Customer Churn Rate Prediction

A Hybrid Machine Learning Model Integrating Data Analysis and Multilayer Perceptron (MLP)

Contents

1 Data Selection, Exploration, and Cleansing

2 Model Selection and The baseline models

3 Experimental Design and Proposed Model

4 Results

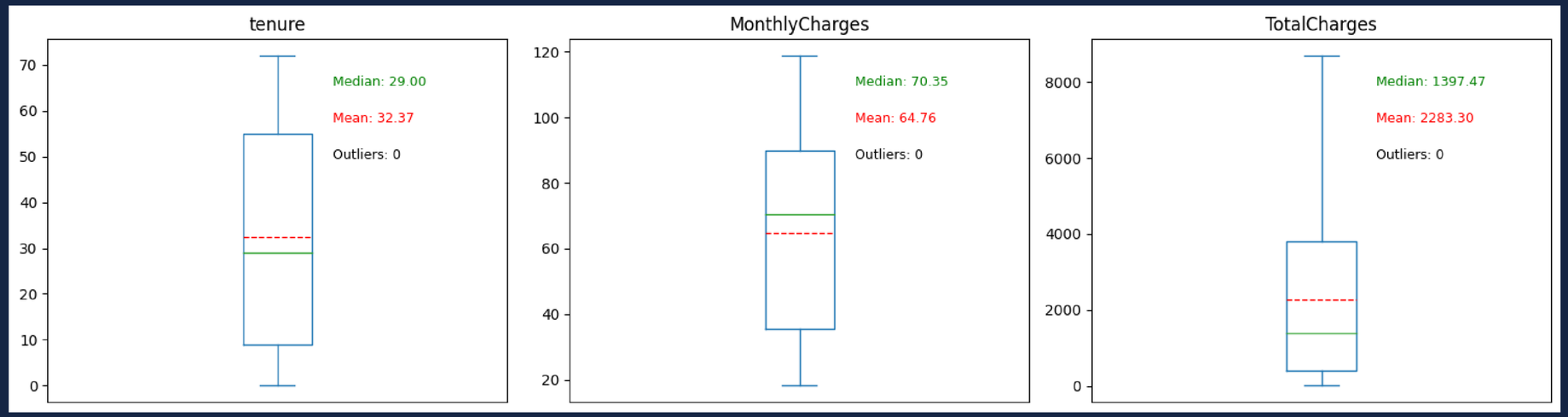
5 Strengths and Weaknesses of each model

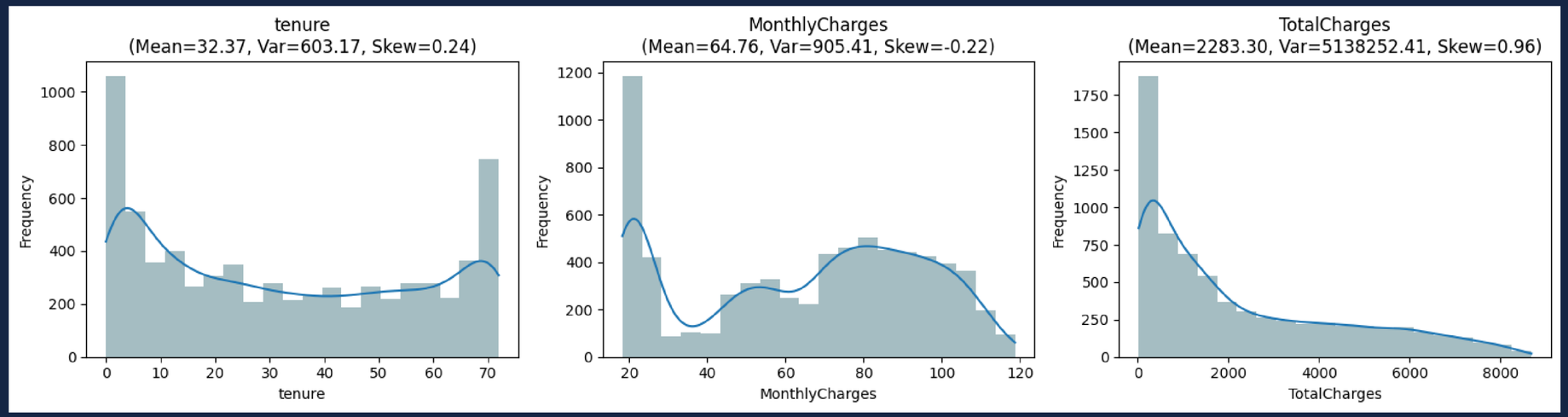
Data Selection, Exploration, and Cleansing

The Dataset include 7043 observations and 33 variables

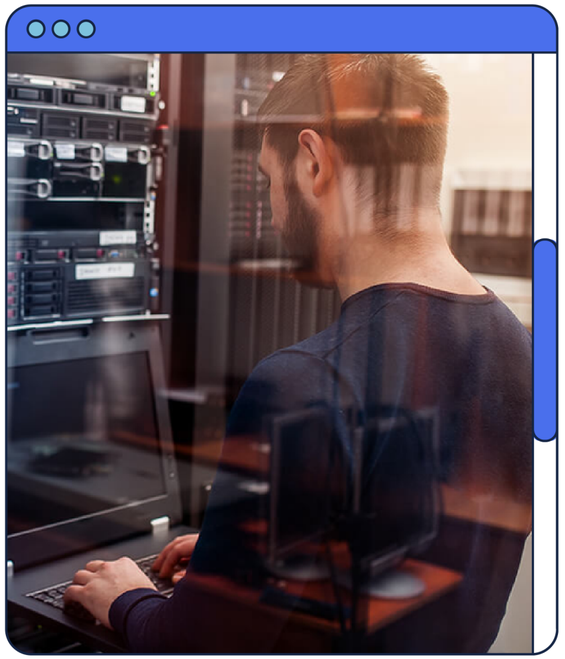
Category	Variables
Customer Demographics	CustomerID, Country, State, City, Zip Code, Lat Long, Latitude, Longitude, Gender, Senior Citizen, Partner, Dependents
Customer Services and Usages	Tenure Months, Phone Service, Multiple Lines, Internet Service, Online Security, Online Backup, Device Protection, Tech Support, Streaming TV, Streaming Movies, Contract, Paperless Billing, Payment Method, Monthly Charge, Total Charges
Churn-related Variables	Churn Label, Churn Value, Churn Score, CLTV, Churn Reason

Summary Statistics





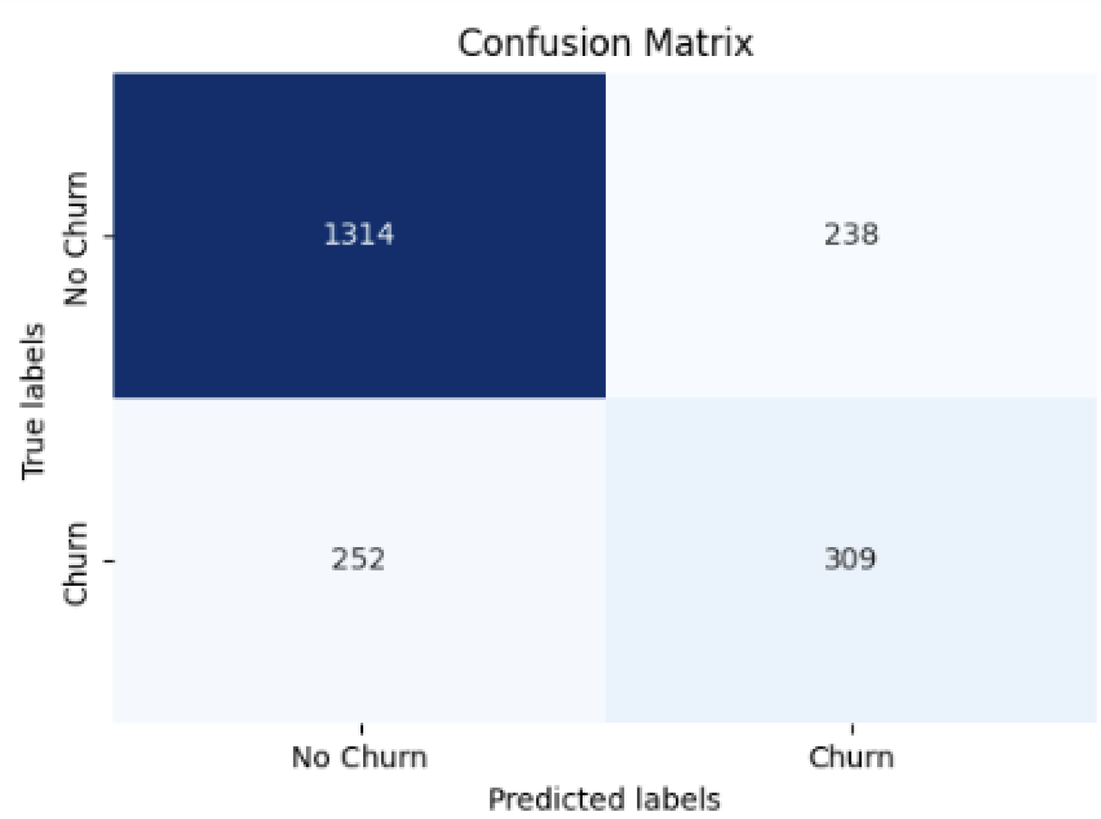
Data Exploration

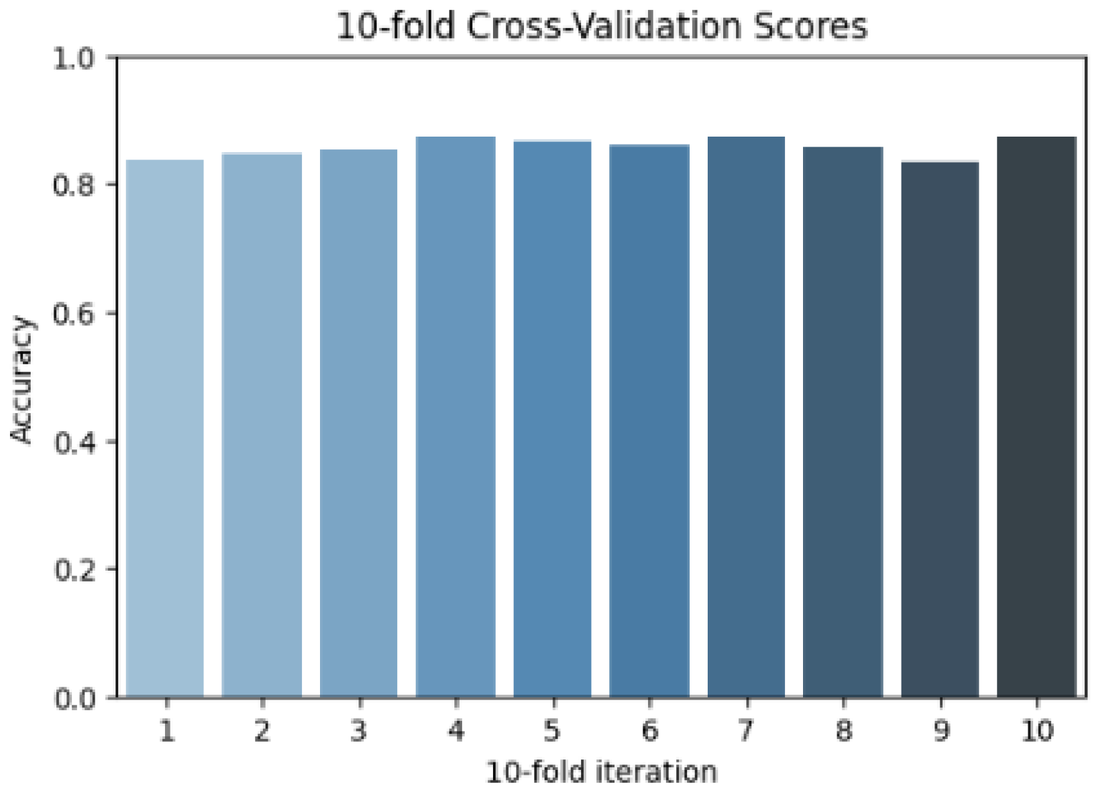


Model Selection & Baseline Models

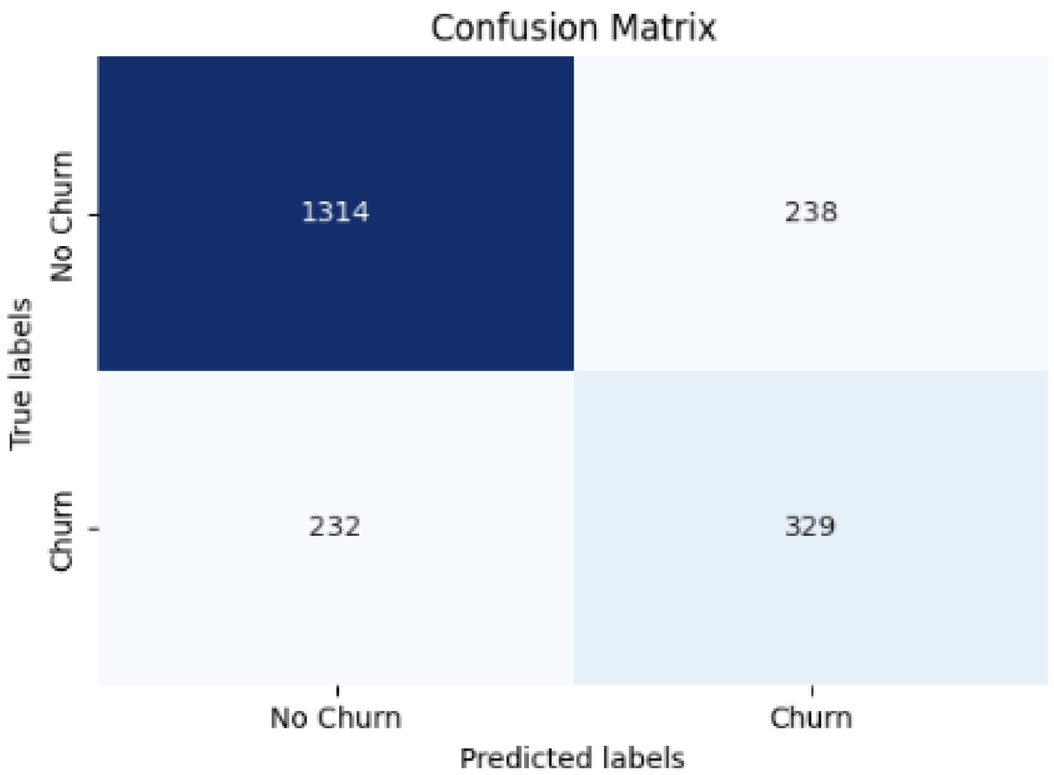
XGBoost, LightGBM, and CatBoost Classifier

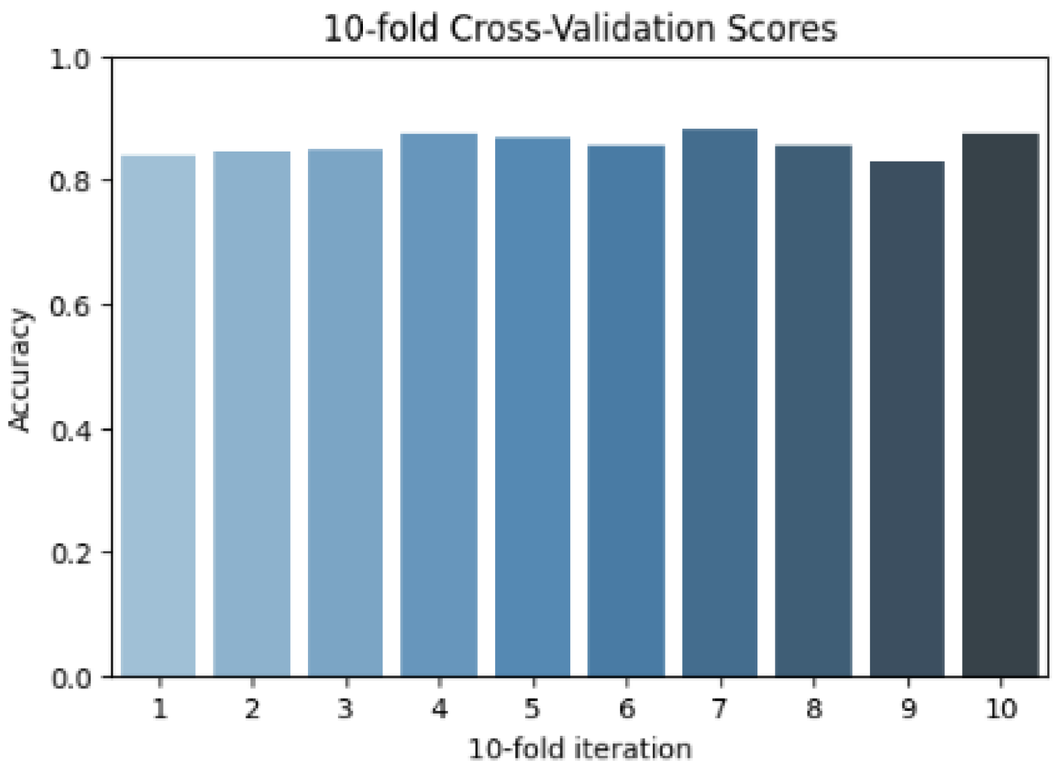
XGBoost Classifier



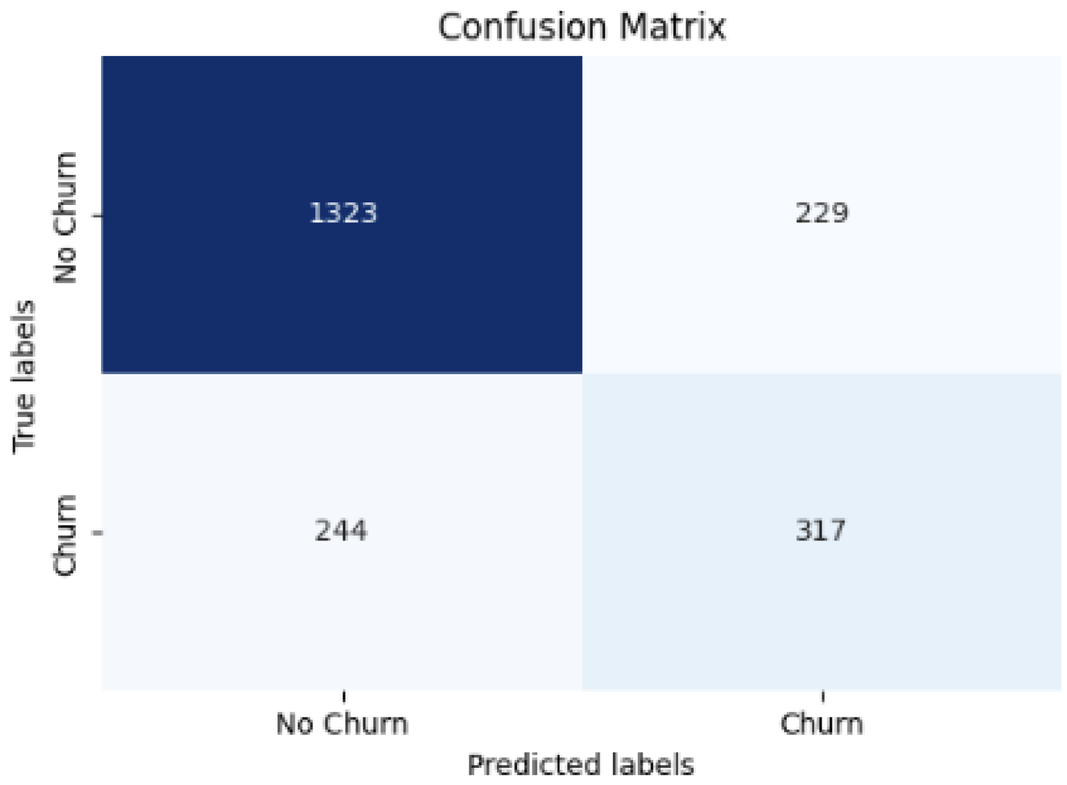


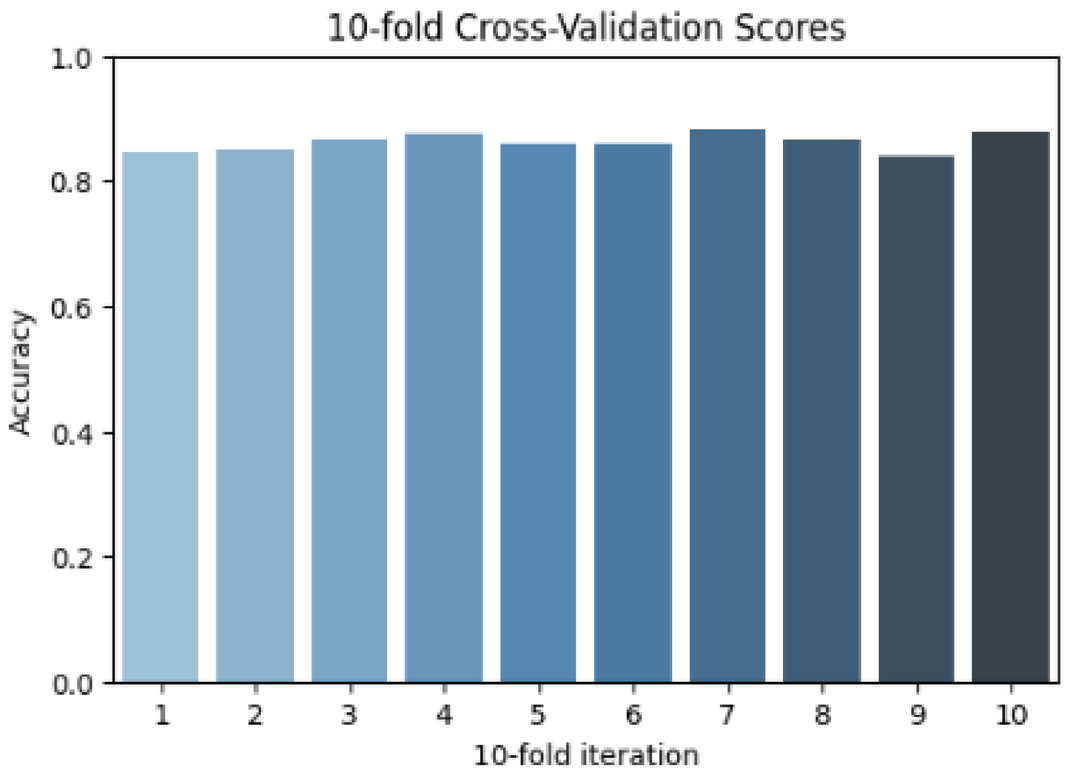
LightGBM Classifier

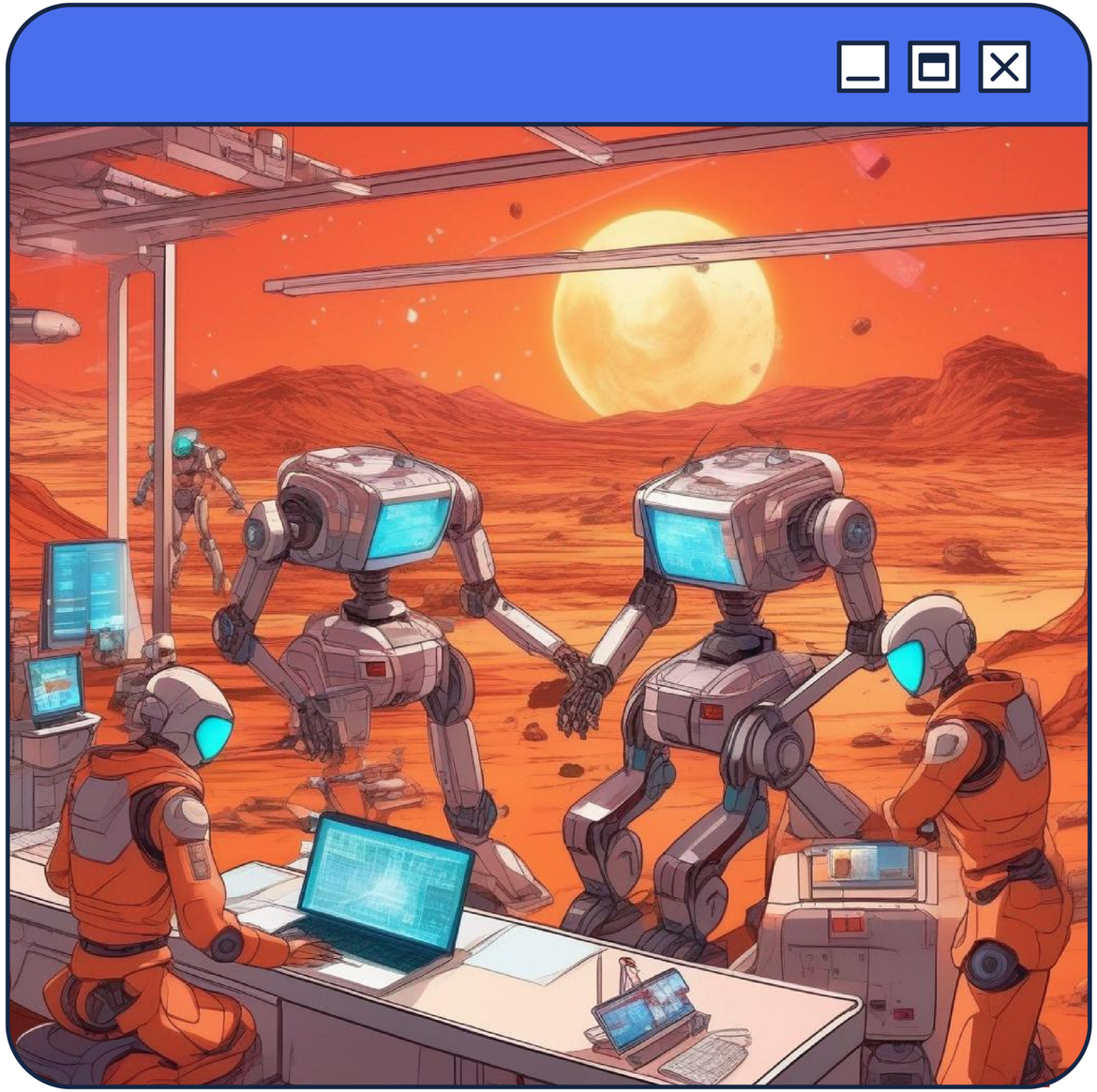




CatBoost Classifier

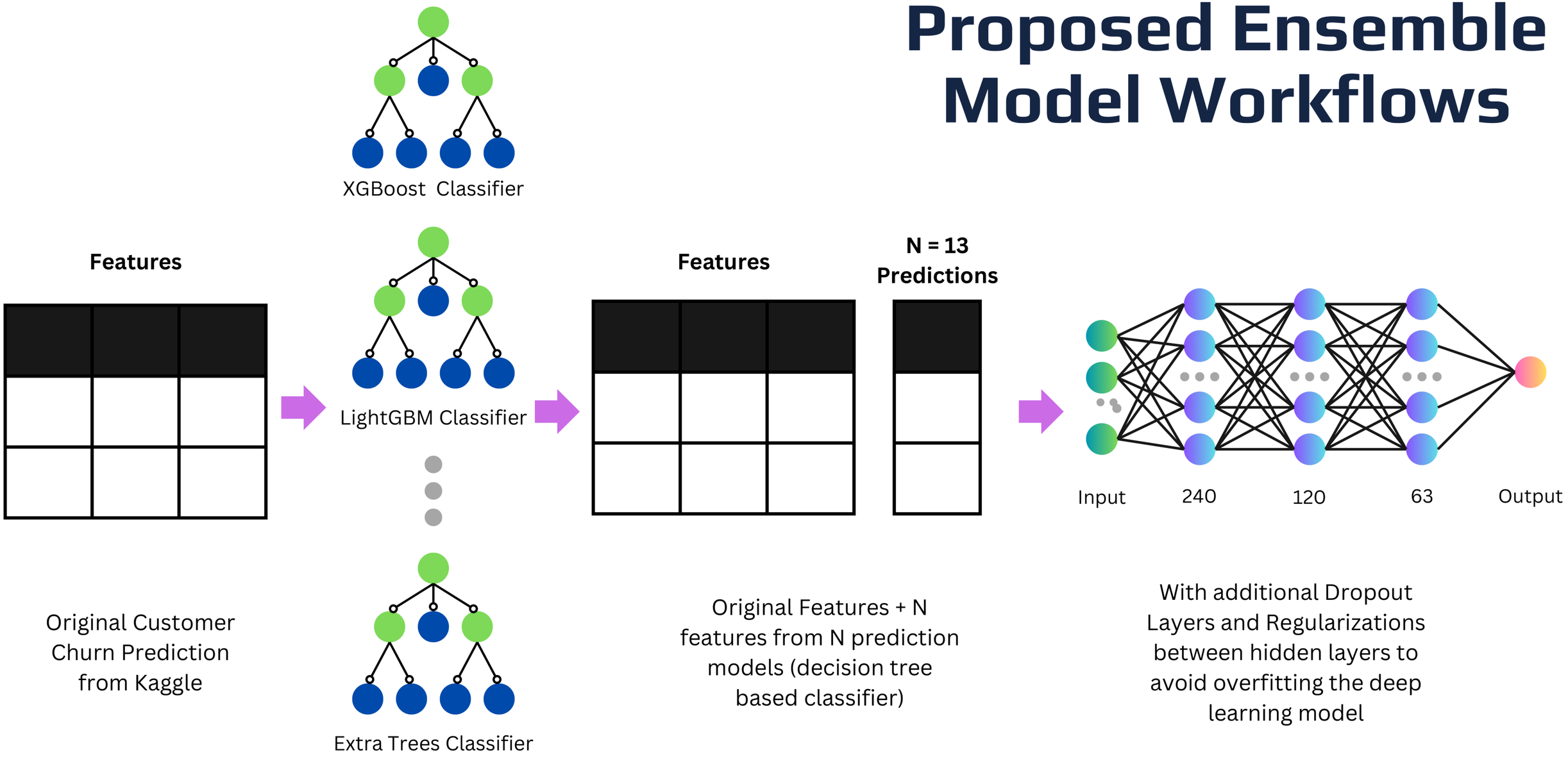




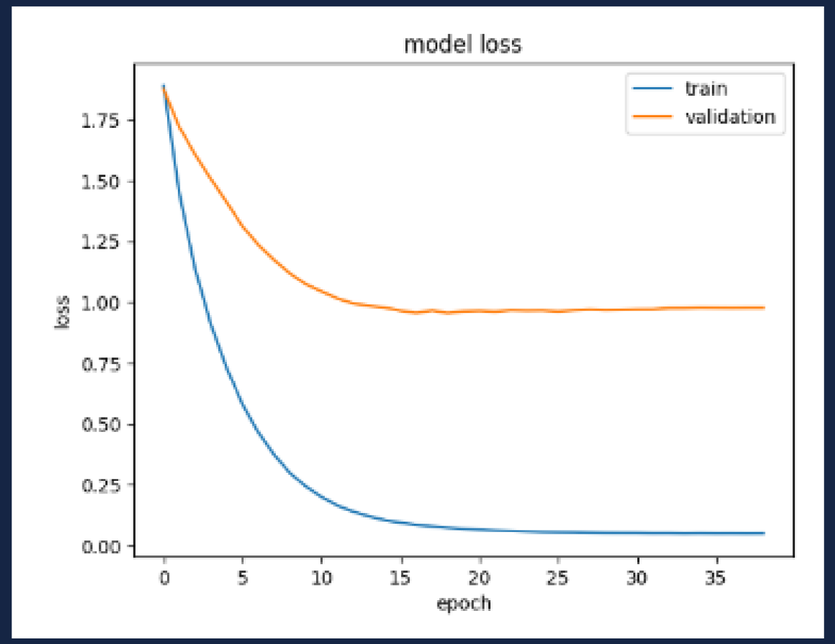


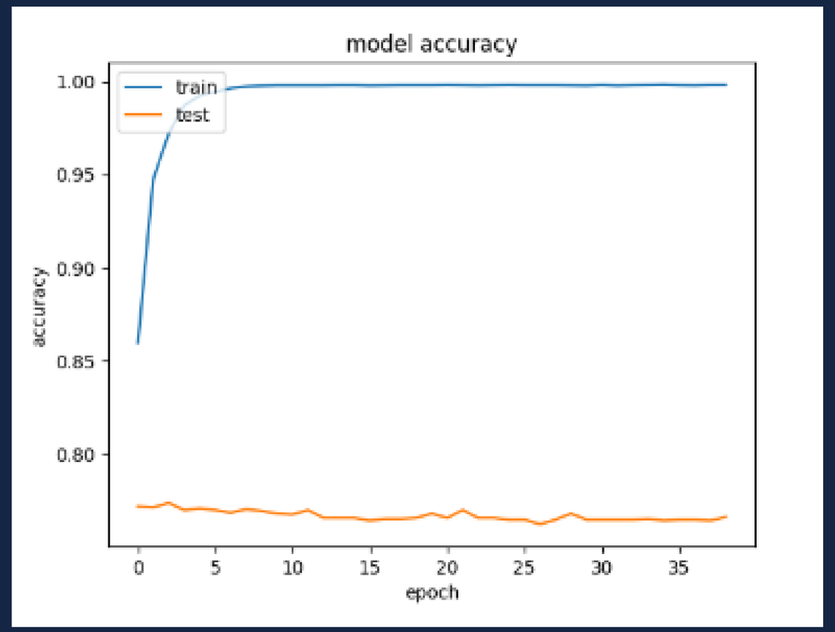
Experimental Design and Proposed Model

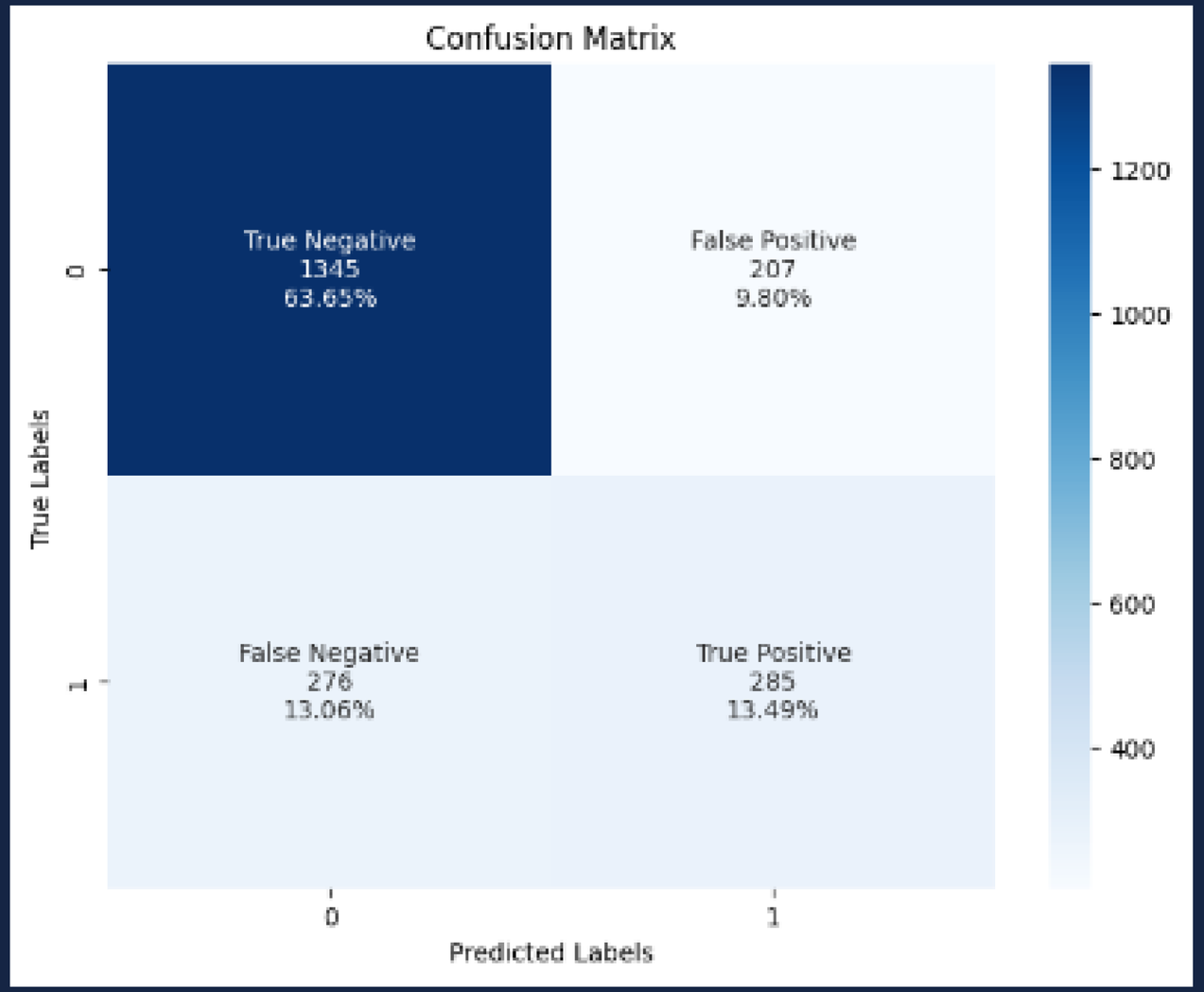
Proposed Ensemble Model Workflows



Proposed Model







Interpretation of Results

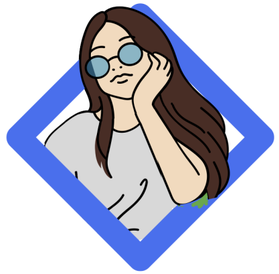
Model Name	True Negative	False Negative	False Positive	True Positive	Model Accuracy
XGBClassifier	1314	252	238	309	0.77
LGBMClassifier	1314	232	238	329	0.78
CatBoostClassifier	1323	244	229	317	0.78
Proposed Model	1345	276	207	285	0.77

Model Strength and Weakness

Model Name	Strengths	Weaknesses
XGBClassifier	Handles missing values well	Prone to overfitting
LGBMClassifier	Handles large datasets well	Prone to overfitting with smaller datasets
CatBoostClassifier	Handles categorical values well	Performs poorly if variables are not properly tuned
Proposed Model	Combined state-of-the-art models and handles large dataset with multiple features, both categorical and numerical data	Performance is lackluster given the dimension and depth of the entire model pipeline that required significantly more resources

Thank you ka

CHANON CHARUCHINDA
6322770692



SUTHISA PANTO
6322773985

NINA NANAKORN
6322774009

Have a nice day