

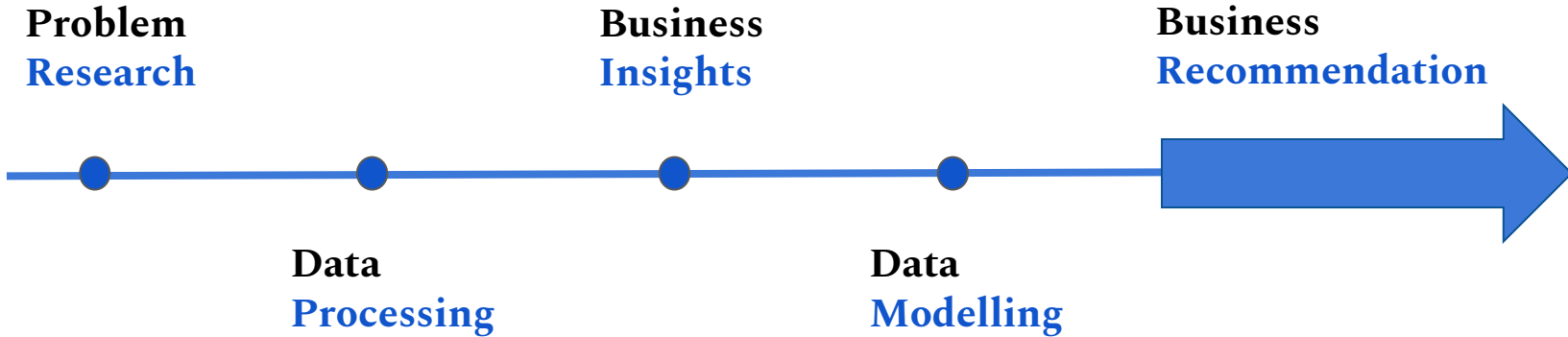
# **Credit Risk Analytics in Financial Services Study Case: ID/X Partners**


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**Written by Novrizal Roynanda**



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# Problem Research

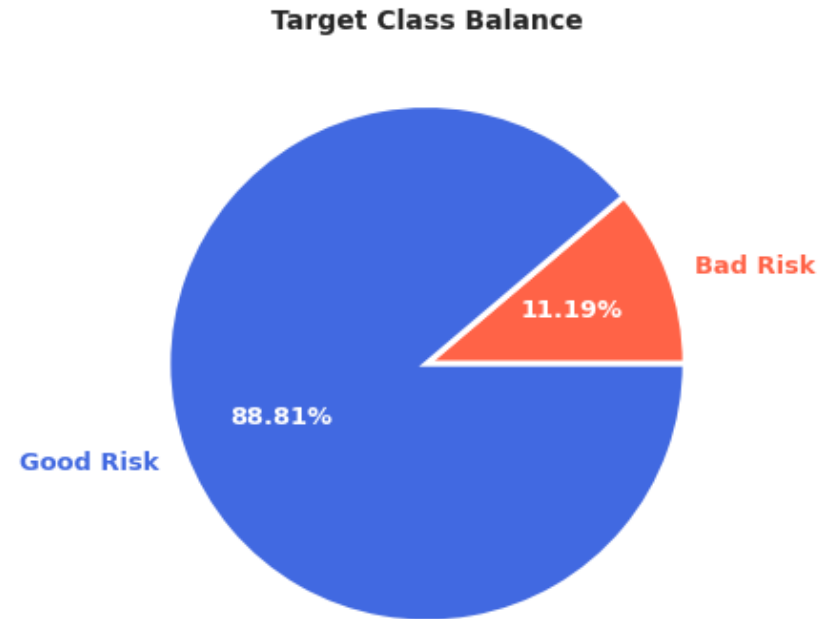
# Dataset Overview

## Loan Status Description

- **Fully Paid** means the loan has been fully repaid, either at the end of the loan term or earlier because of prepayment.
- **Current** means the applicants is making payments on time.
- **In Grace Period** is a set number of days after the due date during which payment may be made by the applicants without penalty.
- **Late** means a payment that has not been made by its cutoff time at the end of its due date.
- **Default** means that the applicant have failed to make sufficient payments for an extended period.
- **Charged Off** means if applicants been delinquent on their credit card or loan payments for several months.

## Create Target Class

- **Good Risk** class consists of **Fully Paid**, **Current**, and **In Grace Period**.
- **Bad Risk** class consist of **Default**, **Late**, and **Charged Off**.



# Problem Research

## Business Understanding

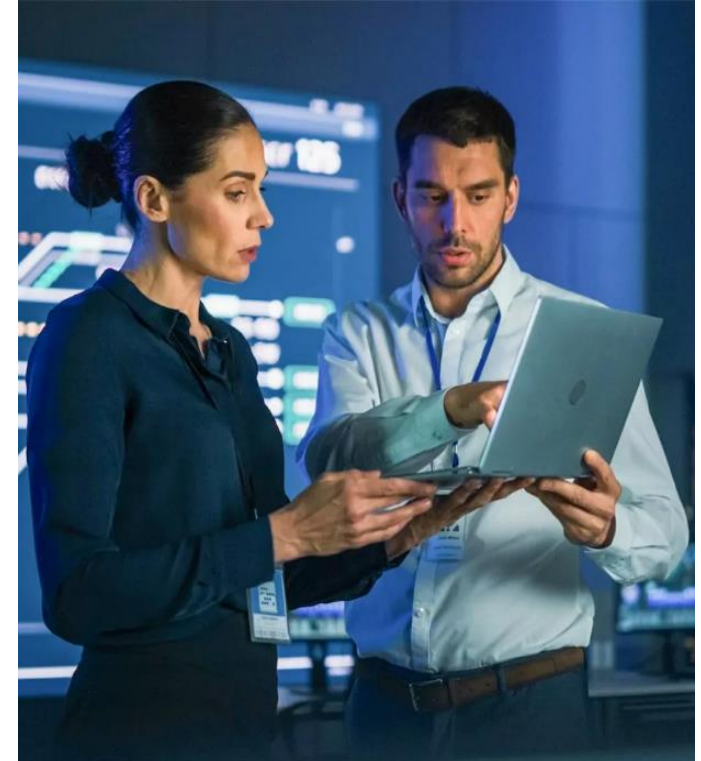
The data contains the information about past loans of applicants and whether they labeled as a good risk or bad risk.

## Problem Statement

Lending loans to bad risk applicants is the largest source of financial loss. Credit loss is the amount of money lost by the lender when the applicant refuses to pay or runs away with the money owed.

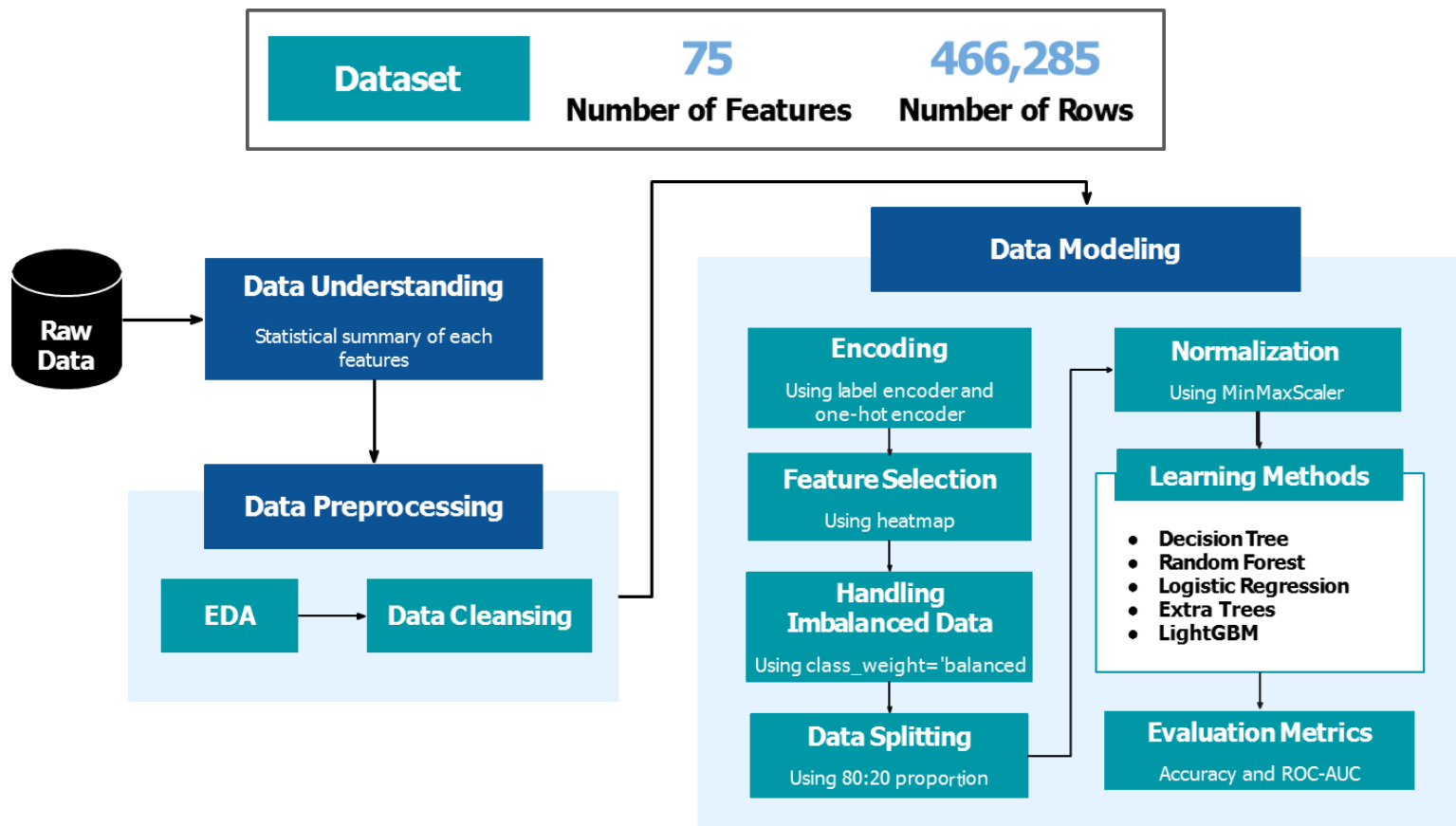
## Business Objectives

Identify patterns that indicate if a person is unlikely to repay the loan or labeled as a bad risk and implement machine learning algorithms to automatically predict whether the loan application submitted by the applicant will be labeled as a bad risk or not.





# Data Processing





# Business Insights



## Total Loss Based on Loan Status

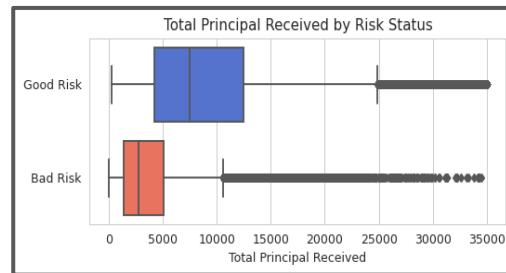
Loan Status	Total Loss	% Total Loss	Total Applicant	Average Loss
Charged Off	\$574,356,330	83.49%	43,236	\$13,284
Late	\$102,293,296	14.87%	8,118	\$12,600
Default	\$11,299,446	1.64%	832	\$13,581

The loan status of **Charged Off** is the biggest source of loss (**83%**) for the company with a total loss of **574 million** from **43,236 applicants**.

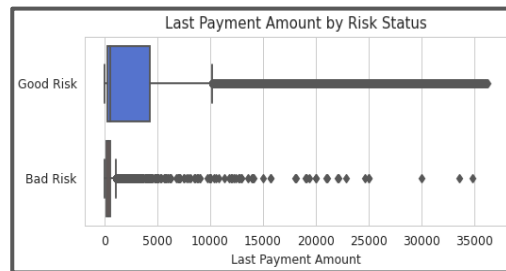
# Business Insights

## Total Principal Received by Risk Status

Bad risk loans tend to have lower principal received. It means applicants with low principal received are unlikely to repay the loan.



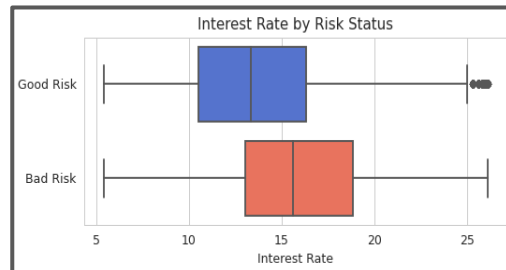
Last Payment Amount by Risk Status



## Last Payment Amount by Risk Status

Bad risk loans tend to have a lower amount of last payment. It means applicants with a low last payment amount are unlikely to repay the loan.

Interest Rate by Risk Status



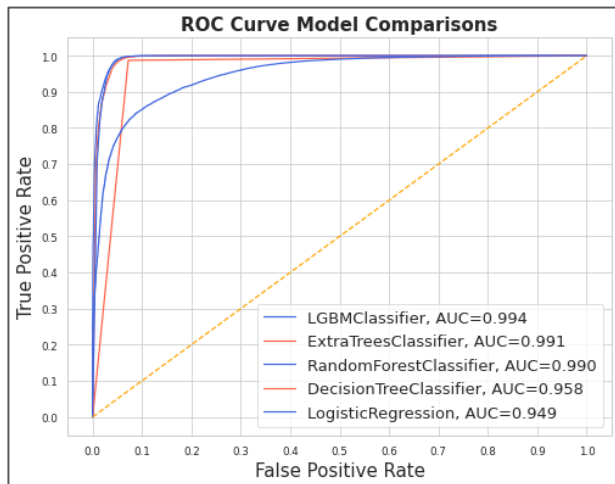
## Interest Rate by Risk Status

Bad risk loans tend to have higher interest rates. It means applicants with the high interest rate have a high chance of not being able to repay the loan.



# Data Modelling

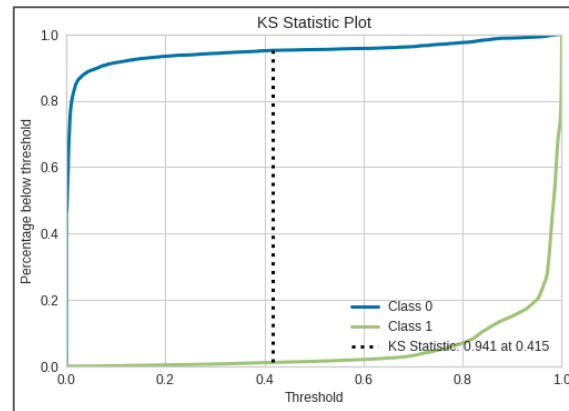
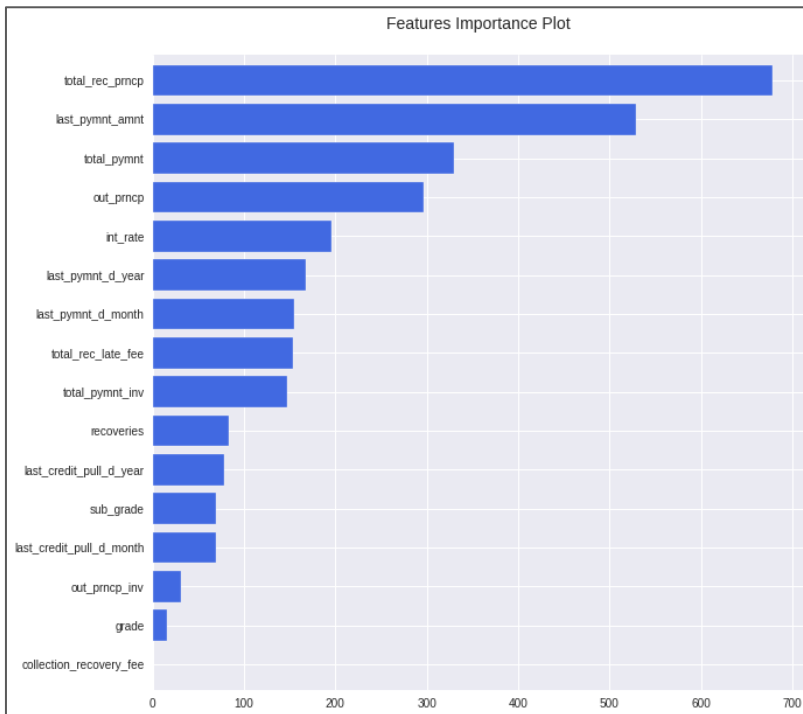
Algorithms	Training Accuracy Score	Testing Accuracy Score	Error Margin
Decision Tree	99.93%	97.99%	1.94%
Random Forest	99.95%	99.03%	0.92%
Logistic Regression	87.26%	85.16%	2.10%
Extra Trees Classifier	99.93%	98.86%	1.07%
LightGBM Classifier	98.49%	98.20%	0.20%



## Model Results

- The best model to predict the risk status of loan applications is **LightGBM Classifier**.
- Although, **Random Forest** has the highest accuracy scores, but **LightGBM Classifier** has the lowest error margin and has the highest ROC-AUC scores with **0.994**.

# Model Evaluation: LightGBM Classifier



- The higher KS value the higher significant good performance model. LightGBM Classifier KS value is **0.941**.
- Top 3 important features is **total principal received, last payment amount, and total payment**.



# **Business Recommendation**

# Business Recommendation

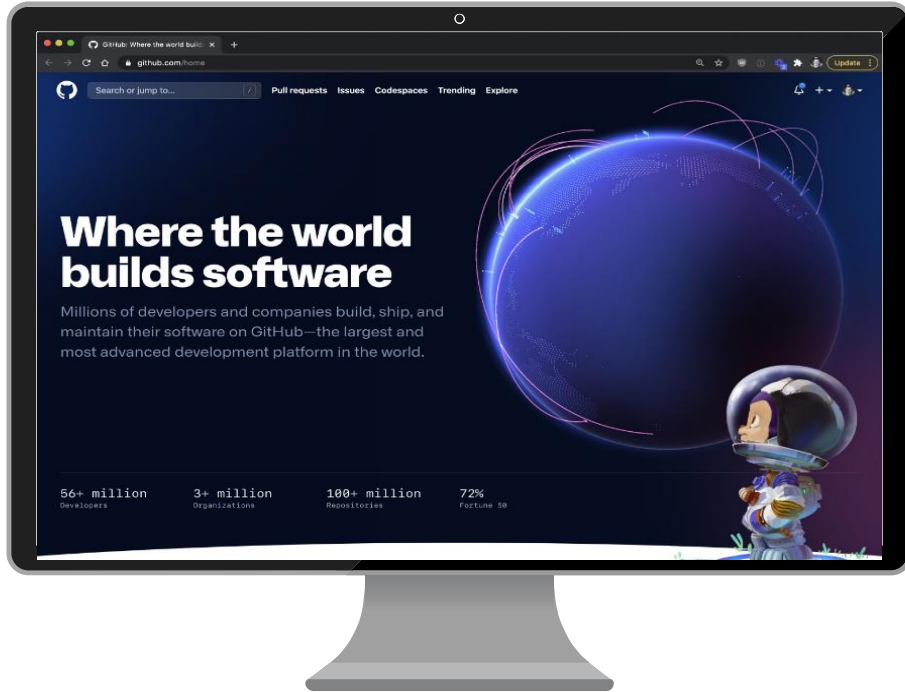
## Monitoring Evaluation

**Total principal received**, **last payment amount**, and **total payment** is the most important features to identify whether the applicant has the possibility of not repaying the loan. The company needs to monitor these indicators to reduce the risk of loss.

## Risk Mitigation

Mitigates the portfolio credit risks sufficiently to optimize the firm's accepted level of risks in the aggregate, including granting credit with specific credit conditions or even approving exceptional credit to borrowers who may not qualify within standard policies.





# Visit my github!

You can see the entire project documentation here from my github [@novrizalrnd](#)