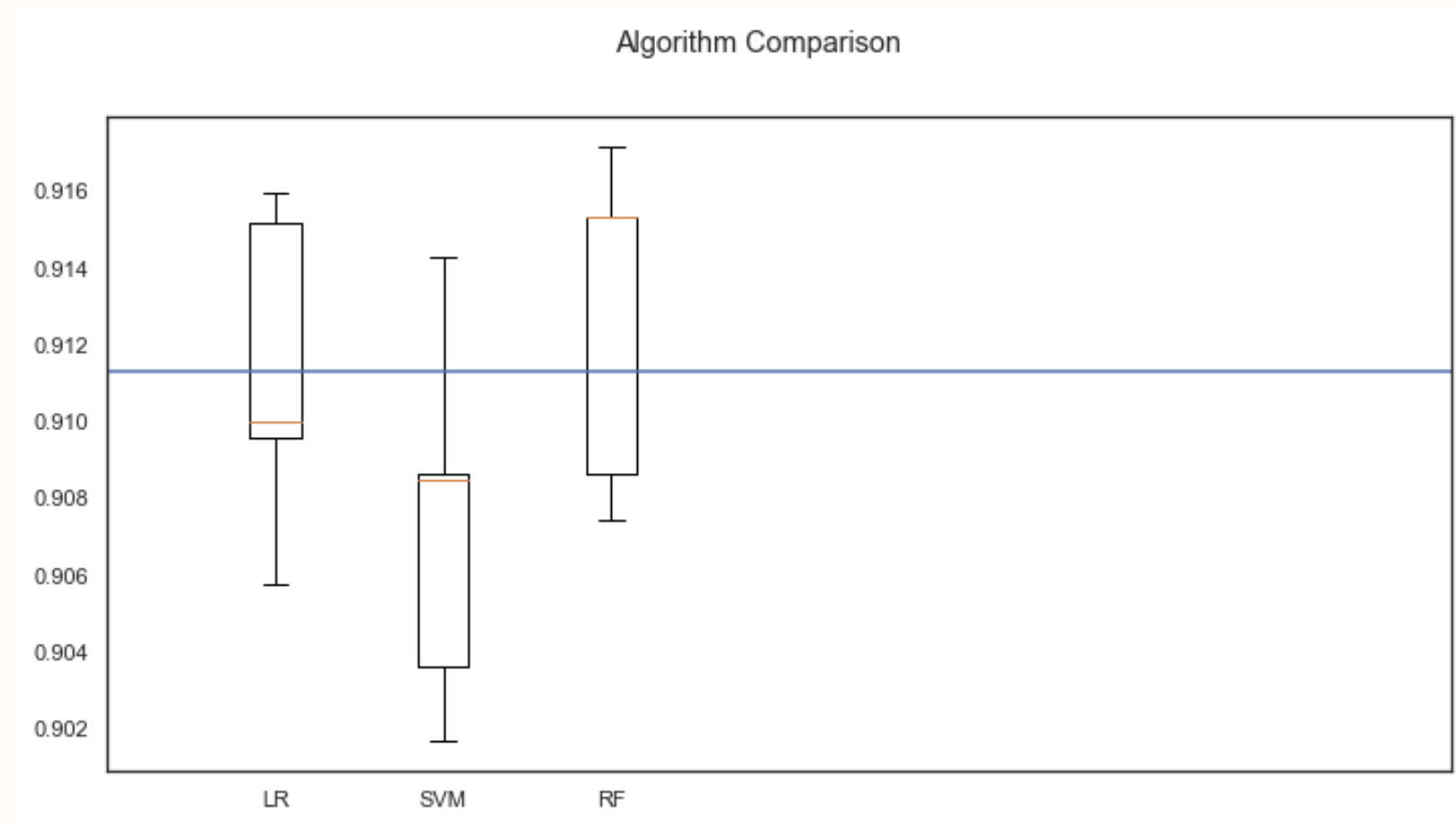


● Logistic Regression

● Support Vector Machine

● Random Forest

```
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 -

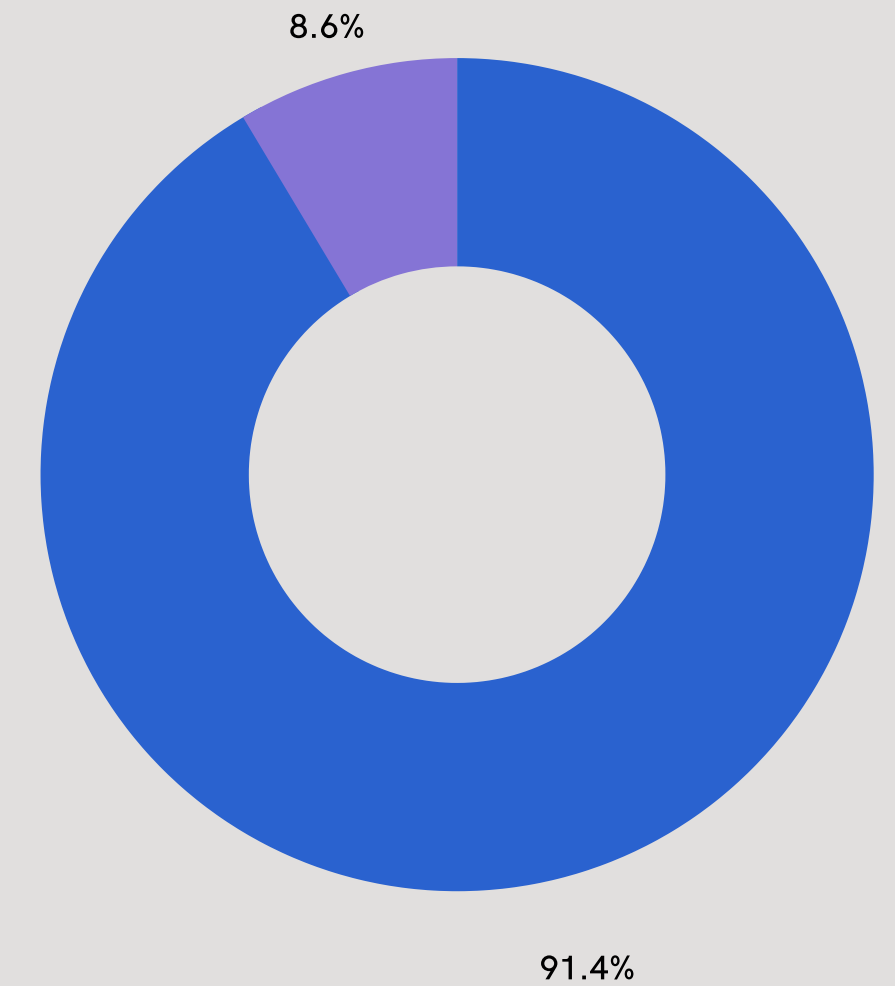
Accuracy : 0.9141781985918912

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 USEFULLINESS 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	COLLABORATION
<p>To utilize data on more department. Eg, processing of job applications and cover letters.</p>	<p>Work with influences. More presence with the young working class.</p>

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/>