INTEGRATED WEB BASED LOAN MANAGEMENT SYSTEM USING MACHINE LEARNING MODEL

P. Prem Priya¹, Dr. P. Durgadevi², M.V.S.L Tejasri³, Sherine Glory J⁴

¹ Assistant Professor, Department of Computer Science and Engineering, RMK College of Engineering and Technology, (prempriya@rmkcet.ac.in)
² Assistant Professor (Sr.G), Department of CSE, SRM Institute of Science and Technology, Vadapalani Campus, No 1. Jawaharlal Nehru Road, Vadapalani, TN, India. (durgadeep@srmist.edu.in)
³ Assistant Professor, Department of Information Technology, Dr MGR Education And Research Institute, (tejasri.it@drmgrdu.ac.in)
⁴ Assistant Professor, Department of Computer Science and Engineering Rajalakshmi Engineering College, (sherinegloryj@gmail.com)

ABSTRACT
In an ever-changing market, where loan default rates are steadily rising, it's getting increasingly difficult to maintain loan information and mitigate the dangers of loan defaulters. There are many lenders and borrowers, particularly in rural areas, whose information is difficult to keep track of. There's a good chance the borrower's information and transaction details may be lost. They also do not have direct access to the borrower's information. Only the lender has access to the borrower's loan information. In light of these developments, this study presents a machine learning approach for lenders using a web-based loan management system that can accurately anticipate potential loan defaulters. Integrating prediction and management features allows the lender to maintain track of the loan process and properly identify loan defaulters, preventing future loss. Storing loan information in an information system allows the lender and borrower to keep track of transaction details and avoid errors. Multiple lending portfolios can be created on a single platform with the help of a loan management system.

Keywords: Machine Learning, Defaulters, Prediction, Transaction, Loan Management.

I. INTRODUCTION
With technological advancements, the use of information systems to store data in a digital format is becoming a valuable resource in every firm. The data that is kept in a digital format is usually arranged. This guarantees that data is stored in a way that can be retrieved quickly. It also makes data more accessible via the internet from even the most remote locations.

The usage of an automated management system has replaced human loan recording and calculation with an automated method. This cuts down on the time it takes to maintain the system and fix any manual errors that arise during the process. The automated technology reduces human mistake and ensures the highest level of accuracy.

The implementation of a web-based system has also boosted the system's users' contentment. Data is now available wherever, anytime, and easily observable because it can be seen transparently rather than being kept in a remote location.

With the advancement of technology, it is now possible to incorporate security features into the web-based system. Security is implemented in the system in a variety of ways. It begins with basic user authentication in order for them to log into their accounts. It also includes role-based data access for the highest level of protection.

The use of machine learning into a loan management system aids in the processing of day-to-day transactions, ranging from member record administration to loan assessment with client information. The use of machine learning to forecast a customer's ability to repay a loan on time adds value to a traditional information system.
II. LITERATURE SURVEY

In the realm of banking, loan repayment is a very important and talked-about topic. Furthermore, this topic has garnered even more attention and significance as a result of recent developments in the fields of machine learning, data science, and numerous key innovations. Many notable discoveries have been made in this area, serving as a springboard for further study and studies.

The following are some of the notable discoveries in terms of loan repayment prediction and data storage:

People are willing to replace traditional paper-pencil systems in processing customer transactions such as member records and loan applications if system automation is implemented [1].

The general consensus is that the existing system will be replaced by system automation, which will deliver effective and efficient transactions in a secure environment that is accessible from a variety of devices. [1]

People, on the other hand, preferred to have their signatures appended in order to maintain the security of the loan application procedure. [1]. In order to store and manage records, several information systems have been developed in many domains. However, a web-based transaction that focuses on both record administration and loan assessment is lacking.

For categorization issues, Logistic Regression is a common and helpful machine learning approach. Logistic regression has the advantage of being a predictive analysis.

As the outcome is binary, either 0 or 1, the model development for prediction is taken into account using the sigmoid function in logistic regression [2][3].

III. EXISTING SYSTEM

The usage of web technology to maintain loan details online is a crucial feature that rural areas lack. Rural communities still rely on word of mouth to keep track of borrower information, resulting in a large number of borrowers being defrauded. The current system, which is only available in a few locations or banks, is also not totally automated and relies heavily on manual loan management. The stored data is also not completely clear to the borrower. Manual maintenance takes time and can result in human error. Because any data loss cannot be reversed, this approach is not totally reliable.

The data that is saved digitally is also not in a format that is easily retrievable. This can cause data retrieval and processing to be delayed. Customer unhappiness and loss of customer bonding might result from data not being available to them.

The information is not stored securely and could be viewed by anyone. Because the data is only available in one location, it is also a challenge in terms of dependability and availability. There is also no user-friendly interface for accessing these data in an easy and straightforward manner.

It takes a lot of time and effort to edit or modify data. Human effort, which is accompanied by human error, is included in this category. There's also the possibility of duplicate data, which can lead to errors when data is modified in an inefficient or disorganised manner. Furthermore, there is no method to prevent the use of erroneous data. After the lender has completed its examination of the form, the consumer is alerted of the invalid data. There is a waste of time and energy as a result of this.

The system does not have an automatic way of determining whether or not a customer will be able to repay the loan. This results in a high number of loan defaulters, which can result in a significant loss for the lender and his firm. The automated method of predicting will also aid in determining the maximum loan amount that can be offered to borrowers depending on the information they submit. The user's salary, age, and other information are used to estimate the repayable loan amount.

Even while these different techniques for projecting loan payback may be accessible in some regions, there is no way to combine them. This can lead to the employment of various platforms for a single task, which might take a long time. During the shift from one platform to another, there may be issues.
The current system can store information in digital form, but not in a format that is easily retrievable or readable. This results in underutilization of data and inability to get data at the critical time.

IV. PROPOSED SYSTEM

The suggested system consists of a web-based loan management system with machine learning algorithms integrated.

Lender and borrower modules make up the web-based loan management system. Each lender and borrower will be able to save their information and keep track of their loans. Both have their own logins, and access is granted based on their positions. This allows consumers to obtain only the info they require while maintaining data confidentiality.

![Figure 1 Block Diagram of Loan Management System](image)

In their login, the lender can see a list of borrowers, their transactions, and loan data. They also have the ability to forecast loan payback based on the information provided by the customer. The information provided is fed into a machine learning algorithm, which calculates the likelihood of payback in percentage. The lender can use the percentage to determine whether or not to lend to a certain consumer or to reduce the loan amount to an amount that they can readily repay.

Before a loan is issued to a borrower, the lender uses machine learning to analyse the borrower's ability to repay the debt. The borrower will also be able to examine and determine the loan amount that they can repay quickly and easily.

Borrowers can keep track of the lenders from whom they have borrowed money. They may have information on the amount to be owed to each lender as well as the due date for each payment. They can also look at the transactions that took place between them and their lenders. This allows customers to keep track of all the facts themselves rather than relying on the lender for this information. This also aids in the transparency of loan facts, ensuring that they are not easily duped by lenders.

The web-based system not only saves the information, but it also calculates the amount to be returned over time using the interest rate specified. It automatically updates and displays the total amount due to the borrower at this time, based on the loan's interest rate.

Both the lender and the borrower will be given a unique id that they will use to access their accounts. This allows them secure access to their account while also maintaining the essential data abstraction between the lender and the borrower. To strengthen the security and secrecy of the information saved in the web-based system, the Id is used in conjunction with a password.
In addition, the web-based loan management system has a mail feature. As a reminder, a mail is sent to the borrower on the due date of the next loan repayment. This allows them to avoid paying the late payment penalty. The lender is also notified, along with the borrower who must pay the due date and the amount that must be repaid. This allows them to maintain track of the borrower's information without having to log in every day to look for loan defaulters and the amount owed to them.

V. SOFTWARE TOOLS

The process for implementing the integrated machine learning system entails the usage of a variety of software tools. The following are the tools that were used:

1. REACT JS:

The front end for the loan management system is built with React. It's a JavaScript library for creating reusable user interface components. Components aid in the reusability of multiple components and the division of labour among them.

Instead of using the conventional DOM, React employs a virtual DOM. It boosts the system's efficiency. It also aids in the abstraction of the DOM, making it easier to utilise.

The JSX, or JavaScript syntax extension, is supported by React. It allows you to directly incorporate HTML and CSS code within react. This cuts down on the time and effort required to create HTML and CSS components with react.

It has the advantage of being able to be used on both the client and server sides.

It facilitates the creation of single-page web apps, which is the current web application trend. The use of a single page application allows for speedier execution and greater ease of use.

2. FLASK:

Flask is a Python online application framework that includes a set of tools and modules that allow developers to build applications without having to worry about low-level details like protocol implementations or thread management.

Machine learning can be integrated into a web application using Flask. Because flask and machine learning algorithms are written in Python, establishing a connection and communicating with them becomes easier.

It is simple and straightforward to get started with the application, and it has the ability to scale up to a huge size.

3. NODE JS:

Node Js is a React Js runtime environment. It aids in the execution of React Js-based front-end applications.

It aids in the dynamic updating of page content, which is a key feature of single page applications.

Because it is a runtime environment, it can make changes or alterations to the server's files. It also allows you to perform database updates. As a result, it allows users to interact with the database.

4. SQLITE:

SQLite is a library written in the C programming language. It is one of the world's most widely utilised databases. It's a compact, fast, and dependable database. SQLite is pre-installed on all mobile phones and computers, making it simple to use across all platforms.

The SQLite files are reliable and may be used on almost any platform.

It isn't a database engine that works with clients and servers. The majority of it is written into the final software.

Because of its simplicity and stability, it is used in web browsers, operating systems, middleware, and web application frameworks.

5. LINEAR REGRESSION:
One of the most basic and effective machine learning methods is linear regression. Regression is a technique for determining the cause-and-effect relationship between variables. The amount of independent variables in the model and the type of link between the independent and dependent variables are what distinguishes regression procedures. Simple linear regression is a type of regression in which there are just one or two independent variables and the independent (x) and dependent (y) variables have a linear relationship.

\[ Y = a_0 + a_1 * x \]

is a common formula for simple linear regression.

**VI. IMPLEMENTATION**

The user interface is designed using React Js as the front-end. It is the location where web page design takes place.

The information provided to React Js on the front end is subsequently transferred to the backend for evaluation and storage. Flask is the backend utilised here.

Flask is a basic application that may easily be scaled. Flask is utilised as the backend because it allows for easy interaction with both the database and the machine learning algorithms.

Flask sends the request to the database or the machine learning algorithm based on the information required. If the request is to retrieve information or store information in a database, it will be forwarded to the SQLite database. If the request is for loan repayment prediction, the request is forwarded to a machine learning model that predicts whether or not a borrower will be able to return the loan on time.

![Diagram of software tools used in the implementation.](image-url)
The loan management system has a login for both the lender and the borrower. The lender will be able to store the borrower's information together with their loan information. An Id for the loan application is produced automatically while it is being stored.

The lender can also see the transaction information, including the loan application ID and the amount paid by each borrower.

The lender can also access all of the borrowers' information, including the amount owed and the next repayment date.

VII. RESULT

As a result, a loan management system using machine learning enables the lender and borrower to save their information in an easily accessible manner on the internet. It is also saved in a format that is both efficient and retrievable.
This system will allow both the lender and the borrower to have access to their loan information at any time and from any location.

Thus, while storing the facts in a web-based loan management system, reliability, availability, confidentiality, and maintainability are achieved.

VIII. CONCLUSION

In the current circumstances, as a result of the proliferation of viruses and the escalating number of crises, the number of people seeking for loans is also expanding. It is nearly impossible to keep a loan application and track each borrower manually in such a case.

This web-based loan management system with machine learning will undoubtedly aid in the safe and effective storage of people's data.

This system may also be expanded up to serve a large number of lenders and banks, enhancing the system's profit and usage.

As a result, this system aids in the creation of transparency between lenders and borrowers, as well as the ability to work in a simple and straightforward manner using the system's user-friendly interface.

REFERENCES