



Predicting Customer Churn

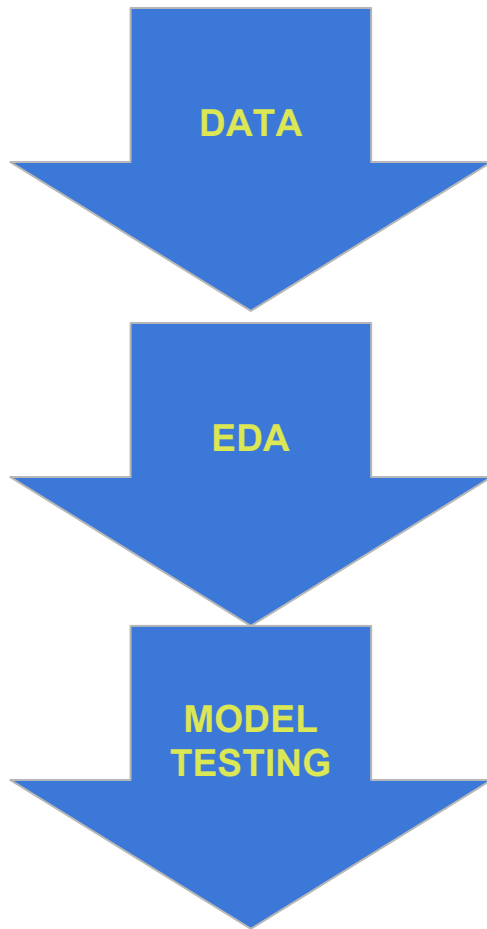
Shweta Pai
Project 3



Motivation

- Maintain Customer Base
- Telecommunication Sector
- Focus retention efforts
- Predict customers at risk of churning.

Process



LOGISTIC REGRESSION



(7043 x 21)



pandas

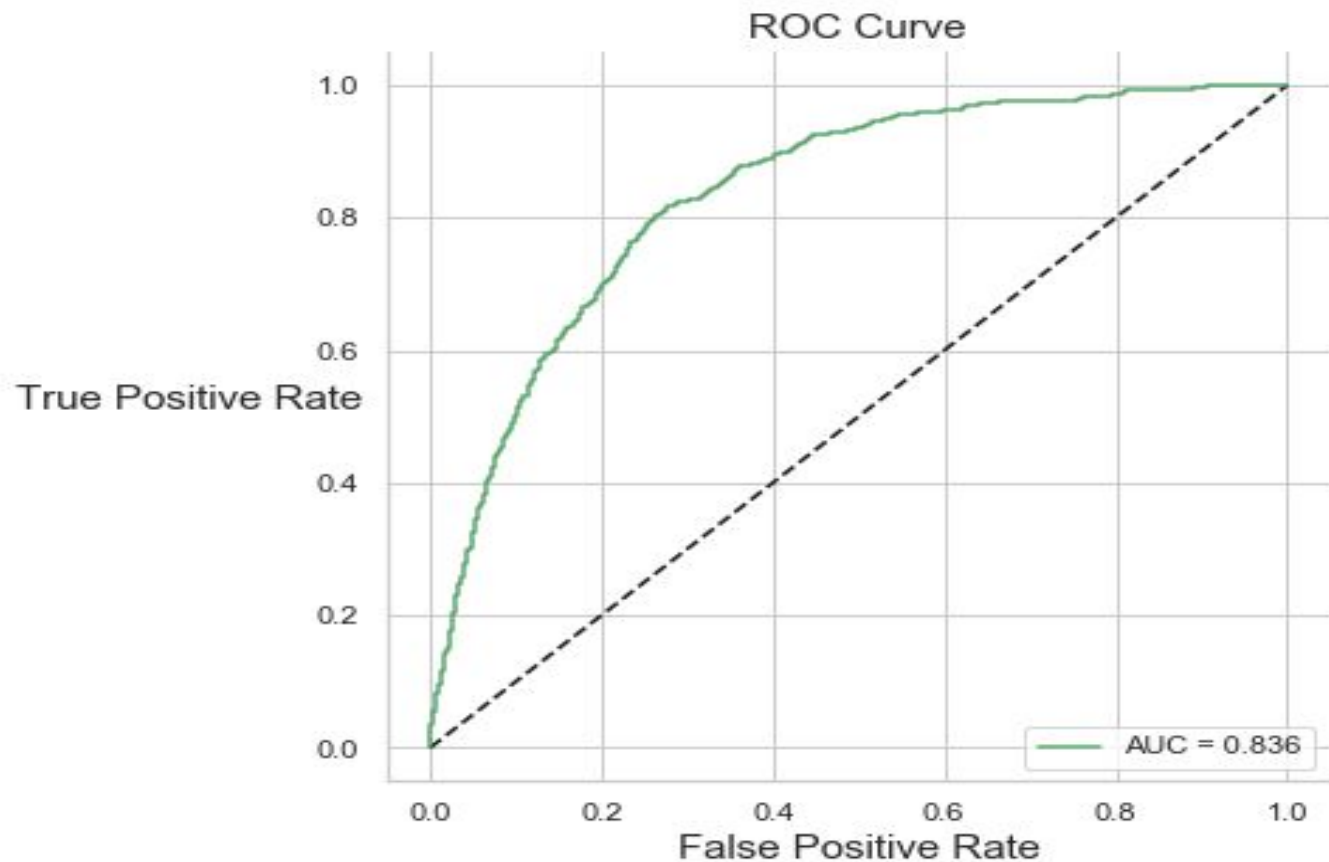
$$y_{it} = \beta x_{it} + \mu_i + \epsilon_{it}$$



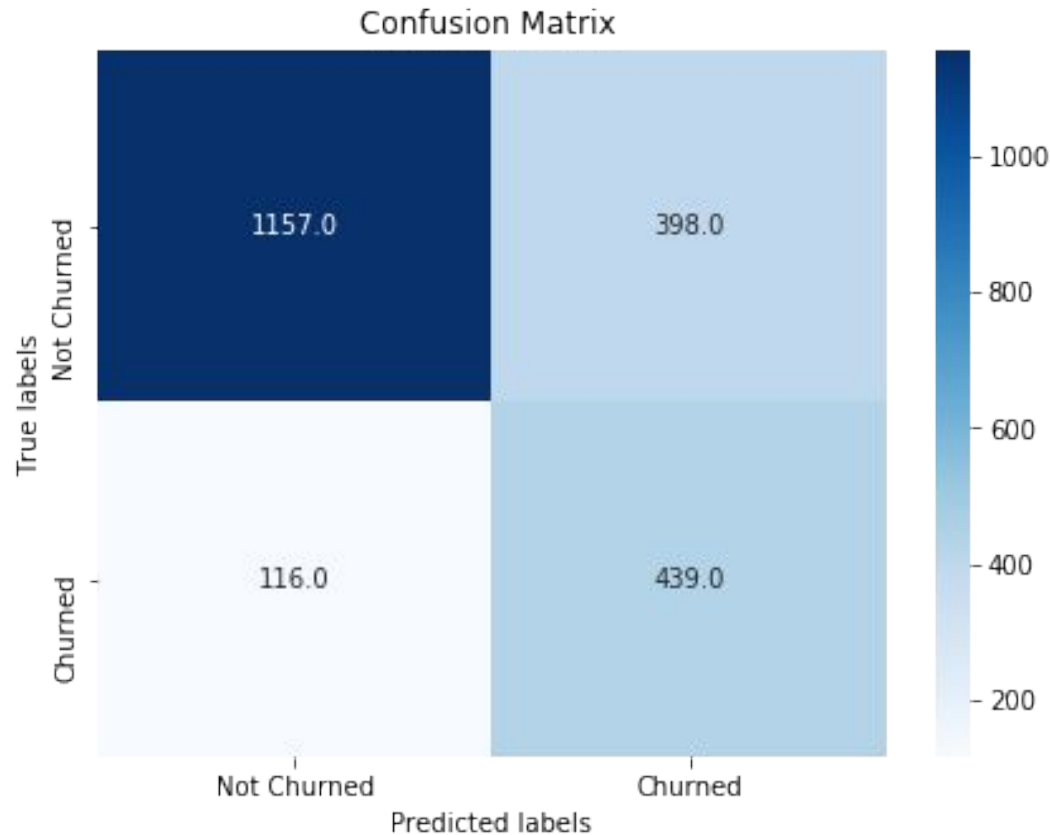
matplotlib



Final Model (Logistic Regression)



What does the Model Say?

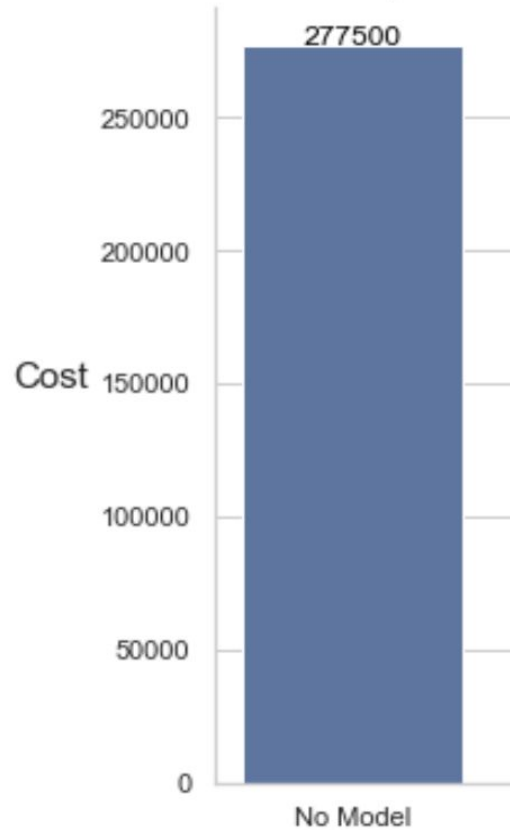


For Churned Customers
Recall:0.79

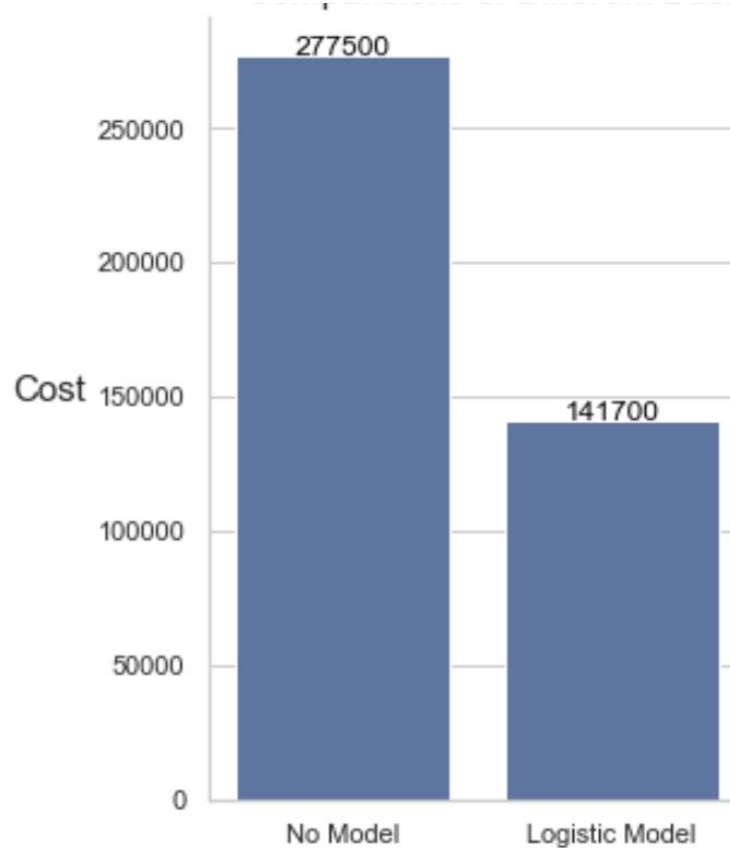
Cost Evaluation (Assumptions)

- Customer Acquisition Cost = 5 x Customer retention costs
- Customer Acquisition Cost: USD 500
- Customer Retention Cost: USD 100
- Total Cost to maintain Customer Base = $FN(500) + FP(100) + TP(100) + TN(0)$

Cost Evaluation (Without Predictive Model)

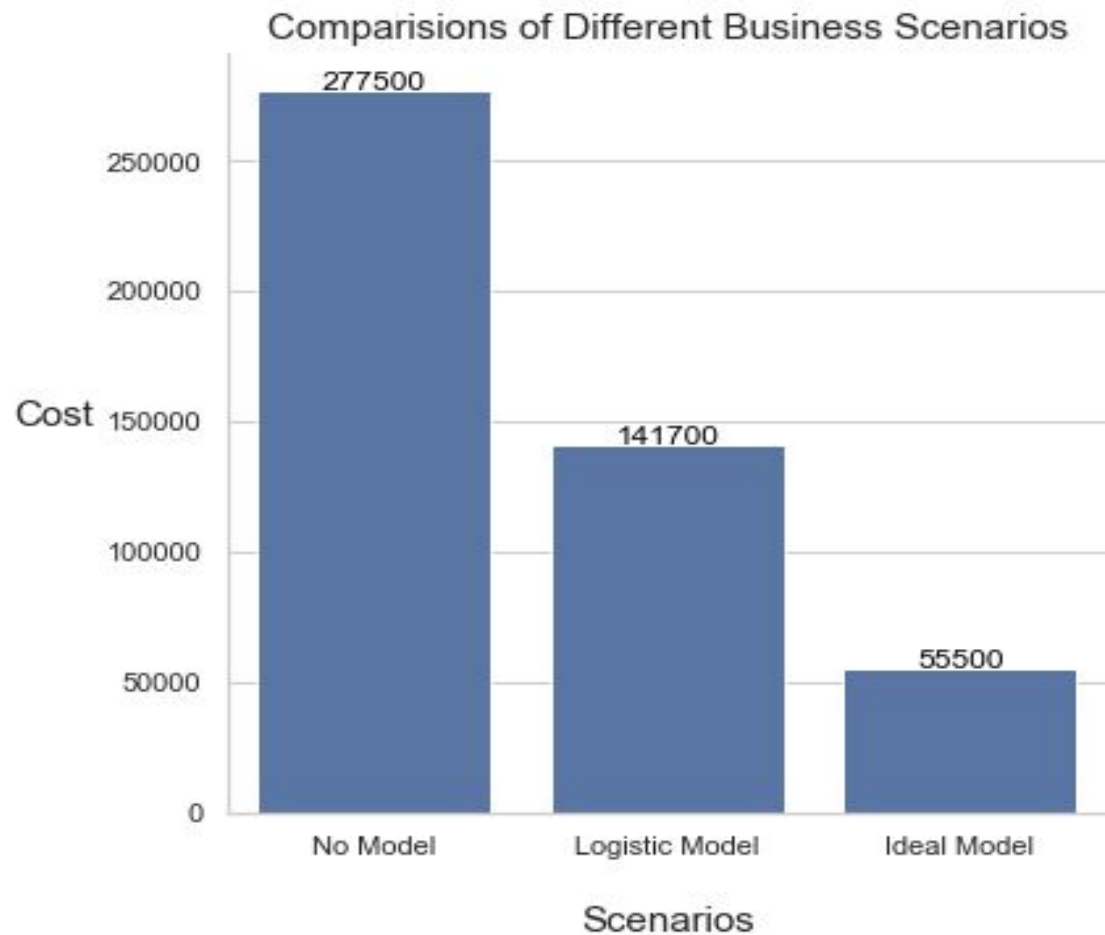


Cost Evaluation (With Current Model)



**Save USD 135,800
in a month**

Cost Evaluation (With an Ideal Model)



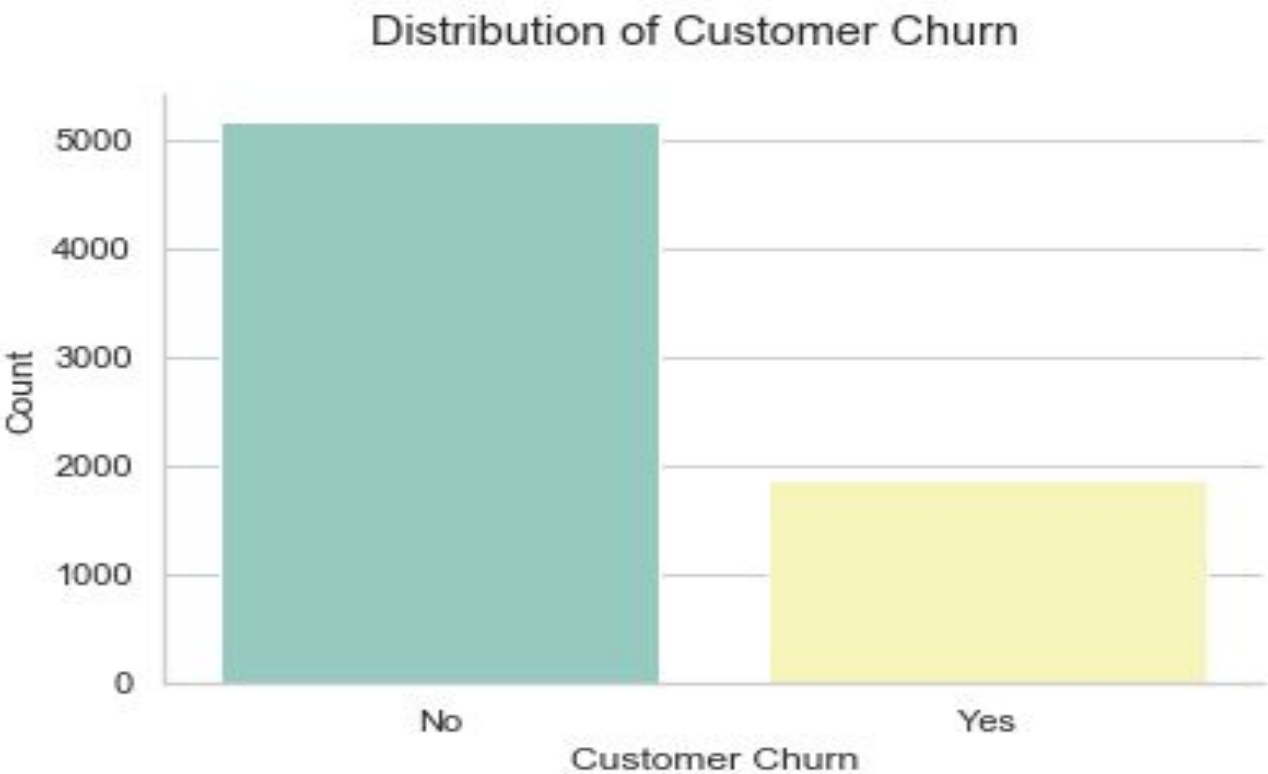
Future Work

- Optimize Model by ;
 - ★ enriching the dataset
 - ★ including costs in determining the optimal threshold
 - ★ Distinguish between voluntary & involuntary churners
- Make current web app better

Thank you

Appendix

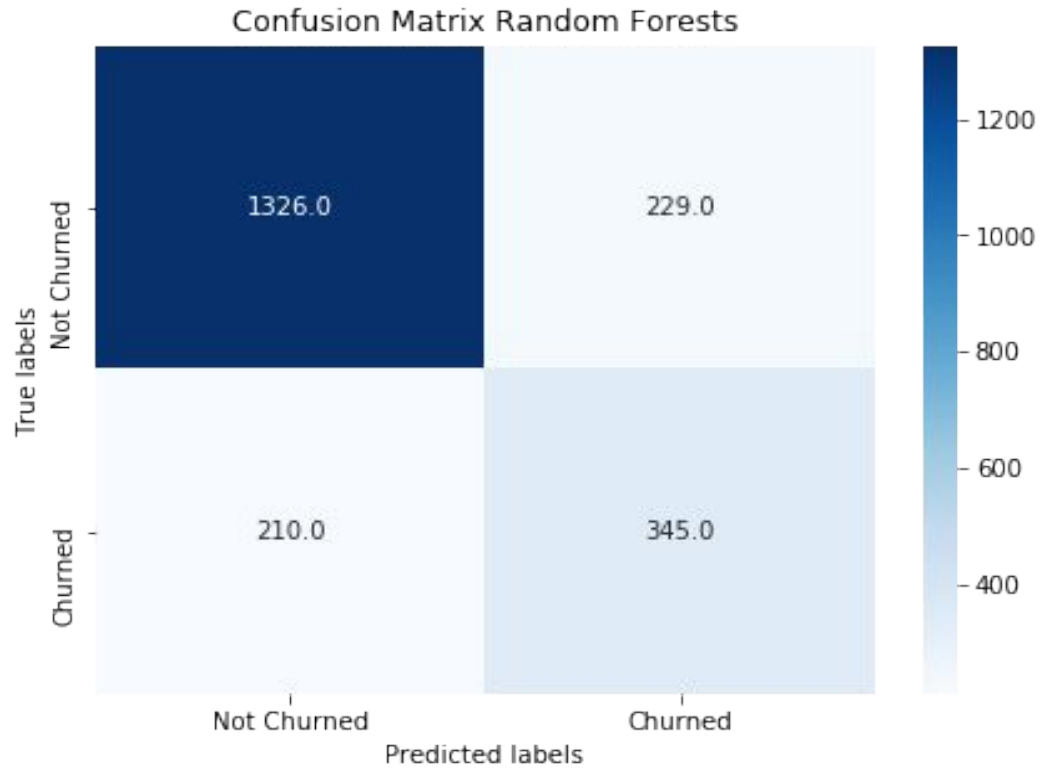
Distribution of the Target Variable



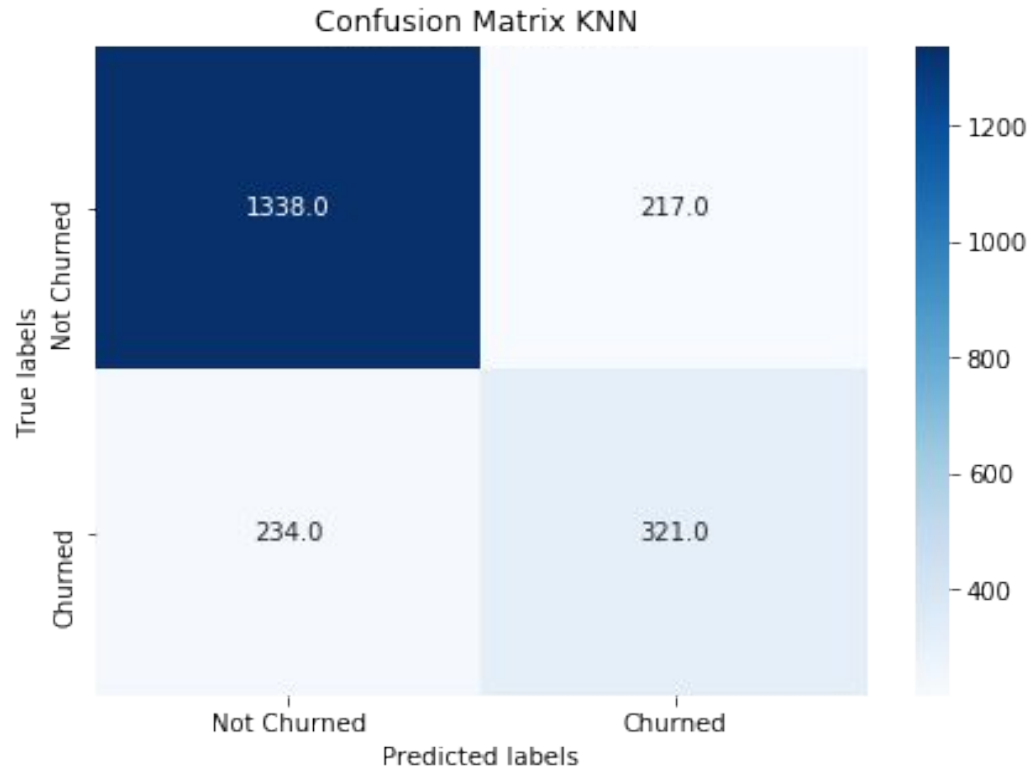
Logistic Regression

	precision	recall
0	0.91	0.74
1	0.52	0.79

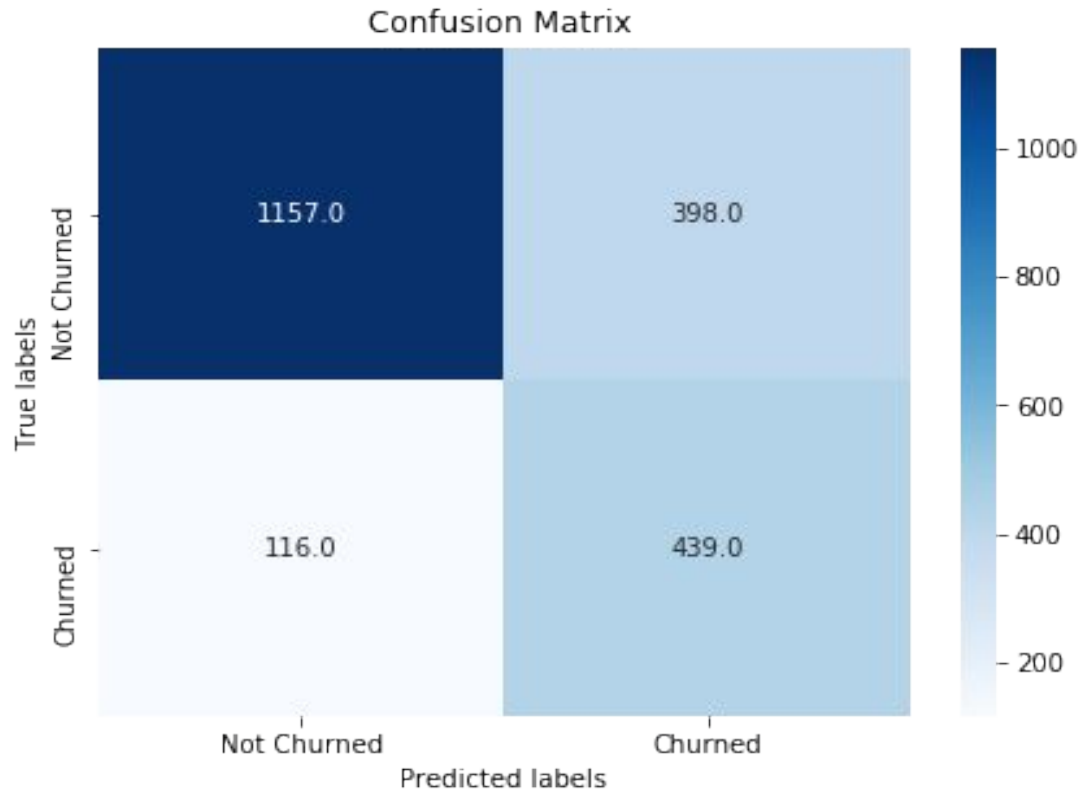
Random Forests Confusion Matrix



KNN Confusion Matrix



Confusion Matrix: Logistic Regression



Cost Calculations

- **Worst Case Scenario:** We assume that no customer will churn. But in reality, 555 customers ended up churning. So to maintain the customer base, the business will have to spend $(\$500 \times 555)$ **USD 277,500**.
- **Applying Model:** The model identifies, FNs, TPs & FPs. So to maintain the current customer base, the business will have to spend $(116 \times 500) + (837 \times 100)$ **USD 141,700**. So using a model will **save USD 135,800** in a month.
- **Best Case Scenario:** We have a model that correctly identifies customers about to churn (FN=0 & FP=0). So to maintain the customer base, the business will have to spend (555×100) **USD 55,500**.

Current Web App

Enter input data

Gender

Female

Senior Citizen

yes

Partner

no

Dependents

Yes

Predict

Predicted value for Churn

20%40%60%80%100%

No69.92%

Yes30.08%