MANIPAL UNIVERSITY
JAIPUR

A Progress Report

on

Credit Card Approval System

carried out as part of the course: AI2270

Submitted by

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IV-AIML

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BACHELOR OF TECHNOLOGY

In

Computer Science and Engineering(AIML)

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School of Computer Science & Engineering

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Registration No. **Student Name**

MANIPAL UNIVERSITY
JAIPUR
(University under Section 2(f) of the UGC Act)

Department of Computer Science and Engineering

School of Computing & Information Technology

Date: _____

CERTIFICATE

This is to certify that the project entitled "***Credit Card Approval System***" is a bonafide work carried out as ***Project Based Learning (Course Code: AI2270)*** in partial fulfillment for the award of the degree of Bachelor of Technology in CSE-AIML, under my guidance by ***Anany Shailan, Om Satyam Panda , Kushar Bajaj*** bearing registration number 229310172,229310076,229310126, during the academic semester *VI of year 2022-23.*

Place: Manipal University Jaipur, Jaipur

Name of the project guide: _____

Signature of the project guide: _____

Abstract

The goal of this project is to estimate customer credit card eligibility using machine learning (ML) techniques in order to mitigate future credit risk that could negatively impact the bank's credit performance and financial stability. A credit card is a type of credit facility that banks and other financial institutions offer to their customers worldwide. The credit facility exposes banks and other financial entities to credit risk. There is rarely a guarantee on repayments, and the loan often ends up as a non-performing credit facility (NPL). Banks evaluate applicants' eligibility and creditworthiness prior to granting a credit facility in an effort to lower credit risk.

Contents

Introduction

Commercial banks support economic growth in several ways. For every banking or financial institution, one of the most significant sources of income is the interest paid on loans. In all of their lending, banks are required to assume the largest credit risk. Banks provide their customers a range of borrowing options.

Conversely, credit cards represent one of the most significant lending tools available to any bank. The majority of financial institutions worldwide are facing challenging times and increased credit risk when it comes to lending money to its final customers.

There is rarely a guarantee on repayments, and the loan often ends up as a non-performing credit facility (NPL). Because credit cards include some credit risk, banks and other financial institutions carefully consider a customer's eligibility for a credit facility before extending one. Verification, validation, and approval are steps in this process that could cause a delay in the issuance of a facility, which would be bad for the bank and the applicant.

Credit officers decide whether borrowers can meet the conditions for a facility, and their judgements and projections are never correct. Credit scoring is a classic way of determining a customer's or entity's trustworthiness when applying for a bank credit facility.

When issuing a credit card to a client in the past, banks had to rely on the applicant's background and history to determine the applicant's creditworthiness. The procedure includes scrutinising application data using reference papers, which was not always precise, and both consumers and the bank had difficulty approving the credit card. However, with the digital transition, there has been an increase in Artificial Intelligence and Machine Learning Technology during the last two decades. As a result, machine learning approaches are being utilised to analyse credit risk and automate credit scoring by properly predicting consumer eligibility

Objective of the project

The primary aims of machine learning-based credit card acceptance prediction are to enhance the effectiveness, precision, and impartiality of the credit card approval procedure. Here is a thorough breakdown of the aims and objectives. Streamlining and speeding up the credit card approval procedure is one of the main goals. Conventional approaches frequently need manual evaluation and review, which can take time and cause delays in the processing of applications. The objective is to automate the decision-making process and minimize the time and effort needed for manual reviews by putting machine learning models into practice. As a result, applicants would receive their applications more quickly, and overall operational efficiency would increase. Improving the accuracy of credit card approval decisions is another goal.

Large amounts of applicant data from the past can be analyzed by machine learning algorithms, which can then be used to find trends, correlations, and creditworthiness indicators. The models hope to decrease the possibility of human biases and errors while increasing prediction accuracy by utilizing these patterns. Enhancing the accuracy and consistency of credit card approval decisions is the aim, with the goal of approving worthy applicants while lowering the likelihood of defaults. When predicting credit card approval, fairness is a key goal. By reducing the possibility of prejudice and guaranteeing an impartial assessment of credit card applications, machine learning models can be used. The objective is to eradicate or minimize discriminatory practices that might exist in manual decision-making processes by utilizing a wide variety of characteristics and training the models on representative datasets.The objective is to create a system that treats all applicants fairly and evaluates their creditworthiness based on objective criteria, regardless of personal attributes such as gender, race, or ethnicity.

Machine learning models can identify relevant risk factors that contributeto credit card defaults. By analysing historical data, the models can uncover patterns and correlations that indicate potential risks. The goal isto provide insights to financial institutions about the specific factors that increase the likelihood of defaults, such as high debt-to-income ratios or past payment delinquencies. This information can assist in making informed decisions, setting appropriate credit limits, and managing credit card portfolios more effectively.

Brief description of project

The credit card approval system utilizes a neural network model to assess credit card applications and predict approval outcomes. The system takes various input parameters such as income,employment status, and others,and processes them through the neural network to generatea probability of approval. Users can submit their application through the system, and receive instant feedback on their application status.

Key Steps:

1. Data Collection and Preprocessing: Gather a dataset containing information about past credit card applicants, including features such as income, age, employment status etc. Preprocess the data by handling missing values, encoding categorical variables, and scaling numerical features to ensure compatibility with the neural network model.
2. Model Training: Design and train the neural network model using the training data, configuring it with two hidden layers, each employing ReLU activation functions to introduce nonlinearity into the model. Adjust hyperparameters such as learning rate, batch size, and the number of neurons in each layer through experimentation and validation to optimize model performance.
3. Model Evaluation: Evaluate the trained model's performance using the testing dataset, measuring metrics such as accuracy, precision, recall, and F1-score to assess its ability to correctly classify credit card applicants as approved or rejected.
4. Deployment: Deploy the trained model into a production environment where it can be integrated into the credit card approval system. Develop an interface or API through which new applicant data can be inputted, and predictions on credit card approval can be generated in real-time.
5. Monitoring and Maintenance: Continuously monitor the performance of the deployed model in production, collecting feedback and updating the model periodically to adapt to changes in the underlying data distribution and improve accuracy and reliability over time.

By leveraging neural networks with ReLU and sigmoid activation functions, this project offers a robust and scalable solution for automating the credit card approval process, enhancing efficiency, and minimizing human bias

Technology used

ProgrammingLanguage:Python(pandas,numpy,matplotlib)

Neural Network Framework: Scikit and Tensorflow

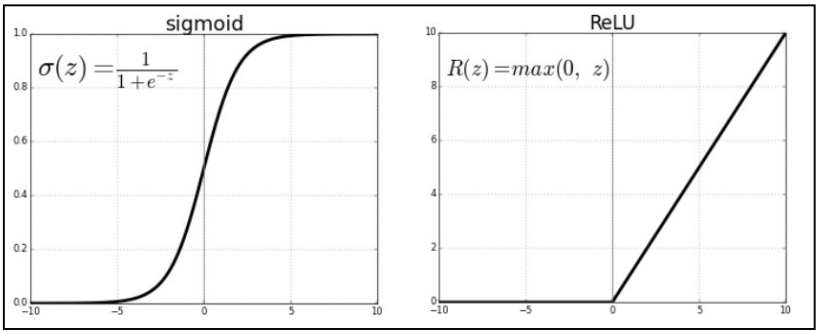
Hardware Requirements

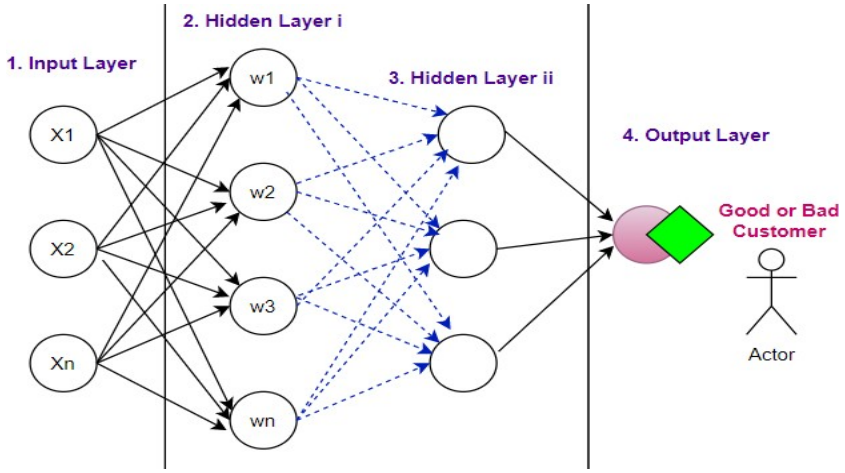
Sufficient RAM and CPU resources for training andinference

Software requirements

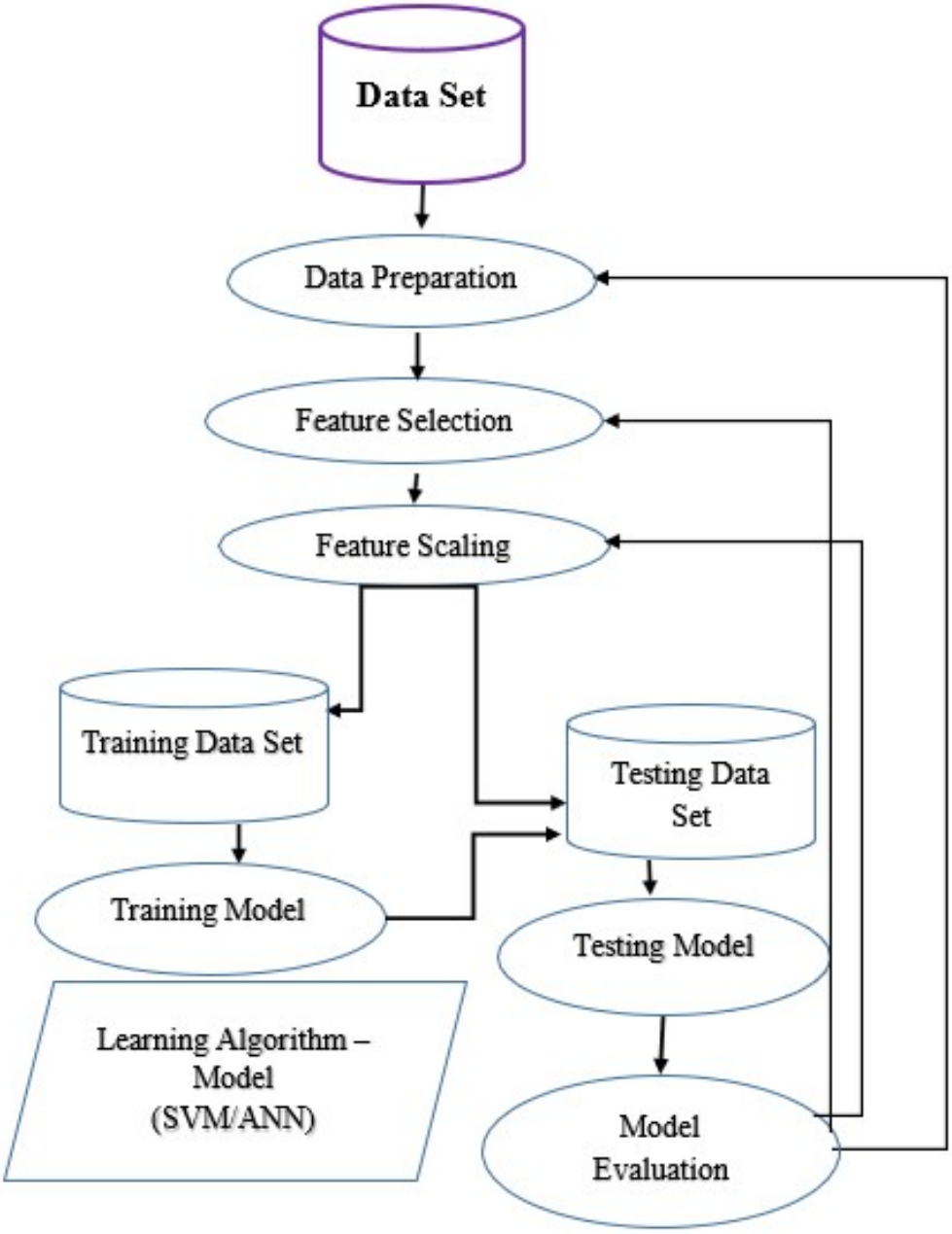
Operating System: Linux, Windows, or macOS
Python interpreter
Neural network framework and dependencies

Design Description

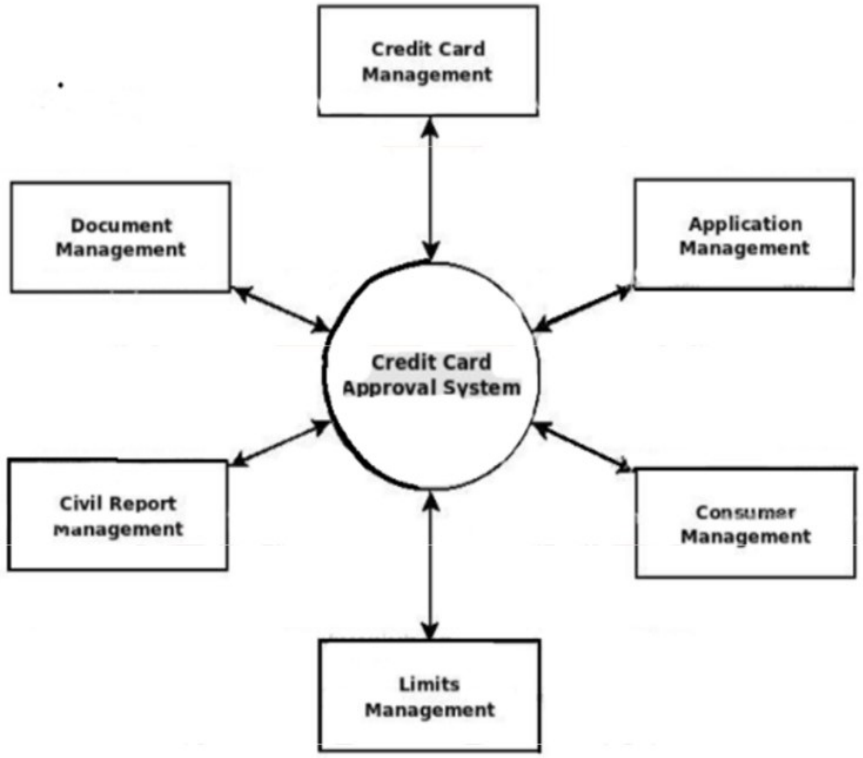




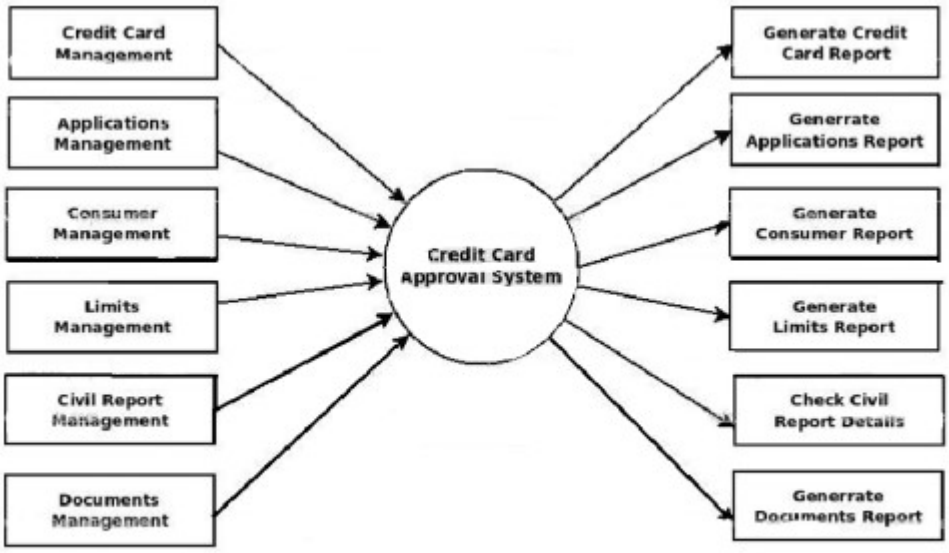
Flow Chart


Data Set
Data Preparation
Feature Selection
Feature Scaling
Training Data Set
Testing Data Set
Training Model
Testing Model
Learning Algorithm – Model (SVM/ANN)
Model Evaluation

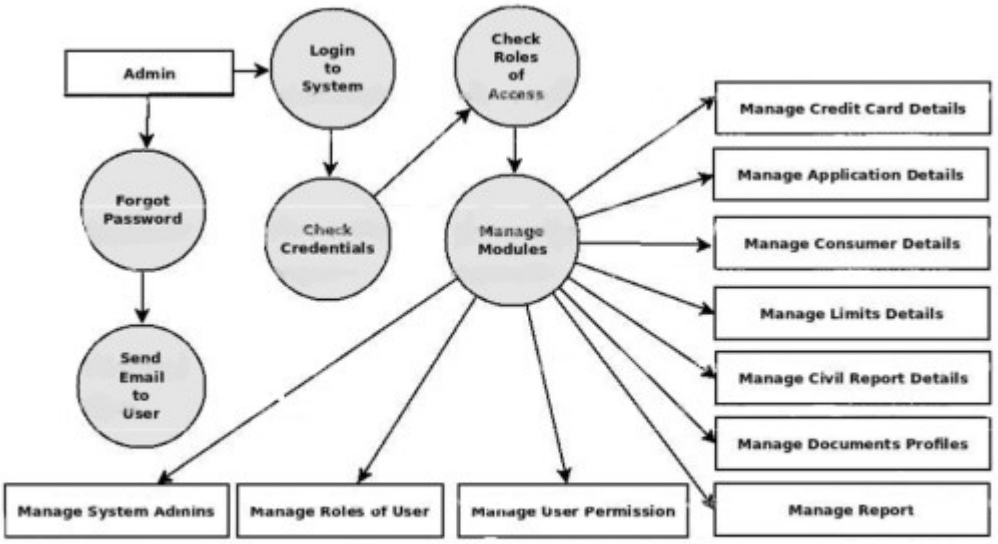
Data Flow Diagram



Zero Level DFD - Credit Card Approval System



First Level DFD - Credit Card Approval System



Second Level DFD - Credit Card Approval System

Project Description

Credit card approval is an important part of finance today and facilitates access to credit while managing risk.Traditional methods are often unreliable and error-prone. Blended machine learning (ML) offers the promise of decision-making and analyzing big data to accurately measure credit worthiness. This introduction provides an overview of the evolution of credit card authorization, highlighting the benefits machine learning brings in terms of efficiency, accuracy, and integrity.

Machine learning algorithms can analyze large amounts of data to identify patterns in the credit card approval process and make predictions for decision-making. Machine learning models can create greater credit and personality assessments of applicants using different types of data, such as financial history and behavior.

Neural Network (NN) is evolved from biological neural network of human brain. It is deep learning algorithm and use as information processing technique. We can use NN not only for a classification problem but also regression. Neural network may contain 3 layers as follows: Model Evaluation Data Set Testing Data Set Testing Model Learning Algorithm – Model (NN) Data Preparation.

Feature Selection Feature Scaling Training Data Set Training Model

• Input Layers – Raw information feed as input to the network

• Hidden Layer – Input unit and weight. There can be many hidden layers.

• Output Layer –This layer depends on hidden layer and weights or input layer. Prediction related to response variable return in output layer.

Future scope

Integration with additional data sources for more accurate predictions

Implementation of advanced neural network architectures for better performance

Expansion to include other financial products such as loans and mortgages

We realized that customer behavior might be different country to country and application of several real banking datasets can be considered for further studies. To consider default customers not only their demographic and socio-cultural data but also other existing credit facilities information such as other loans can be taken as features to get more accurate results.

This data set was generated before the pandemic situation. During the current pandemic

situation of Fraud there is an increase of defaulters and their paying behaviors are different than before the pandemic.

Economic conditions have changed due to the pandemic Application of data sets including Fraud impact under new normal to be an area of concern for researchers.

Conclusion

The credit card approval system using neural networks offers an efficient and reliable solution for automating the approval process. By leveraging machine learning techniques, the system can provide accurate predictions andstreamline the application process, leading to improved customer satisfaction and operational efficiency. We have obtained the publically available data set and explanatory analysis was carried out to understand the data set. Then conducted several activities related to data preparations such as data preprocessing, feature selections and feature scaling. To achieve a desired outcome, it is very important to carry out these activities accurately. We have divided the data set into two parts as a training and test data set and the intended purpose is to validate the accuracy of the model. Accuracy is 0.90, Precision is 0.81, Recall is 0.73 and AUC is 0.79 with a higher learning rate of 0.01. Accuracy is 0.76, Precision is 0.76, Recall is 0.74 and AUC is 0.85 with a lower learning rate of 0.001. Precision and recall values are high in higher learning rate. Smaller batch size provides a slower learning process. However, a small learning rate gave better AUC at 0.85 for NN compared to high learning rate.

Bibliography

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Krish Naik and Andrew Ng for learning ml and nn.