Project Report

The project have three modules:

- Part 1 : Building Classical ML projects with respect to basic ML Coding best practices
- Part 2 : Integrate MLFlow to your project
- Part 3 : Integrate ML Interpretability to your project

We combined parts one and two of this project into a single module and completed part three as a separate module. Since the SHAP library took a lot of time during execution, so based on its time complexity we encode it's separately.

Part1 and Part2:

Step 1: Load Dataset and perform Feature Engineering

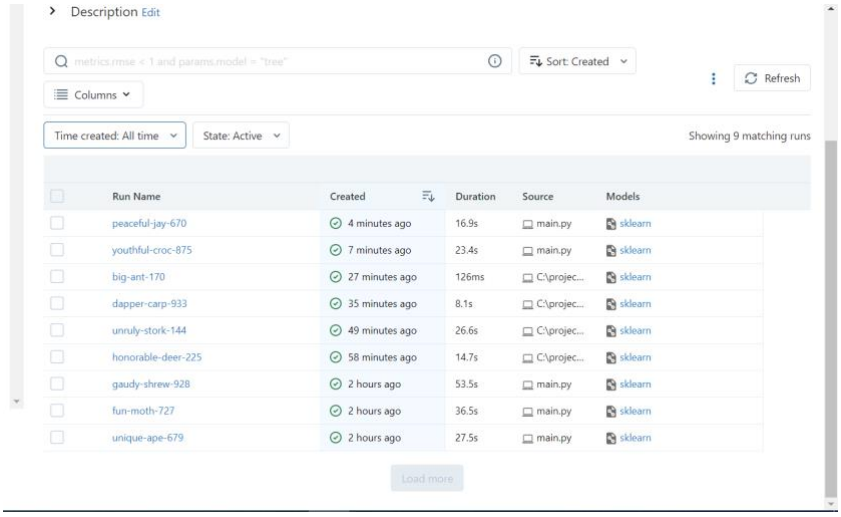
After loading the dataset, we went through some data pre-processing and analytic activities in the first stage. After that, we computed certain features from the given features using feature engineering, which we believe is crucial for this situation.

Step2: Data Splitting and model training

Here, we initially divided the dataset into a train set and a test set (80% and 20%, respectively), trained the ML model (RF), and saved the model in local directory.

Step3: Model prediction and MLFlow

In step 3, after receiving the model's prediction, we compute the performance matrix and save it along with the model's tuning parameters on the MLFLOW library. In this way, all of the findings from each experiment have been stored in the MLFLOW UI web page. MLFLOW offers a great technique to analyse the model and experiments based on different parameters, based on the outcomes value. I also attached few images of my experiment during and its integration with MLFLOW.



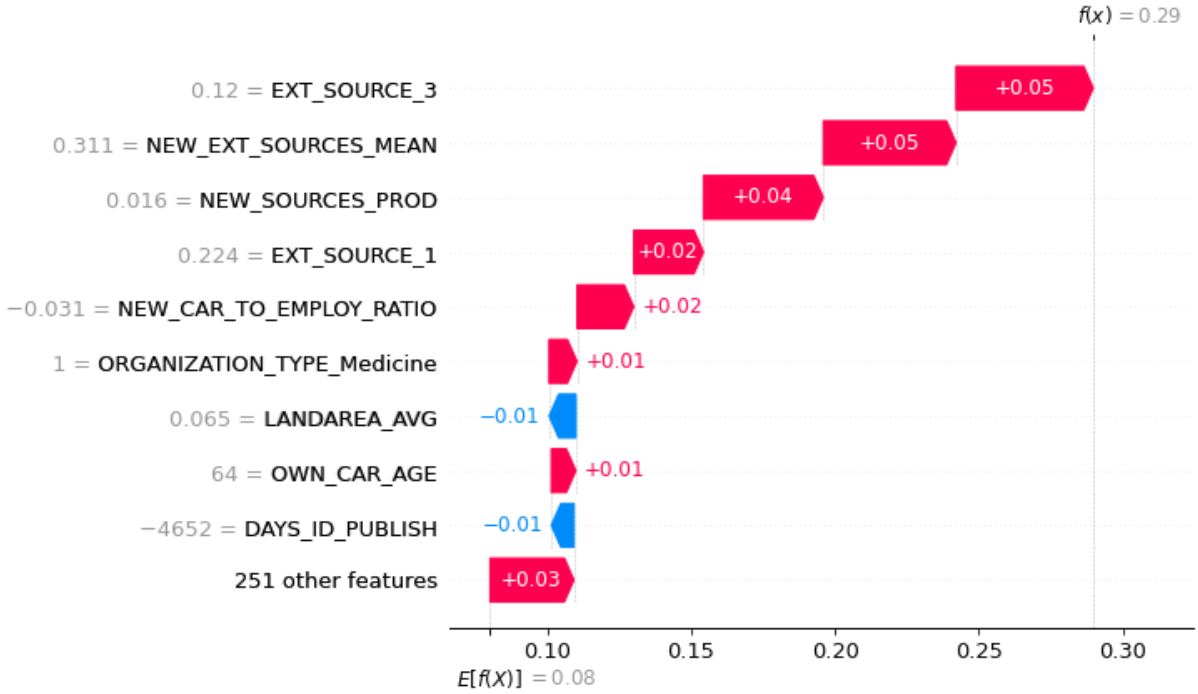
Part 3:

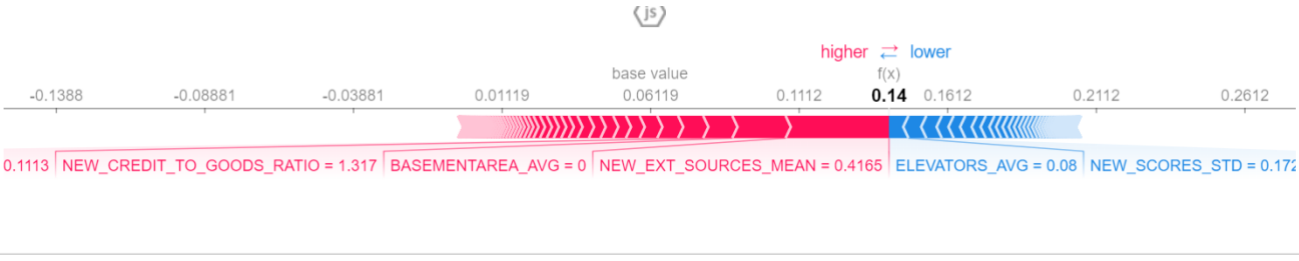
SHAP values can be used to determine the relative contributions of several model components to a specific prediction. Additionally, we can combine SHAP values to comprehend how the model predicts things generally. we can use SHAP values to pinpoint and depict crucial connections in our model.

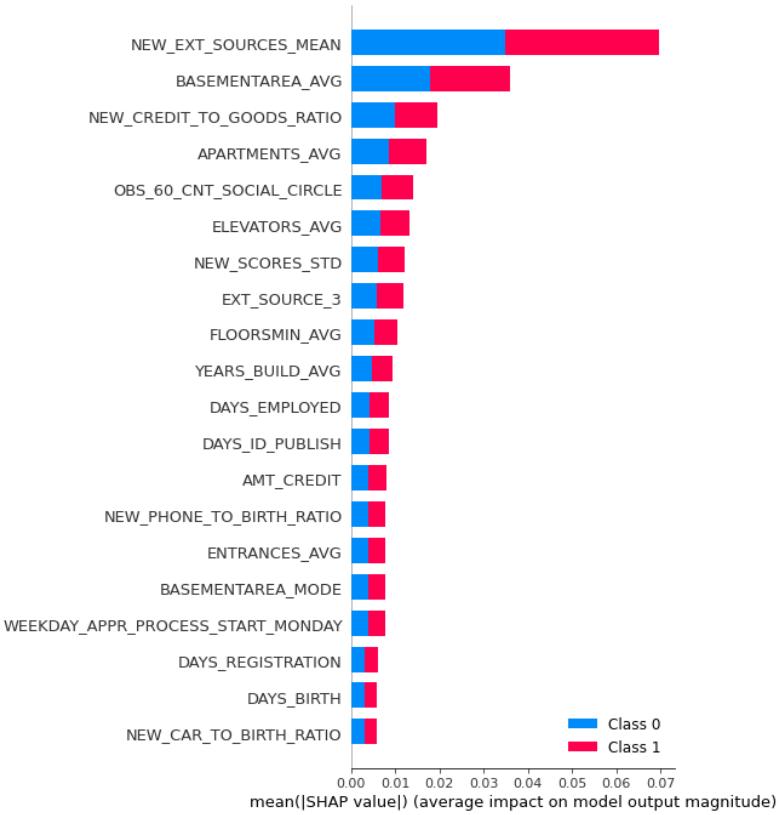
The basic **Steps** I took in SHAP module are:

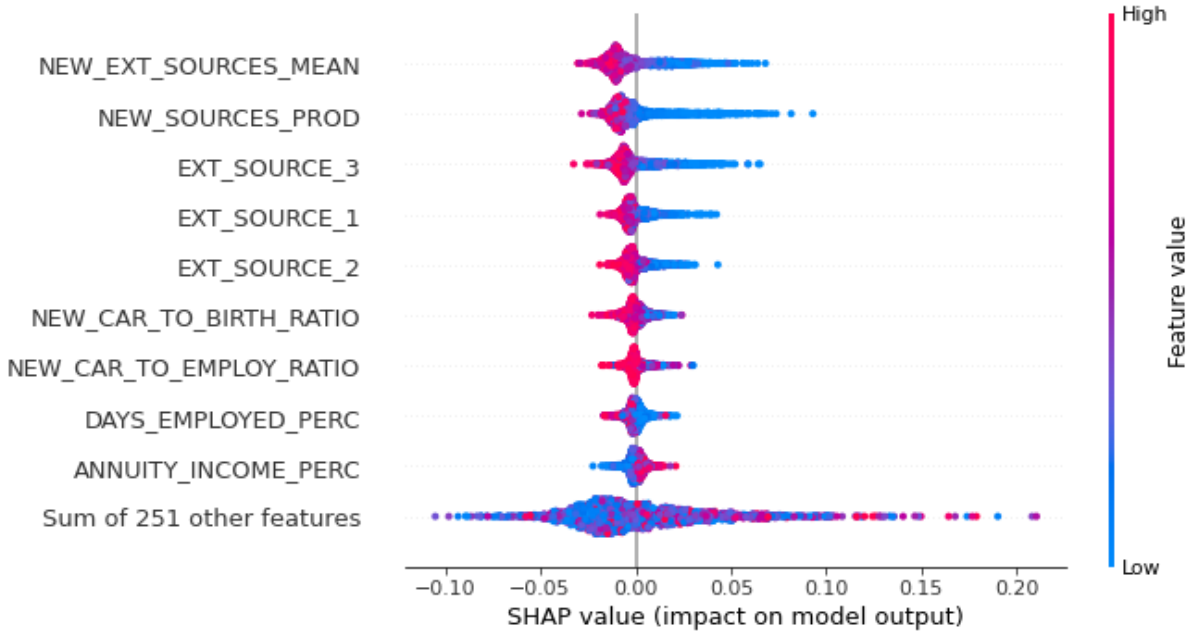
- Load dataset
- Pre-process and did some feature engineering
- Split Data set (Train and test)
- Train model
- Explainer (train model)
- Visualized and analysis features based on single sample, whole dataset, and class label

Here we attach few images as reference :






NEW_EXT_SOURCES_MEAN
BASEMENTAREA_AVG
NEW_CREDIT_TO_GOODS_RATIO
APARTMENTS_AVG
OBS_60_CNT_SOCIAL_CIRCLE
ELEVATORS_AVG
NEW_SCORES_STD
EXT_SOURCE_3
FLOORSMIN_AVG
YEARS_BUILD_AVG
DAYS_EMPLOYED
DAYS_ID_PUBLISH
AMT_CREDIT
NEW_PHONE_TO_BIRTH_RATIO
ENTRANCES_AVG
BASEMENTAREA_MODE
WEEKDAY_APPR_PROCESS_START_MONDAY
DAYS_REGISTRATION
DAYS_BIRTH
NEW_CAR_TO_BIRTH_RATIO
Class 0
Class 1
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07
mean(|SHAP value|) (average impact on model output magnitude)


NEW_EXT_SOURCES_MEAN
NEW_SOURCES_PROD
EXT_SOURCE_3
EXT_SOURCE_1
EXT_SOURCE_2
NEW_CAR_TO_BIRTH_RATIO
NEW_CAR_TO_EMPLOY_RATIO
DAYS_EMPLOYED_PERC
ANNUITY_INCOME_PERC
Sum of 251 other features
−0.10 −0.05 0.00 0.05 0.10 0.15 0.20
SHAP value (impact on model output)
High
Feature value
Low