UNIVERSITY OF BIRMINGHAM

School of Computer Science
College of Engineering and Physical Sciences

MSc. Project

Machine Learning & Deep Learning Approaches to Predict Credit Card Default

Submitted in conformity with the requirements
for the degree of MSc. Artificial Intelligence & Computer Science
School of Computer Science
University of Birmingham

Sarathkumar Padinjare Marath Sankaranarayanan
Student ID: 2359859
Supervisor: Dr.Kashif Rajpoot

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Abstract

The material contained within this report has not previously been submitted for a degree at the University of Birmingham or any other university. The research reported within this report has been conducted by the author unless indicated otherwise.

Keywords Credit Card Default Prediction, Ensemble Learning

Sarathkumar Padinjare Marath Sankaranarayanan

Declaration

The material contained within this report has not previously been submitted for a degree at the University of Birmingham or any other university. The research reported within this report has been conducted by the author unless indicated otherwise.

Signed Sarathkumar Padinjare Marath Sankaranarayanan

Sarathkumar Padinjare Marath Sankaranarayanan

"You have to learn the rules of the game.
And then you have to play better than anyone else"

Albert Einstein

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1 Introduction

The objective of this project was to create a machine learning model to predict credit card default on an industrial-scale dataset. 7 different machine learning models & 3 deep learning architectures were explored during the experimentation phase.

1.1 Definitions

This section introduces definitions for terms that are important for understanding the problem.

1.1.1 Credit Card Statement Date

The credit card statement date is the date on which the statement/bill is generated every month. Any transaction conducted on the card post billing date will reflect in the next month's credit card statement.

1.1.2 Delinquent Account

A credit card account is considered delinquent if the customer has failed to make the minimum monthly payment for 30 days from the original due date.

1.1.3 Delinquency Rate

The percentage of credit card accounts within a financial institution's portfolio whose payments are delinquent.

$$DelinquencyRate = \left(\frac{Numberof DelinquentCreditCardAccounts}{TotalNumberofCreditCardAccount} \right) * 100 \tag{1}$$

1.1.4 Credit Card Default

The customer is considered as defaulting customer in the event of nonpayment of the due amount in 120 days after the latest statement date.

1.2 Motivation

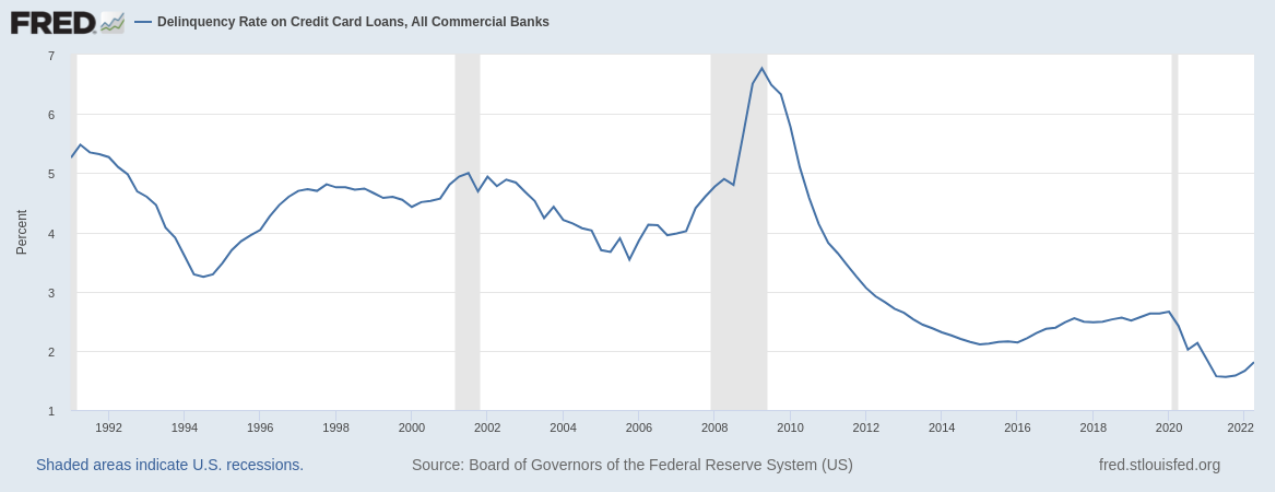

Figure 1: Delinquency rate on credit card loans for the period 1992-2022(Board of Governors of the Federal Reserve System (US) 2022).

1.3 Aim & Approach

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1.4 Structure of Report

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2 Background Knowledge

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6.1 Summary

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7 Conclusion & Summary

asfsf

7.1 Summary

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References

Board of Governors of the Federal Reserve System (US) (2022), 'Delinquency Rate on Credit Card Loans, All Commercial Banks [DRCCLACBS]', Available: `https://fred.stlouisfed.org/series/DRCCLACBS`. Data retrieved from FRED, Federal Reserve Bank of St. Louis;.

8 Appendix One: Code

8.1 Directory Structure

8.2 Running the Provided Code