Predicting of Impact on Re-admission Rates for Patients Hospitalized with Heart Disease.

GANESH KASTURI

IMS Proschool Institute for Data Science

Andheri Batch, Mumbai(W)

1 INTRODUCTION.

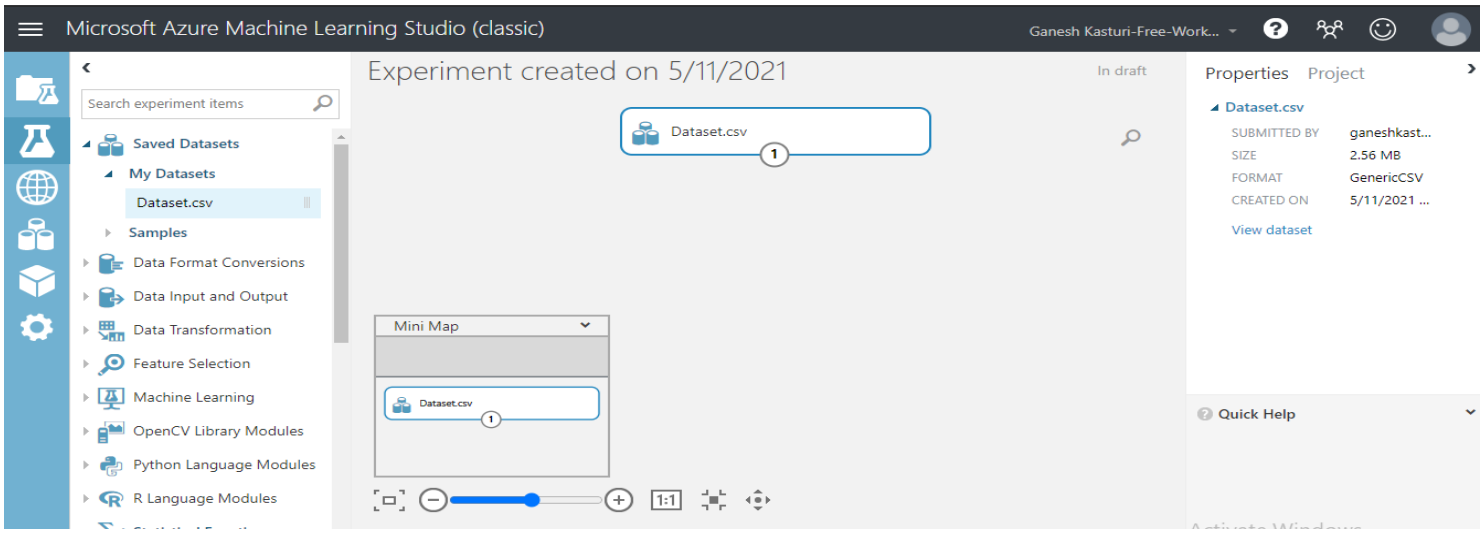
A healthcare organization together with a couple of government hospitals in a city has collected information about the vitals that would reveal if the person might have a coronary heart disease in the next ten years or not. This study is useful in early identification of disease and have medical intervention if necessary. This would help not only in improving the health conditions but also the economy as it has been identified that health performance and economic performance are interlinked.

As a data scientist, you are required to construct a classification model based on the available data and evaluate its efficacy. Your activities should include - performing various activities pertaining to the data such as, preparing the dataset for analysis; checking for any correlations; creating a model; evaluating the performance of the classification model.

2 METHODOLOGY

2.1 Data Set

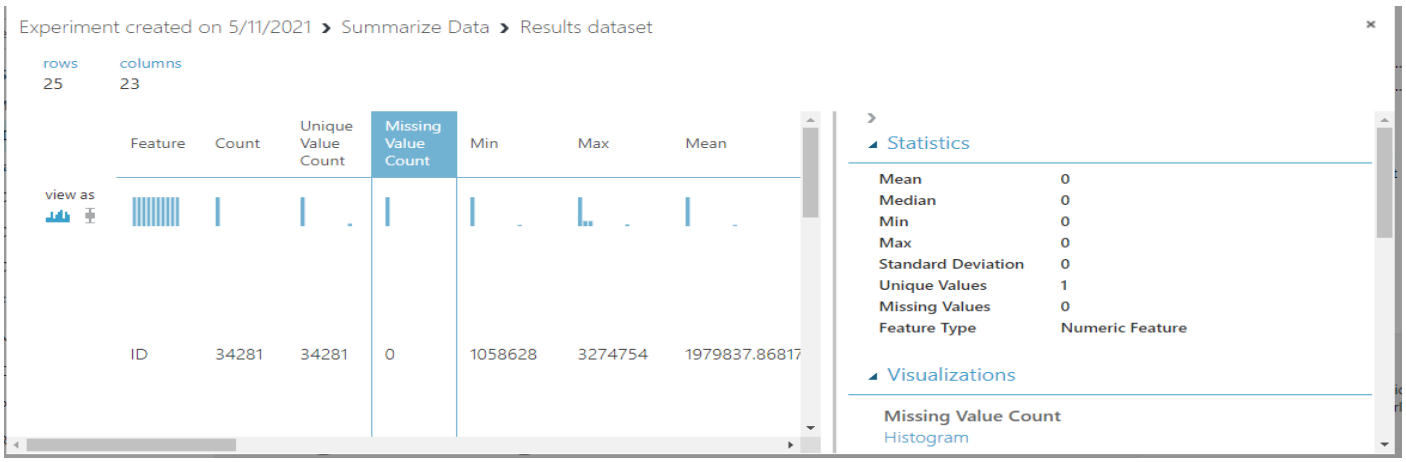
To explore this problem, we have taken a dataset and upload it into Microsoft Azure Machine Learning Studio(Classic).



2.2 Summarize Dataset.

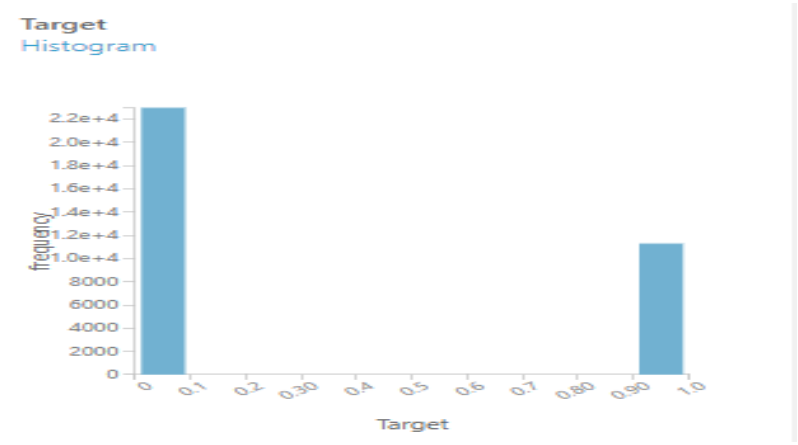
From the Summary of Dataset, we have find some explanation about the dataset.

1. There are Total 23 columns and Count of the dataset is around 34291.
2. All the columns as of Numeric Feature! We must do less pre-processing because we do tree-based algorithm.
3. From the Summary we have Predict there are No Missing values Present in the Data Set.

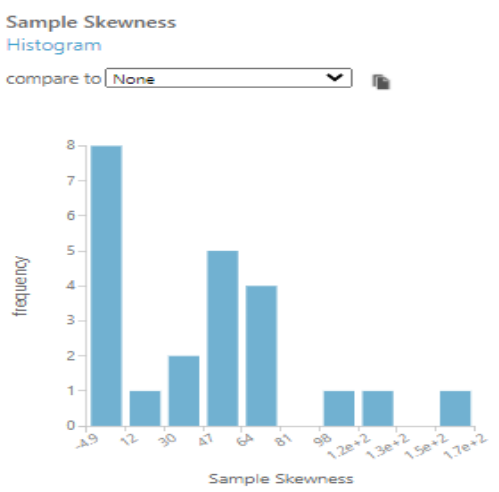


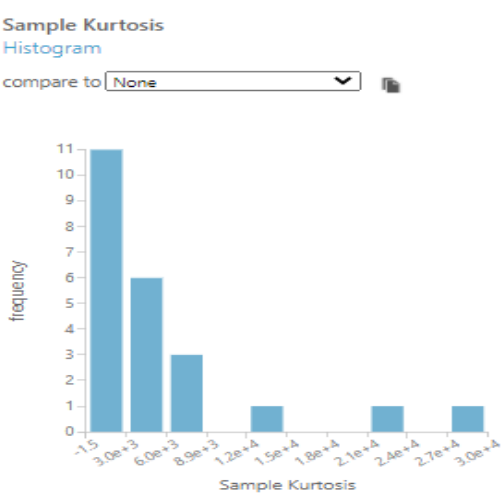
3 Exploratory Analysis

3.1 Prior to performing any analysis, we conducted exploratory analysis to preview the data type, attributes, and overall patterns of the data. We are interested in the class label “Target”.



3.2 We have Also Visualize the Skewness and Kurtosis to see how the data is Actually positively or negatively Skewness!



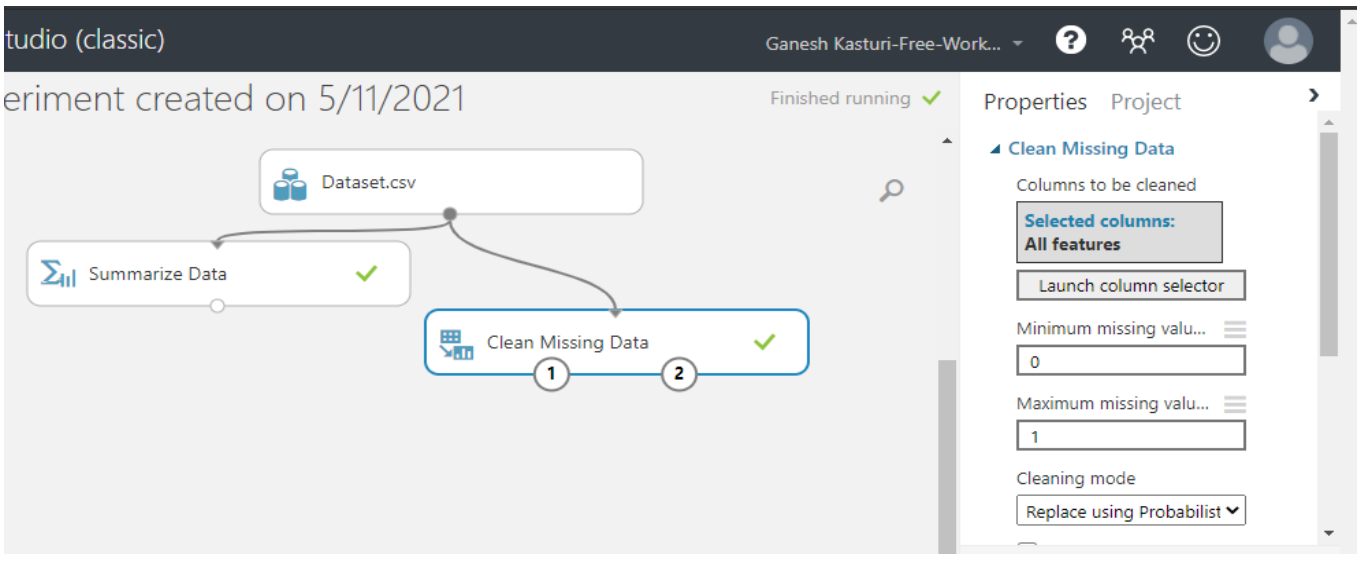


4 Data Pre-Processing

After the exploratory analysis, we found several challenges lies in the original dataset, and thus some data wrangling tasks such as data cleaning, dealing with missing values, creating new variables, and data transformation needs to be addressed before modelling.

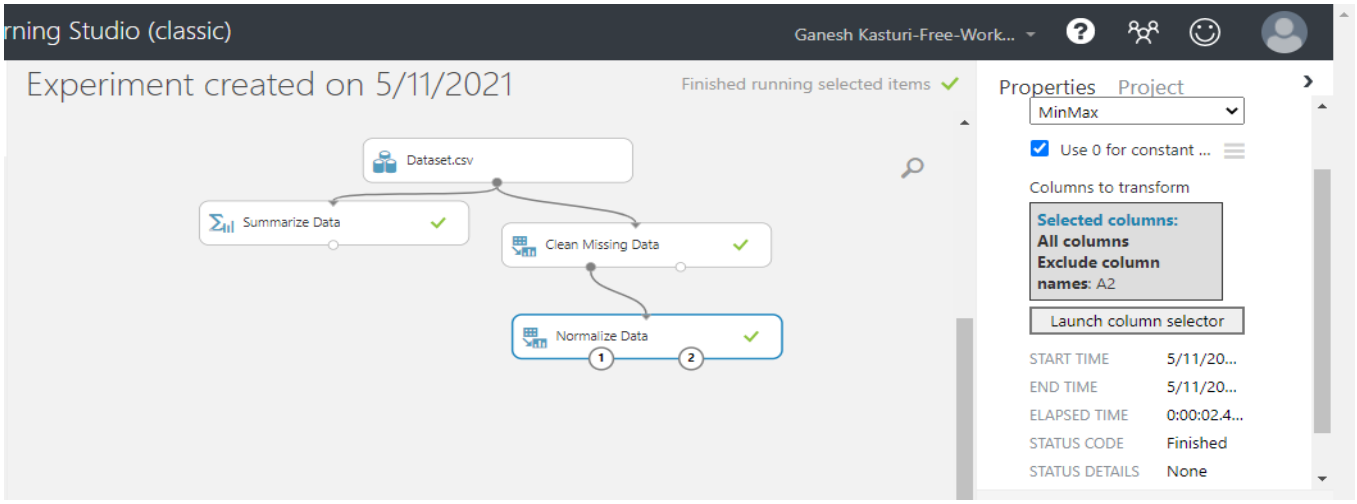
4.1 Dealing with Missing Data.

We discovered no missing values; this dataset has 23 variables which contain no missing values. But for our requirement we have check by use the Tools and lets the Azure deal with the Missing values.



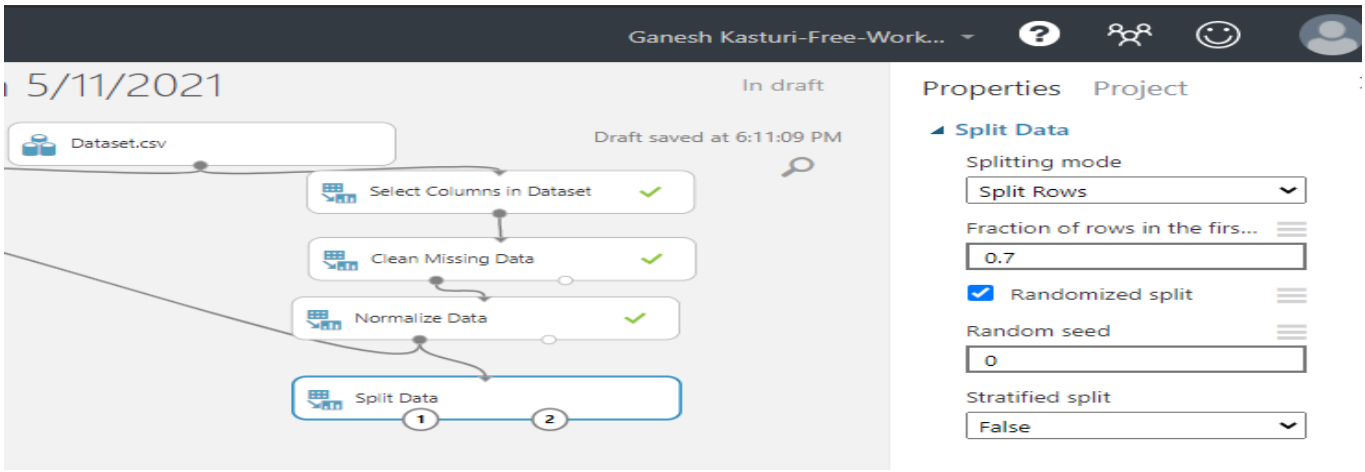
4.2 Normalize Data

Data Normalization is a common practice **in** machine learning which consists of transforming numeric columns to a common scale.



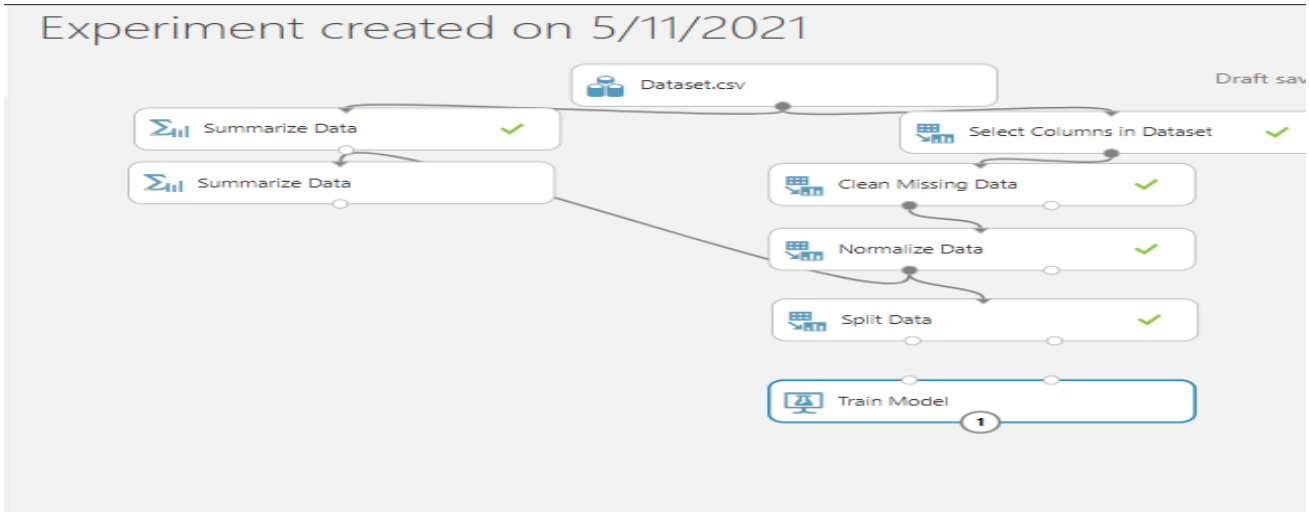
5 Split the Dataset.

We have Split the dataset into 2 parses. Training 70% and to test the model 30%.



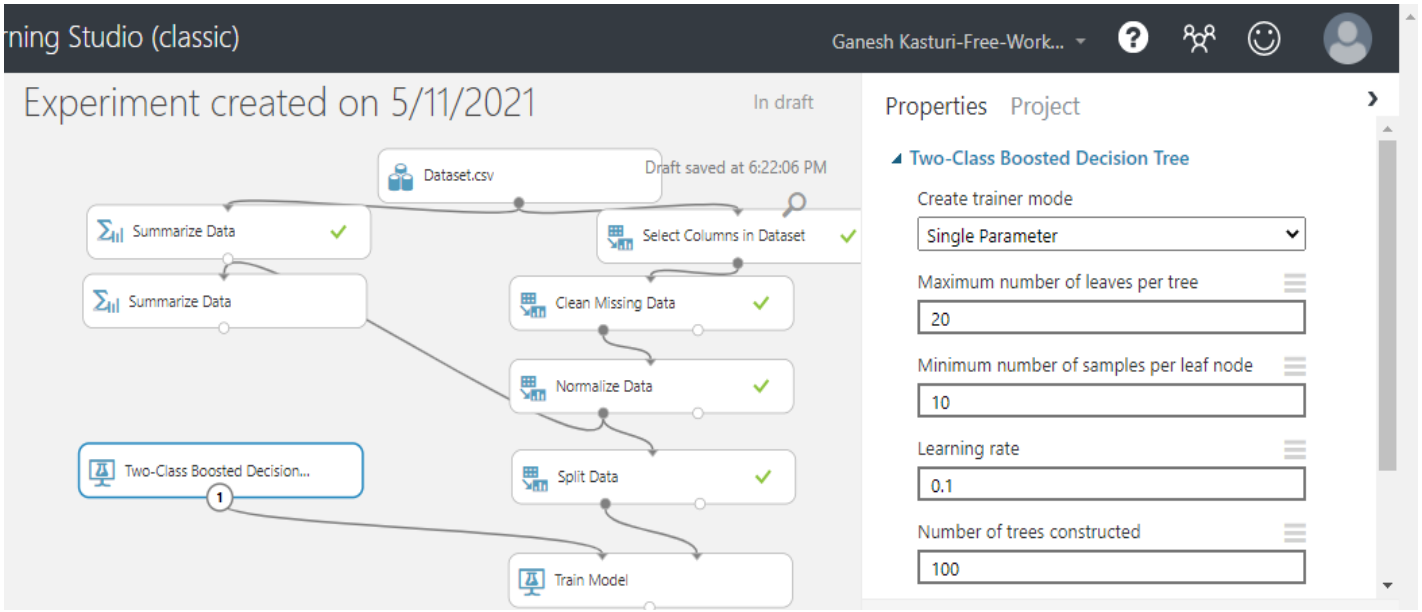
6 Train Model

We have Train the Model in Microsoft -Azure. We have a Prediction Variable "Target"



7 Two – Class Boosted Decision Tree

Since, we have Summarize, and from the EDA prediction we have seen that this problem we have to be predicted using classification algorithm.

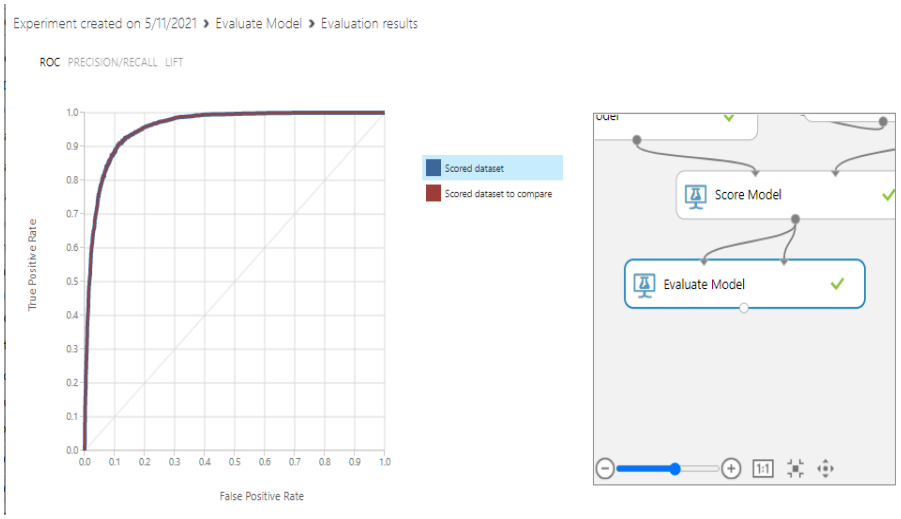


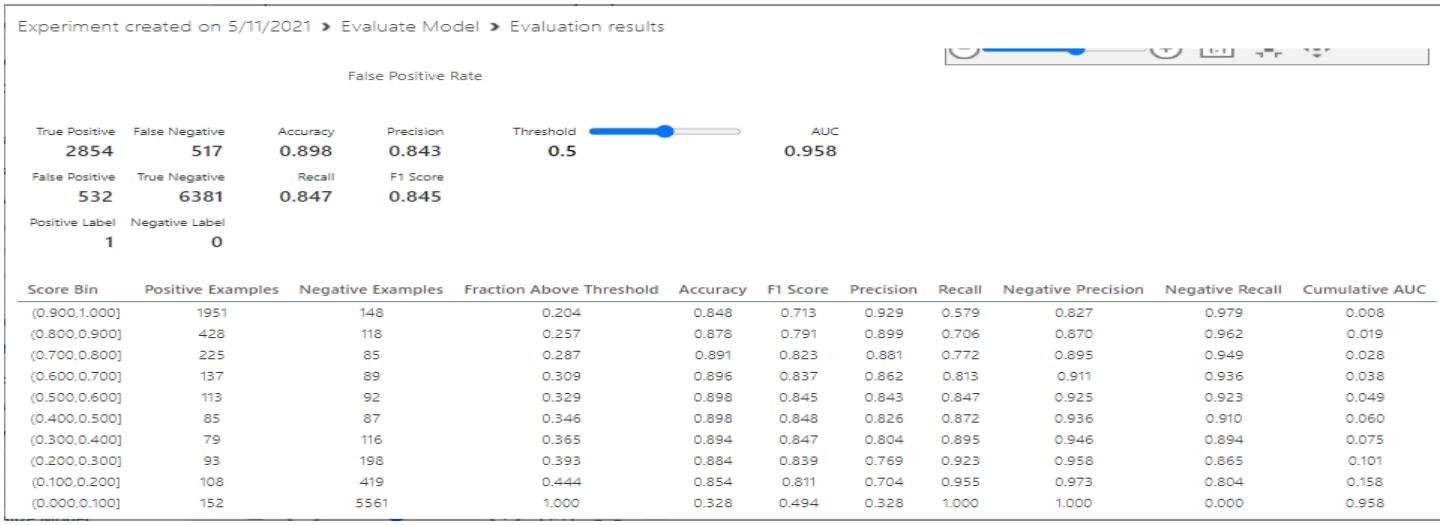
8 Score Model

We must Train the Model on testing data, so we have to perform the Score Model.

9 Evaluate Model:

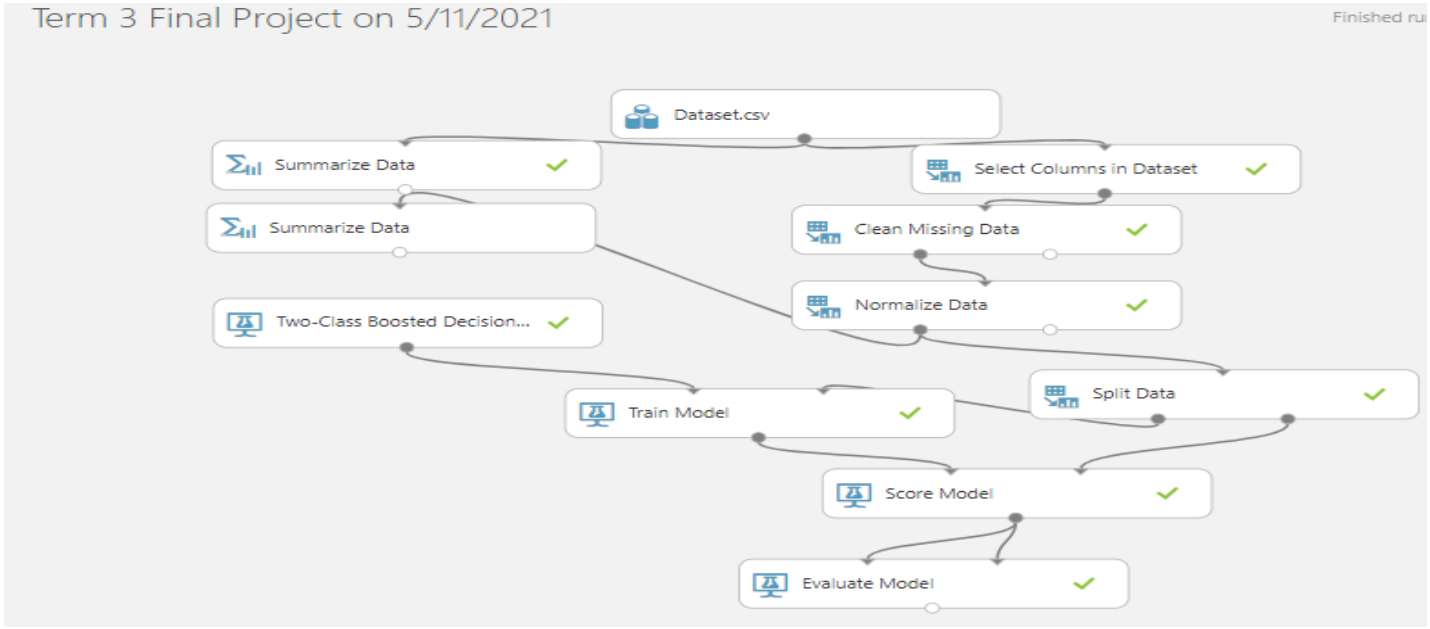
Model evaluation aims to estimate the generalization accuracy of a model on future (unseen/out-of-sample) data.





Score Bin	Positive Examples	Negative Examples	Fraction Above Threshold	Accuracy	F1 Score	Precision	Recall	Negative Precision	Negative Recall	Cumulative AUC
(0.900,1.000]	1951	148	0.204	0.848	0.713	0.929	0.579	0.827	0.979	0.008
(0.800,0.900]	428	118	0.257	0.878	0.791	0.899	0.706	0.870	0.962	0.019
(0.700,0.800]	225	85	0.287	0.891	0.823	0.881	0.772	0.895	0.949	0.028
(0.600,0.700]	137	89	0.309	0.896	0.837	0.862	0.813	0.911	0.936	0.038
(0.500,0.600]	113	92	0.329	0.898	0.845	0.843	0.847	0.925	0.923	0.049
(0.400,0.500]	85	87	0.346	0.898	0.848	0.826	0.872	0.936	0.910	0.060
(0.300,0.400]	79	116	0.365	0.894	0.847	0.804	0.895	0.946	0.894	0.075
(0.200,0.300]	93	198	0.393	0.884	0.839	0.769	0.923	0.958	0.865	0.101
(0.100,0.200]	108	419	0.444	0.854	0.811	0.704	0.955	0.973	0.804	0.158
(0.000,0.100]	152	5561	1.000	0.328	0.494	0.328	1.000	1.000	0.000	0.958

10 Final Model.



11 Suggest ways of improving the model.

After running the decision tree, we decided to use a boosting method by the relatively new algorithm tree-boosting for model improvement. Boosting is an ensemble method that create a strong classifier based on weak classifiers, according to how correlated are the learners to the actual target variable. The errors of the previous model are corrected by the next predictor, by adding models on top of each other iteratively until the training data is accurately predicted or a maximum number of models are added.

We applied and tuned the algorithm for better performance. e.g. learning rate to prevent overfitting (etc=0.01).

12 Any interesting observations.

- We have seen data is Imbalanced dataset from the Target variable visualization.
- Dataset is Normally Distributed.

13 CONCLUSIONS.

In this work we adopted machine learning methods using Microsoft Azure Studio to identify high risk patients and evaluated machine learning algorithms. Study achieved high accuracy due to the sophisticated pre-processing procedure. The Two-class Based Tree Boosting Algorithm method is reported to be the best method for prediction of the readmission rate for Heart Diseases.