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Credit Recommender System using Blockchain Technology

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ABSTRACT: In this paper, we propose a public blockchain-based deep-learning-based credit-recommender system to facilitate smart lending operations between prospective borrowers (PB) and prospective lenders (PL) and to eliminate the need for credit-score (CS) generation by third-party credit-rating agencies (CRAs). To speed up the distribution process, PL's loan grants to PB are secured, sanctioned, and automated. In a public blockchain, this stores PB previous transactions, current assets, and liabilities as time-series sequenced data. A long-short term memory (LSTM) model retrieves the sequenced data from blockchain and generates CS for loan recommendations based on proposed lending algorithms for PB and PL.

I. INTRODUCTION

Loan disbursement to PB by financial stakeholders such as banks, insurance agencies, and PL is facilitated in modern financial institutions by electronic loan records. PB sensitive information, such as their unique identifying number, residence, income-tax filings, and financial holdings, is contained in the records. Third-party CRAs analyse risk in granting a loan to PB by establishing a CS for PB after PL shares loan records with them. CRAs charge huge charges from PL to generate CS, which they impose on PB once loan grants are confirmed. To compute CS, CRAs use PB historical data of financial transactions to create a recommender model that incorporates details such as age, loan purpose, past credit and lending histories, nature of job, current assets and liabilities, and bank account balance.On PB loan data, recommender systems use two types of filtering processes to help with this: collaborative and content-based filters. To identify risk in loan grants, collaborative filters examine PB current assets and liabilities, job type (business/salaried), and age, whereas content filters examine PB prior repayments and defaults to compute a lending score. To finalise CS for PB, the risk values and loan scores go through numerous rounds (cycles) of statistical inferences. PL makes an informed judgement about the amount of loan grant, interest rate fixation, and loan repayment period based on CS. CRAs, PLs, and other financial stakeholders such as insurance agencies and banks use open, insecure methods, such as the Internet, to get PB sensitive information from these repositories. As a result, any malevolent intruder can acquire access to these repositories, raising security risks such as identity theft, personal data sales, and data breaches.

II. EXISTING SYSTEM

The total loan disbursement cycle under the current system is lengthy and cumbersome. This is owing to the complicated interrelationships that exist across a wide range of variables such as previous credit histories, defaults, and payback cycle lengths. Furthermore, loan approvals are contingent on PL profit margins, with varying degrees of uncertainty based on the PL's prospective. Losses (defaults) are more important to certain PL than gains (repayments), and vice versa. As a result, various recommender models may assign different scores to the same PB, resulting in the proportionality of the risk assessed by PL. This method is incorrect since even a missing repayment can have an impact on CS, resulting in a high-risk computation. New PB with a strong reputation and substantial assets are not considered in CS generated by recommender models since their credit histories are missing. The loan pay out process is generally sluggish and tedious.

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III. LITERATURE SURVEY

N. Kabra, P. Bhattacharya, S. Tanwar, and S. Tyagi, "MudraChain: Blockchain-based framework for automated cheque clearance in financial institutions," Future Gener. Comput. Syst., vol. 102, pp. 574–587, 2020. the burden on the cheque clearing houses in financial institutions is increasing day-by-day, which necessitates the upgrading of the existing cheque truncation system (CTS). It is a manual process which uses Magnetic Ink Character Recognition (MICR), where cheques have been scanned and sent to the clearing house for further processing. The limitations of existing CTS are — illegal duplication of cheque images, invisible ink usage, visibility issues in beneficiary name, and amount on the cheque.

P. Bhattacharya, S. Tanwar, U. Bodke, S. Tyagi, and N. Kumar, "BinDaaS: Blockchain-based deep-learning as-a-service in healthcare 4.0 applications," IEEE Trans. Netw. Sci. Eng., vol. 8, no. 2, pp. 1242–1255, Apr.–Jun. 2021. Electronic Health Records (EHRs) allows patients to control, share, and manage their health records among family members, friends, and healthcare service providers using an open channel, i.e., Internet. Thus, privacy, confidentiality, and data consistency are major challenges in such an environment. Although, cloud-based EHRs addresses the aforementioned discussions, but these are prone to various malicious attacks, trust management, and non-repudiation among servers. Hence, blockchain-based EHR systems are most popular to create the trust, security, and privacy among healthcare users.

V. Thakur, M. Doja, Y. K. Dwivedi, T. Ahmad, and G. Khadanga,"Land records on blockchain for implementation of land titling in India," Int. J. Inf. Manage., vol. 52, 2019, Art. no. 101940. Transparency of processes is very crucial across all institutions. In land administration processes, this is particularly important given the multi-stakeholder involvement. This paper argues that transparency of land administration processes involves carrying out and sharing up-to-date information on ownership, value, and the use of land and all of its associated resources among related institutions, right holders and other stakeholders, including third parties, as well as, acting on the information in an open manner.

Y. Liu, A. Ghandar, and G. Theodoropoulos, "A metaheuristic strategy for feature selection problems: Application to credit risk evaluation in emerging markets," in Proc. IEEE Conf. Comput. Intell. Financial Eng. Econ., Shenzhen, China, May 2019, pp. 1–7. Regarding the increasing attention on the credit risk rating system, the traditional way to evaluate the credibility of any given individual or company using machine learning is based on methods like SVM, decision tree or MLP. In our research, a more efficient method is introduced, which is known as the Gradient Boosting Decision Tree. With proper data preprocessing and feature selection, models are compared due to their performance.

K. Ren and A. Malik, "Recommendation engine for lower interest borrowing onpeer to peer lending (P2PL) platform," in Proc. IEEE/ WIC/ACM Int. Conf. Web Intel., Thessaloniki Greece, Oct. 2019, pp. 265–269. Online Peer to Peer Lending (P2PL) systems connect lenders and borrowers directly, thereby making it convenient to borrow and lend money without intermediaries such as banks. Many recommendation systems have been developed for lenders to achieve higher interest rates and avoid defaulting loans. However, there has not been much research in developing recommendation systems to help borrowers make wise decisions.

"Mythril security analysis framework on EVM bytecodes to detect security vulnerabilities of smart contracts," Accessed: Jul. 5, 2020. Mythril is a security analysis tool for EVM bytecode. It detects security vulnerabilities in smart contracts built for Ethereum, Hedera, Quorum, Vechain, Roostock, Tron and other EVM-compatible blockchains. It uses symbolic execution, SMT solving and taint analysis to detect a variety of security vulnerabilities. It's also used (in combination with other tools and techniques) in the MythX security analysis platform.

IV. PROPOSED SYSTEM

Prospective lenders and borrowers can communicate directly with one another. As a result, students will have a clear understanding of their details. We use sentiment analysis to read a borrower's reviews in this method. We can determine the total percentage of favourable and negative reviews using sentiment analysis. PL will decide whether or not to lend the loan to that user based on the reviews and the percentage of good and negative ratings. So that the greatest number of people can acquire a loan without difficulty. In block-chain, we will keep the potential lender's loan details as well as the prospective borrower's payment history.

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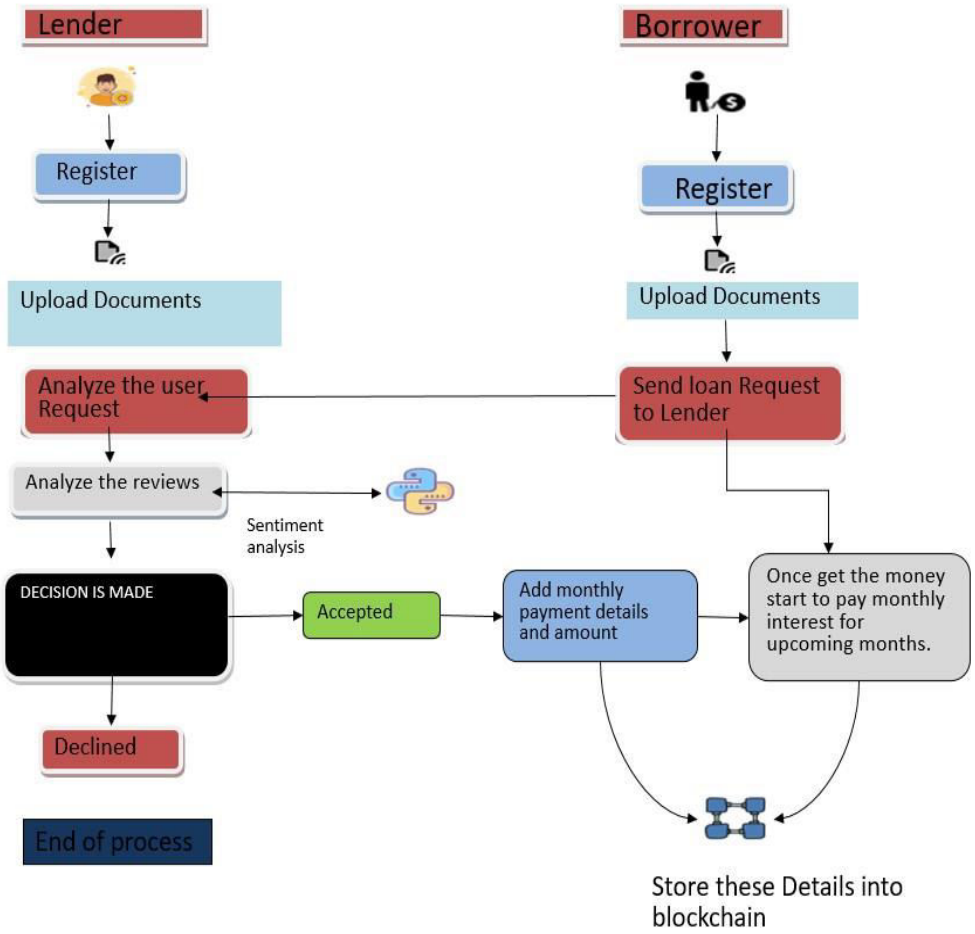

V. RESULT

To speed up the distribution procedure, PL's loan to PB is secured, authorised, and automated. In a public blockchain, this stores PB previous transactions, current assets, and liabilities as time-series sequenced data. A long-short term memory (LSTM) model retrieves the sequenced data from blockchain and generates CS for loan recommendations based on proposed lending algorithms for PB and PL.

VI. CONCLUSION AND FUTURE SCOPE

In the future, the authors will improve the regularization parameters with early stopping in training samples that improve the learning rate and optimize the loss functions. This will improve the overall response time of CS generation and induce responsive feedback through faster repayments at the same desired security and accuracy level.

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