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Smart Contract Based Fraud Degree Detection System

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Abstract - This paper delves into the challenges faced by universities in preserving students' evaluations and academic records securely. These records are crucial not only for validating academic qualifications but also for analyzing and implementing meaningful reforms. However, the prevalence of corruption and fraudulent activities in university results necessitates robust security measures to prevent tampering or deletion of such sensitive data. The paper explores the potential of using blockchain technology and smart contracts to address this security and trust issues in managing students' evaluations. By leveraging the inherent characteristics of blockchain, such as immutability, transparency, and decentralization, smart contracts offer a secure and reliable solution for data management. Smart contracts act as autonomous agreements, facilitating direct interaction between exam administrators and students without intermediaries, thereby reducing vulnerabilities associated with third-party involvement. Implementing blockchain-based smart contracts brings various benefits, including cost and timesaving. Students maintain full control over their data thanks to emerging technologies like blockchain. Data stored in blockchain networks is organized into linked blocks, and validators ensure the authenticity and integrity of each block through cryptographic hash codes. Furthermore, the decentralized nature of blockchain ensures that data is distributed across the network, minimizing the risk of single points of failure and enhancing overall system security. With consensus mechanisms and mathematical operations, blockchain-based smart contracts provide transparent records of completed operations, often referred to as decentralized ledgers. In conclusion, the paper emphasizes the potential of blockchain-based smart contracts in strengthening information security and trust in university systems. This innovative technology can safeguard student evaluations from tampering, fraudulent activities, and unauthorized access. By adopting such solutions, universities can not only enhance data security but also streamline administrative processes and foster a culture of trust within academic institutions. As blockchain gains wider acceptance, exploring these transformative solutions becomes essential for ensuring a more successful educational environment.

Keywords: Students' evaluations, Academic records, Data management, Blockchain technology, Smart contracts, Information security, Trust, Fraud prevention, Tamper-proof, Immutability, Transparency, Decentralization, Third-party intermediaries, Time and financial efficiency, Data ownership Cryptographic hash codes, Consensus mechanisms

1. INTRODUCTION

Universities are required to keep track of students' evaluations for a considerable amount of time. These two pieces of information/records are utilized not only to confirm the students' academic qualifications, but also for two additional purposes of analysis in order to implement more beneficial and successful reforms. In order to prevent tampering with or deletion of such data, it is crucial to keep it in a secure environment. due to the widespread instances of corruption in university results. Similar incidents of system hacking and the creation of fraudulent papers have been reported. The two main restrictions are security and trust. The security of information remains a critical challenge in current systems, especially due to the involvement of multiple parties. To address this, the implementation of smart contracts within blockchain technology offers a promising solution for conducting services between exam administrators and students. By utilizing smart contracts, we can ensure heightened security and trust, while also reducing time and financial costs. The evolution of blockchain and related technologies empowers users to retain control over their data, further enhancing data security. One of the key advantages of blockchain networks is their decentralized nature, eliminating the need for intermediaries. Consequently, users can directly access and process services without involving any third parties. The fundamental building blocks of these networks are data blocks, responsible for securely storing and managing information. Each data block is connected through a cryptographic hash code, assuring the integrity and immutability of the data. To ensure the validity of each data block, a network of validators rigorously verifies the associated hash codes using various consensus processes. This consensus mechanism, a mathematical procedure, strives to achieve unanimous agreement on the validity of each data block's signature code. In conclusion, the fusion of smart contracts and blockchain technology presents a unique and efficient approach to tackle information security challenges. By promoting transparency and data ownership, these decentralized ledgers offer a robust foundation for trustworthy and secure operations between exam administrators and students. In addition, known as smart contracts on the blockchain since they contain all of the data that is automatically created after an operation is finished.

2. RELATED WORK

[1] Experiments show that more than 92% of these answers might be machine-read by implementing the suggested technique into the current automated grading system, so

saving the operator considerable time and enhancing the automated system for grading A smart contract (SC) stands as an electronic protocol facilitating direct transactions between multiple anonymous parties, bypassing the need for trusted intermediaries. Operating autonomously, it serves as an electronic contract executed on the blockchain, ensuring the code and agreements are perpetually recorded within the distributed public database. The versatility of smart contracts finds application across diverse domains like management, healthcare, and the Internet of Things, significantly impacting the digital economy. Among the prominent open-source blockchain technologies, Ethereum and Hyperledger garner considerable acclaim, boasting cross-industry appeal. Nonetheless, challenges persist, with security, privacy, accuracy, and verifiability being key technological issues that blockchain endeavors to fully address and resolve.

[2] The emergence of smart contracts– blockchain-based protocols that can automatically execute a contract – has accelerated the spread of the technology to new application areas. Higher education is one field where suitable use-cases are prompting innovators to start using blockchain. With the world moving towards digitization, there is a need to deliver data and important documents to students in higher education institutions via digital platforms while maintaining the integrity and confidentiality of the data so that it can be trusted with the guarantee that no unauthorized modification has taken place. To solve this problem, we propose the utilization of blockchain in the field of education via a blockchain-based university transcript verification system and a blockchain based system for storing and processing examination answers.

[3] In this study, we focused on developing a machine-learning algorithm that takes into account students' prior knowledge to evaluate the effectiveness of teaching methods in an ordinary differential equations class. Our findings revealed that clickers outperformed traditional handwritten homework as a more effective teaching strategy. Through eighteen experiments, preliminary results indicated the predictability of students' performances, with the potential to enhance classification by applying pre-processing techniques to raw data before employing machine learning algorithms.

The evolution of Artificial Intelligence has had a profound impact on various fields, particularly in the realm of educational teaching and learning processes. To address the issue of Trusted Third Party (TPA) reliance in cloud storage, we propose a decentralized auditing scheme. This system involves a data owner, a Cloud Service Provider (CSP), and a blockchain. Data stored in the cloud encompasses text, images, audio, and video, encrypted by the owner before storage. Each file is divided into blocks, and a hash value is generated for each block. Leveraging Ethereum smart contracts, a decentralized platform facilitates smart auditing. The smart contract securely maintains the submitted contract with essential file information like name, size, hash, and data owner details. The CSP subsequently verifies data integrity in the system.

[4] Many decentralized apps are built around smart contracts, which contain the essential elements of the five types of business logic. In a transparent, decentralized manner, they oversee the trade of valuable assets like digital currencies or tokens. They are computer programs, which makes them susceptible to programming flaws, which have already resulted in enormous losses. As a result, techniques and tools have been developed to assist in the creation of safe smart contracts as well as the study of those that have already been deployed. It is challenging to judge these tools' quality. There are community tools, companydeveloped tools, and academic tools available in open repositories, but there isn't a thorough analysis that could act as a guide. Additionally, the majority of research paper discussions on related works are ineffective because they focus on

[5] In spite of growth in technology, Indian Judiciary system somehow lacks digitalization. In the court trials cases, every argument by the lawyers, evidence presentation, witness/suspect cross examination everything will be noted down by the stenographer and everyday hearings details will be printed at the end of every court session. Therefore, the details about particular case will be in physical files as well as in digital format and can be accessed whenever it is needed like in the situation of case reopening. Data integrity is important in the judiciary system; when it comes to court cases, evidence integrity must be protected because even little changes in the evidence can lead to false judgments, and historical data is crucial. Where historical data archiving is necessary, Blockchain technology is suited. In the modern era, Blockchain technology is regarded as more reliable technology than any other. Blockchain technology can be used in the justice system to provide privacy and integrity, as well as efficient auditability and traceability, for storing case records and evidences. This research study has proposed a novel method using Inter Planetary File System distributed data storage to store case details and evidences on top of the Ethereum Blockchain. The case details can be stored using text and image files. The Ethereum smart contract is used for storing hash value of data in the Blockchain. The storage and access of the data in Inter Planetary File System is studied and explained using an experimental setting.

[6] Blockchain serves as a distributed ledger technology, operating on a decentralized peer-to-peer (P2P) network. It grants users the capability to globally store data in an immutable format across thousands of computers, while also enabling the deployment of smart contracts, small programs that enforce agreed-upon terms between untrusted parties. However, vulnerabilities in Ethereum-based smart contracts pose security concerns, potentially leading to unintended behavior and significant financial losses. As these smart contracts can hold substantial amounts of cryptocurrency, such vulnerabilities demand careful examination. This paper presents a systematic review focusing on Ethereum blockchain security vulnerabilities. It delves into Ethereum smart contract weaknesses, detection tools, real-life attacks, and preventive measures. A comparison of Ethereum smart contract analysis tools is conducted, considering various features. The in-depth review highlights several issues related to Ethereum blockchain-based smart contracts, and potential future research directions are discussed to aid researchers in this domain.

[7] Medical records serve as comprehensive files containing patients' identities, examinations, treatments, actions, and other health-related services during their medical care journey. Maintaining the confidentiality of these personal data necessitates strict authorization for access. However, challenges arise in managing files, particularly when categorizing medical records based on specific criteria like documentation year or patients' biodata. Additionally, the need for extensive storage space and the absence of data backups further compounds the issues. Addressing these concerns, blockchain-based solutions offer a promising remedy. An example is Hyperledger Composer, an expansive and open development framework for blockchain systems. Comprising three main files - model, script, and access control - Hyperledger Composer offers coding flexibility and ease of understanding. Leveraging JavaScript for coding and incorporating a client library for node.js, Hyperledger Composer presents a valuable tool in healthcare data management.

[8] In this article, they proposed a secure and auditable private data sharing (SPDS) scheme under data processing-as-a-service mode in smart grid. Specifically, we first present a novel blockchain-based framework for trust-free private data computation and data usage tracking, where smart contracts are employed to specify fine-grained data usage policies (i.e., who can access what kinds of data, for what purposes, at what price) while the distributed ledgers keep an immutable and transparent record of data usage. A trusted execution environment based off-chain smart contract execution mechanism is exploited as well to process confidential user datasets and relieve the computation overhead in blockchain systems. A two-phase atomic delivery protocol is designed to ensure the atomicity of data transactions in computing result release and payment. Medical records are personal data that can only be accessed by authorized personnel. First, by leveraging blockchain and smart contracts, a trust-free framework was presented for privacypreserving data computation, fine-grained data access and usage control, non-repudiable data usage tracking, and verifiable proof of policy compliance. Second, a TEE-enabled off-chain smart contract execution mechanism with atomic operation guarantee was developed for confidential user data processing and the alleviation of computation overhead in blockchain. Furthermore, a contract theoretical incentive model was devised in the presence of information asymmetry to stimulate user's participation and high-quality data sharing by designing optimal contracts.

3. METHODOLOGY

Initially, a dataset of SMS spam was obtained from Kaggle repository [9]. Subsequently, various text preprocessing methods were used to clean the dataset. Following that, the naive Bayes classifier algorithm was utilized for analysis. The proposed model shown in the below figure:

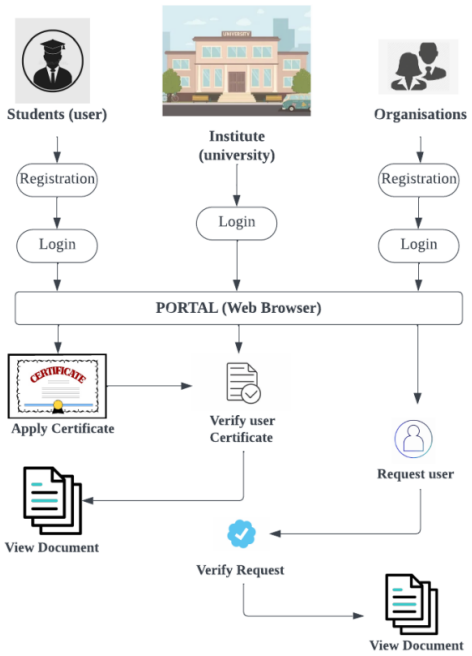

Fig 1. Proposed Model for detection of Spam SMS

A. Registration & Login

Our platform incorporates both registration and login modules. After logging in at the home-page candidate checks their result using the hash code (applicant number). The details provided data will be stored in the smart Contract.

B. Examination

Text data can be transformed into a vectorized representation, as numerical data is required for machine learning algorithms. This makes it necessary to preprocess the text using various Natural Language Processing (NLP) techniques. Tokenization involves dividing the text into smaller units. In text preprocessing, stop words, which are noninformative words like "is," "was," and "that," are removed. Additionally, stemming reduces words to their base form, such as changing "playing" to "play." Following preprocessing, word embedding is performed, representing words as vectors of real values. We utilized Count Vectorizer techniques for word embedding.

C. Transaction

Within the realm of Ethereum, transactions take place via smart contracts. Once a transaction is successfully executed, the most significant advantage offered by blockchain comes to the forefront: immutability and atomicity of transactions. This signifies that in the event of a transaction failure, a corresponding failure hash is generated, enabling meticulous monitoring and system management. Crucially, the amount involved in the failed transaction remains safeguarded, and no deductions occur, ensuring a secure and reliable process.

D. Consensus algorithm

This application employs the Proof-of-Stake (POS) consensus process, succeeding the Proof-of-Work (PoW) mechanism. Within this framework, Ethereum Network transactions and data traverse the blockchain network, seamlessly moving from sender to receiver. Unlike PoW, POS

prioritizes a shift in authentication before proceeding to validate a blockchain block. This approach enhances efficiency and reinforces the security of the overall system.

E. Contract

In our implementation, smart contracts play a crucial role, ensuring that all data remains encrypted and secure. Only the candidate and the examination administrator have access to the original data, preserving confidentiality and privacy throughout the process.

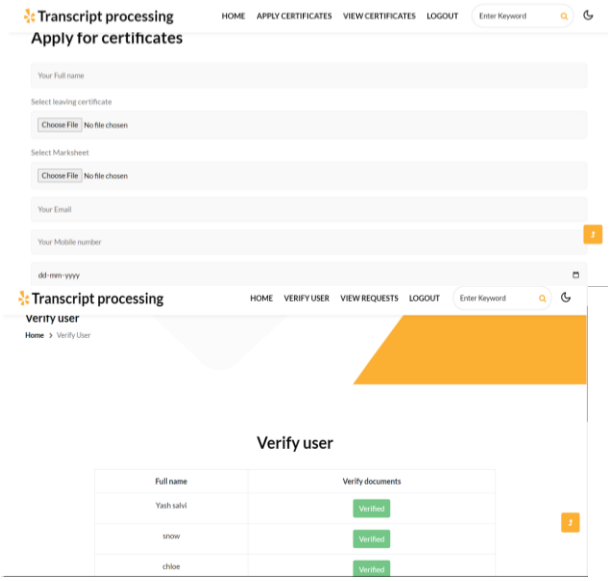

Fig 2. Apply Certificates

The system design for the document verification using smart contract the student and administration process in document verification using blockchain smart contracts would work as follows. The student would upload their document, such as a degree certificate, to the blockchain network using a user interface provided by the system.

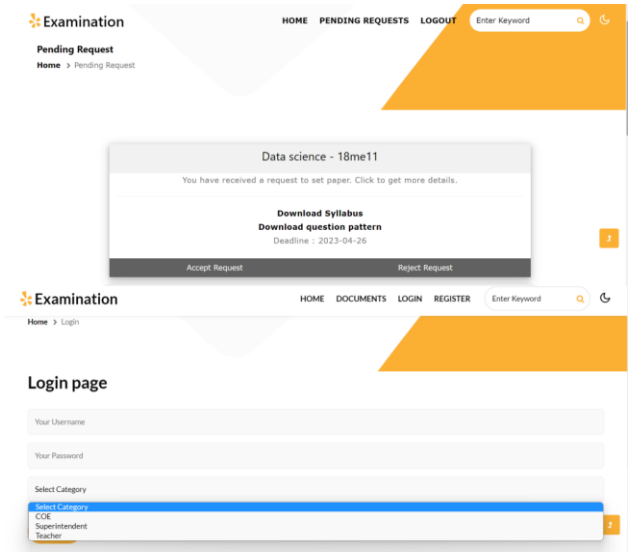

Fig 3. Question paper evaluation

Upon students' submission of their question papers for evaluation, the exam 2 administrator undertakes the task of inputting pertinent details like student ID, exam date, subject, and answers into the system. Subsequently, this data is utilized to generate a smart contract on the blockchain. Smart contracts, being self-executing in nature, encompass agreement terms directly coded within them. As a result, these contracts automatically activate and execute upon the fulfillment of specific predetermined conditions.

4. EXPERIMENTAL RESULT AND PERFORMANCE METRICS

We have developed an intuitive interface that enables employers to receive real-time alerts within their web browsers, differentiating between genuine and counterfeit certificates. By leveraging blockchain technology's immutable and decentralized nature, our system ensures the authenticity and integrity of educational qualifications. Through smart contracts, verification processes are streamlined, providing instant notifications to employers, thereby safeguarding them against potential hiring risks and promoting a trustworthy hiring ecosystem. This innovative approach offers a robust and efficient tool for combating degree fraud, bolstering the credibility of educational qualifications in the professional world.

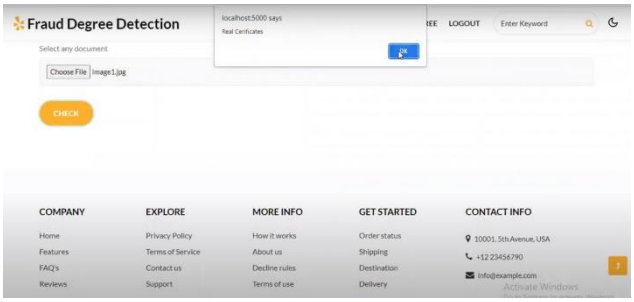

Fig 4. System Detecting Real Certificate

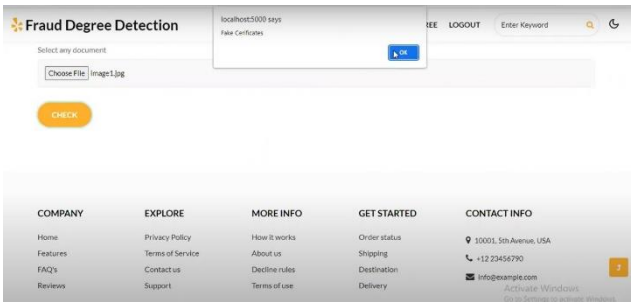

Fig 5. System Detecting Fake Certificate

5. CONCLUSION AND FUTURE WORK

The integration of blockchain technology and smart contracts within universities offers a promising resolution to address the pressing issues of data security and trust when managing student evaluations and academic records. Incidences of corruption in university results and system hacking underscore the urgency for a robust and tamper-proof system.

Blockchain's innate features, including immutability, transparency, and decentralization, create a secure and credible environment to handle sensitive student data. Implementing smart contracts automates processes and

ensures data remains under the control of authorized users, reducing third-party involvement and mitigating data breaches.

Future endeavors in this domain hold transformative potential, revolutionizing how universities manage student evaluations and records with improved security and efficiency. One direction for exploration lies in seamlessly integrating blockchain technology with existing university systems. Incorporating smart contracts into evaluation and record-keeping processes streamlines operations and lessens administrative burdens, enabling faster academic qualification verification.

Furthermore, blockchain-based smart contracts could transcend evaluation records and academic qualifications, extending their application to course enrollment, student financial aid distribution, and research collaboration agreements. The transparent and tamper-proof nature of blockchain enhances the integrity of these processes, fostering a trustworthy academic environment.

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