# Diabetes Readmission Within 30 Days Prediction

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#TF010

# outline

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# Introduction

The main goal of this project is to design a machine learning classification system, that is able to predict the readmission of a diabetes patient, based on the patient's medical history information.

- Hospital readmission is a healthcare quality measure that helps in determining the level of quality of care.

**Identify whether a hospitalized diabetic patient will be readmitted within 30 days will help to:**

- Reducing early hospital readmissions is a policy priority aimed at improving healthcare quality.
- Reduce cost.

# Problem statement

Identify the major factors that contribute to hospital readmissions

Compare accuracy of each model.

# Methodology

Pre-process, analyze, visualize, and conduct supervised learning on dataset.

Classification algorithm used  in order to classify whither patients will readmitted based on the features.

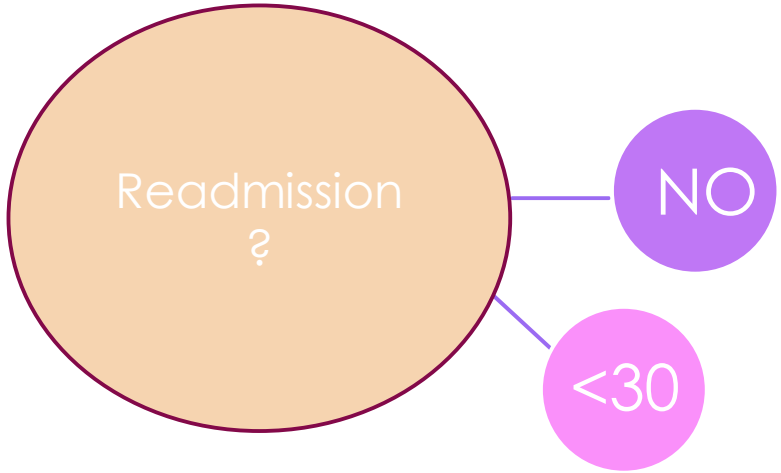
Random forest and Boosting algorithm.

# Data preparation and Feature Engendering

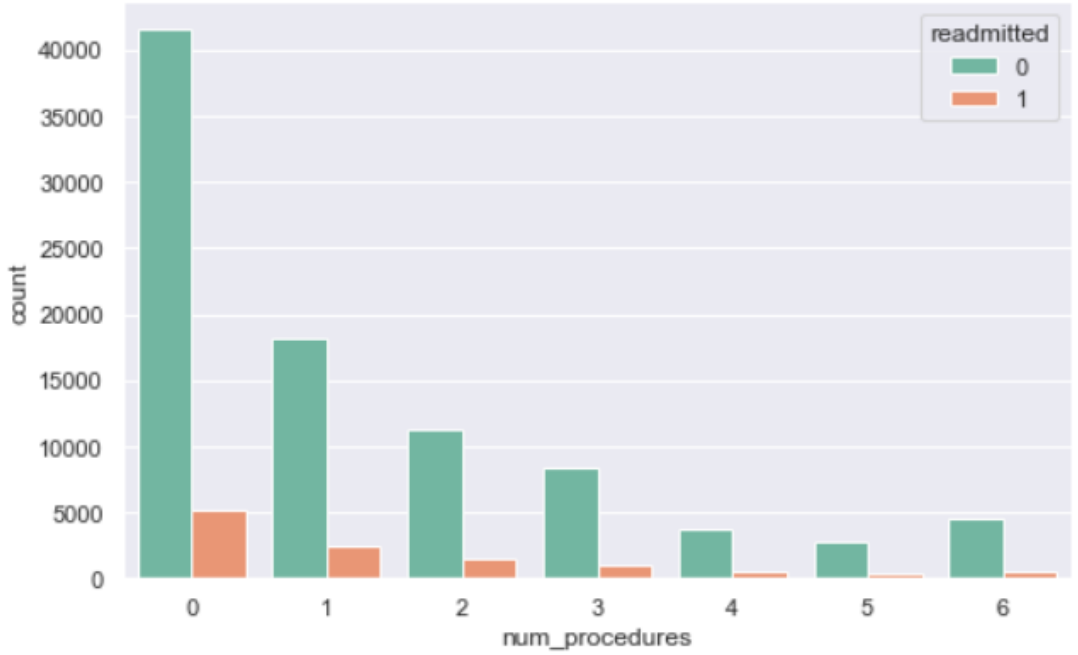
- Fill missing , encoding, drop useless columns
- Ensured data classification were the same
- Generate new column to calculate total visits of patients
- Divided data into testing and validation

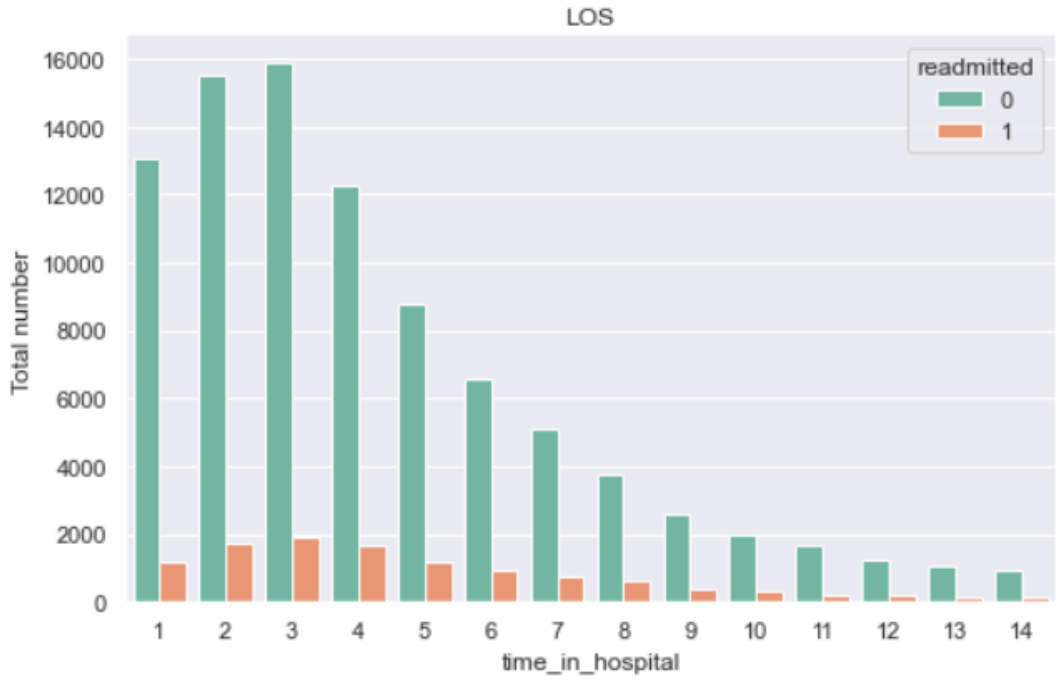
# prediction

Predicate whether diabetes patients will be readmitted to the hospital based on several factors.



# Finding


readmitted
0
1
count
num_procedures
0
1
2
3
4
5
6
0
5000
10000
15000
20000
25000
30000
35000
40000


LOS
readmitted
0
1
Total number
time_in_hospital
1
2
3
4
5
6
7
8
9
10
11
12
13
14
0
2000
4000
6000
8000
10000
12000
14000
16000

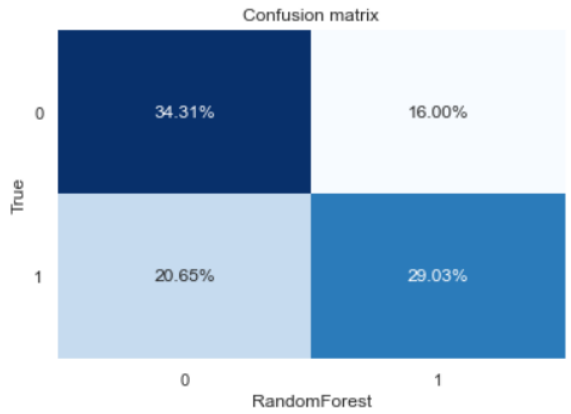
# prediction

Random Classifier

```
Accuracy (overall correct predictions): 0.63
Auc: 0.63
Recall (all 1s predicted right): 0.58
Precision (confidence when predicting a 1): 0.64
Detail:
              precision    recall  f1-score   support

           0       0.62      0.68      0.65      1267
           1       0.64      0.58      0.61      1251

    accuracy                           0.63      2518
   macro avg       0.63      0.63      0.63      2518
weighted avg       0.63      0.63      0.63      2518
```



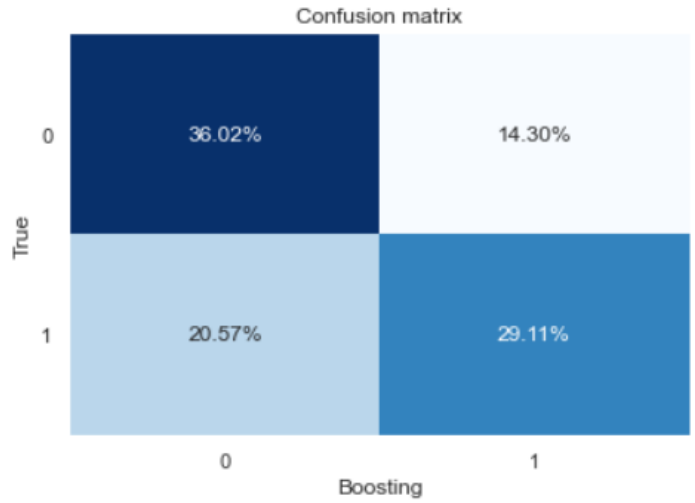
# prediction

Boosting Classifier

```
Accuracy (overall correct predictions): 0.65
Auc: 0.65
Recall (all 1s predicted right): 0.59
Precision (confidence when predicting a 1): 0.67
Detail:
              precision    recall  f1-score   support

           0       0.64      0.72      0.67      1267
           1       0.67      0.59      0.63      1251

    accuracy                           0.65      2518
   macro avg       0.65      0.65      0.65      2518
weighted avg       0.65      0.65      0.65      2518
```



# Result

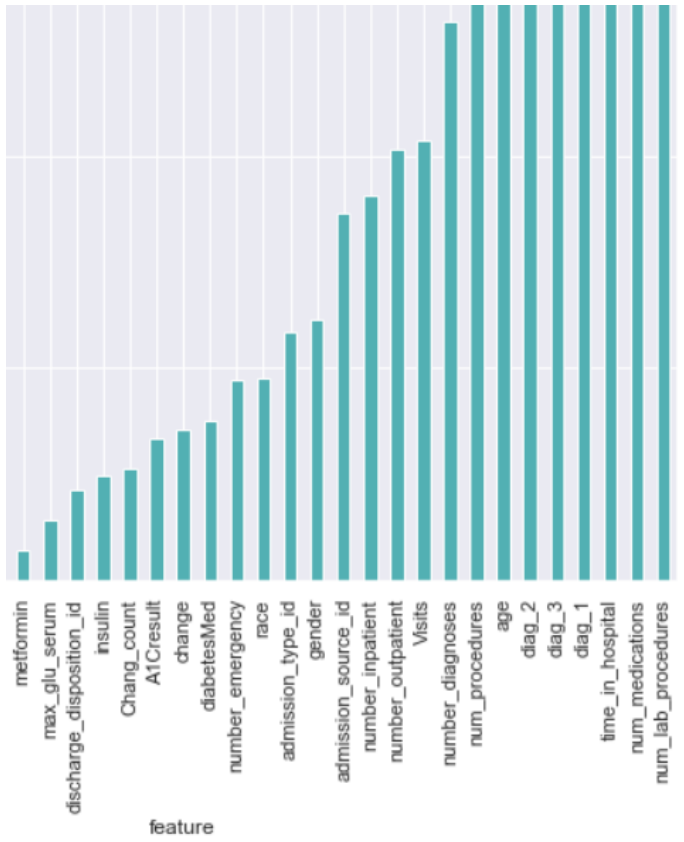
**Boosting Forest classification:**

What are the top 3 factors that predict a diabetic readmission within 30 days?

- Number of medication.
- Number of lab procedures.
- Time in hospital.

If the length of a patients stay in the hospital is predictor of a readmission ? Yes

If the number of procedures a patient entered into the electronic medical record is indicator for readmission ? Yes



# Future Work

- In the future, I'll try the following to improve the performance of our classifier:
- Generate new features.
- Neural network.