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Credit Card Default Project

Architecture

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Abstract

Financial threats are displaying a trend about the credit risk of commercial banks as the incredible improvement in the financial industry has arisen. In this way, one of the biggest threats faced by commercial banks is the risk prediction of credit clients. The goal is to predict the probability of credit default based on credit card owner's characteristics and payment history.

Use of various classification models like Decision Tree, Random Forest, XGBoost, MLPClassifier was done. XGBoost was selected as best model from above. The XGBoost model provided 82.63% accuracy in training. Testing accuracy for model was 82.3%. 80% data was used for training and 20% data was used for testing.

After Providing various details the model will predict whether customer will default next month or not. Model will also predict probability of default.

1 Introduction

1.1 Why this Low-Level Design Document?

The goal of LLD or a Low-level design document is to give an internal logical design of the actual program code for the Credit Card Default Probability Prediction. LLD describes the class diagrams with the methods and relations between classes and the program specs. It describes the modules so that the programmer can directly code the program from the document.

1.2 Scope

Low-level design (LLD) is a component level design process that follows a step-by-step refinement process. This process can be used for designing data structures, required software architecture, source code and ultimately, performance algorithms. Overall, the data organization may be defined during requirement analysis and then defined during data design work.

1.3 Definitions

Term	Description
IDE	Integrated Development Environment
EDA	Exploratory Data Analysis
XGBoost	Extreme Gradient Boost Algorithm
ML	Machine Learning
MLP Classifier	Multi-Layer Perceptron Classifier
KNN	K-Nearest Neighbours
VS Code	Visual Studio Code

2 Technical Specification

2.1 Dataset Overview

For training and testing the model I used a publicly available dataset on Kaggle. This dataset contains information on default payments, demographic factors, credit data, history of payment, and bill statements of credit card clients in Taiwan from April 2005 to September 2005.

URL - https://www.kaggle.com/datasets/uciml/default-of-credit-card-clients-dataset

Variable Name	Measurement Unit	Description
LIMIT_BAL	NT Dollar	Amount of given credit
SEX	Integer	Gender (1=male, 2=female)
EDUCATION	Integer	1=graduate school, 2=university, 3=high school, 4=others, 5=unknown, 6=unknown
MARRIAGE	Integer	Marital status (1=married, 2=single, 3=others)
AGE	Years	Age of the person in years
PAY_0-6	Integer	Repayment status for various months
BILL_AMT1-6	NT Dollar	Amount of billed statements for various months
PAY_AMT1-6	NT Dollar	Amount of Previous payments done
default.payment.next.month	Binary	Will Customer default? Yes/No

2.2 Predicting Credit Card Default

The web application must be loaded properly for the users without any technical glitches like server timeouts.

- It must display the input fields and the “Predict” button to the users who accessed the application and allow the user to enter the values with respect to the attributes of the customer.
- The user gives the required information.
- Then the application should be able to predict Default and the probability of default based on the information given by the user about the customer.

2.3 Logging

We should be able to log every activity done by the user.

- The system should be able to log every step in the program flow.
- System should not be hung even after using so many loggings.
- Logging makes debugging much easier, like we can directly go to that specific line of code, having bugs.
- In this project, logs will be written in the files “logfile.txt” in the log folder of filesystem.

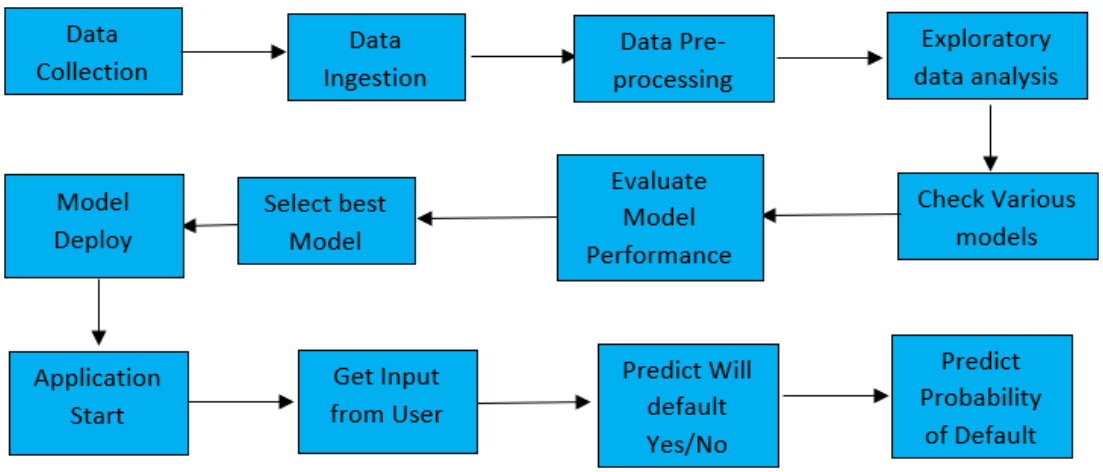
3 Technology Stack

Front End	Dash by Plotly
Back End	Python Version 3.10.7, Dash Library Call-back decorator
Deployment	Heroku, Gunicorn

4 Proposed Solution

The solution proposed here is a web application, which takes the details of the customer and those details will be taken by a machine learning model in the backend, which will then predict whether customer will default and the probability of default and display it on the front-end page of the user.

5 Workflow



6 Model Feature Importance