

AI-Powered Loan Default Prediction using Explainable AI

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Abstract: Loan default prediction is a critical task in the banking and financial sector, as it directly impacts profitability and risk management. Financial institutions must accurately evaluate a borrower's ability to repay a loan to minimize Non Performing Assets (NPAs) and financial losses. Traditional credit evaluation methods are often manual, time consuming, and lack the ability to analyze complex patterns in large datasets.

This project presents an AI driven Loan Default Prediction System using Machine Learning and Explainable AI (XAI) to enhance the decision making process. The system utilizes the XGBoost (Extreme Gradient Boosting) algorithm, known for its high performance and efficiency, to predict whether a borrower is likely to default on a loan. The model is trained on a structured dataset containing key financial attributes such as age, income, credit score, loan amount, employment history, debt to income ratio, and previous defaults.

A key feature of this system is the integration of Explainable AI, which ensures transparency by providing clear, rule based insights into the model's predictions. Instead of acting as a black box, the system highlights important risk factors such as low credit score, high debt ratio, or past defaults, enabling bank officers to understand and trust the AI's decisions.

The solution is implemented as a highly interactive web application using Streamlit, featuring multiple modules such as executive dashboard, advanced exploratory data analysis (EDA), model performance monitoring, real time risk prediction, and automated PDF report generation. The system provides a professional, user friendly interface designed to simulate a real banking risk analysis environment.

Overall, this project demonstrates how modern AI techniques can improve credit risk assessment by making it faster, more accurate, and transparent. It has practical applications in banks, NBFCs, and fintech platforms, and can be further extended with real time data integration and cloud deployment for large scale usage...

Keywords: Loan Default Prediction, Machine Learning, Explainable AI (XAI), Credit Risk Assessment, XGBoost Algorithm, Financial Analytics, Risk Modeling, Data Analysis

