MACHINE LEARNING AND BLOCKCHAIN-BASED REAL-TIME FACIAL RECOGNITION ATTENDANCE SYSTEM

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ABSTRACT: In a vast majority of fields, the use of facial recognition for authentication is expanding. In this information age, authentication has become vital, and the need for faster and more secure methods of user authentication has been on the rise. The introduction of image processing technologies such as OpenCV has increased society's reliance on face recognition. Using blockchain, information could be stored in blocks throughout the blockchain network. Blockchain is an extremely secure means for storing and protecting data from intruders. It is a highly disruptive technology that has the ability to alter every plane of society. This paper intends to implement open-source computer vision (OpenCV) to construct a facial detection model that will be employed in a blockchain-secured Attendance Monitoring System. It will not only automate the attendance procedure but also give the system unassailable security. This system will take a live video feed from a camera using OpenCV and identify the faces of students and record their attendance along with the entry time. The data will be kept in a distributed way over the blockchain network that will be accessible to everyone, but data cannot be manipulated.

KEYWORDS: Authentication, Automation, Block Chain, Face Recognition, Open Cv

1. INTRODUCTION

Since most organizations need a way to keep track of their students' attendance, every organization uses their own methods to do so like calling out the names and manually taking it down, some have opted for more efficient and accurate biometric systems like fingerprint [1], RFID card readers and iris systems. Although the most commonly used method of taking down the attendance manually is extremely inefficient and inaccurate. Even in systems like RFID, since each student is given a card corresponding to their unique IDs but there is no real way of knowing if the card is being used by the individual it was assigned to, there may be cases where one student is using the cards of multiple people to mark everyone's attendance while in reality only one of them was present. Other means of biometric IDs like fingerprinting, voice recognition or iris scans are not entirely feasible to use, have their drawbacks and don't provide idea performance. A system that could match a human face to a digital image could prove to be highly efficient and practical to use.

 The ever-growing count of students increase the pressure of professors to monitor and control the attendance. One emerging problem among various countries is the falsification of graduation document falsification. This could be solved by using blockchain technology to store the attendance records on a decentralized distributed ledger that is publicly available for everyone to see. Since records stored on the blockchain network are immutable in nature, the authenticity of the records is guaranteed. Using blockchain also ensures that unauthorized access and tampering[5] of the records is avoided. This project aims to solve the problems of inaccuracy, inefficiency, and unauthentic records. The project would use Open CV [4] to identify all the students present in a class and use blockchain to maintain the records securely. The system will reduce the amount of manual work needed, improve accuracy, and save time which could prove to be beneficial for an organization. Since the system is automated, it would also reduce the risk for human error.

Open CV has several algorithms to detect and recognize faces each of which uses different facial points and gathers different measurements. This project uses haar cascade algorithm for detecting and recognizing faces. The measurements are used to create unique facial signatures which are then compared with the facial data stored in our database.

2.LITERATURE SURVEY

TITLE:" A Blockchain Implementation of an Attendance Management System"
An attendance management system (AMS) is a useful system for personal management in organizations. The existing AMSs include traditional manual method, smart-card identification, fingerprint recognition, face recognition and so on. An awkward problem with these systems is that the recorded data could be forged by malicious users. Fortunately, the block chain is emerging which can be used to decentralize management and protect sensitive data. In this paper, we present a block chain architecture for the AMS and its implementation in detail.

TITLE:" Automated Attendance System Using OpenCV"
Student Attendance mainframe structure is defined to manage the student's class attending files using the concept of face detection and recognition through open computer vision. The principal reason this system has been put forward is to improve the traditional attendance system of various universities to avoid the misuse of time and assets. The pointing-sides of automation world have forced an idea of switching from standard attendance to the digital system by using face detection and recognition methods. This is how the Student Attendance structure is being developed by introducing the dataset of an individual. The major reason of building this system is to improve the adaptability and performance of the attendance system procedure besides reducing the long-term time load, work and disposables used. The main purpose of the Student Attendance marks up structure is to perform, adding and manipulating attendance notes of an individual, automatic calculation on number of presents and absentees based on subject and affability of the class and then generates the automated document or spreadsheet. This idea is completely based on general purpose language named as python through which we use the concept of open computer vision. For face detection system we used Haar cascade and for face recognition, we used LBPH model; then the training of individual student happened 10 and finally the system generates the spreadsheet which provides the no. of students present in classroom with an image or video capturing live.

3 SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

Some existing systems in attendance monitoring use facial recognition technology, which automates the attendance process by identifying individuals based on their faces as they enter an area. Additionally, blockchain technology is employed in certain systems for secure data storage and access control. These systems often use a combination of hardware like cameras and software, including machine learning for facial recognition and smart contracts on a blockchain network. They capture attendance data and store it securely, making it tamper-proof and transparent. While these systems might not match your exact project's abstract, they serve as a foundation for developing a comprehensive solution that combines the benefits of facial recognition and block chain for attendance monitoring.

LIMITATION OF EXISTING SYSTEM

The limitations of existing systems for attendance monitoring, particularly those using facial recognition and blockchain technology, can include the following:
Privacy Concerns: Facial recognition technology can raise privacy issues as it involves the collection and processing of biometric data. Some individuals may be uncomfortable with their facial data being stored and used for attendance tracking.
Accuracy: Facial recognition technology may still have limitations in terms of accuracy, especially in varying lighting conditions or with individuals of different ethnic backgrounds. False positives and negatives can occur.
**Data Security:** While blockchain technology is considered secure, vulnerabilities and breaches have occurred in some blockchain networks. Security measures must be implemented effectively to protect the data stored on the block chain.

3.2 PROPOSED SYSTEM

The proposed system aims to address the limitations of existing attendance monitoring solutions by combining facial recognition with block chain technology. This system will leverage the accuracy of facial recognition for real-time

attendance tracking. It will use open-source computer vision (Open CV) to develop a robust facial detection model. The attendance data, along with entry times, will be stored in a secure block chain network, ensuring tamper-proof and transparent records. Access to the data will be controlled through smart contracts, enhancing data security and privacy. The system will offer scalability to accommodate a growing number of users. It will be designed with privacy regulations in mind, obtaining consent and ensuring data protection. By uniting facial recognition and block chain, this system aims to provide a reliable and secure solution for attendance monitoring in various sectors, such as education and corporate environments.

4.SYSTEM ARCHITECTURE
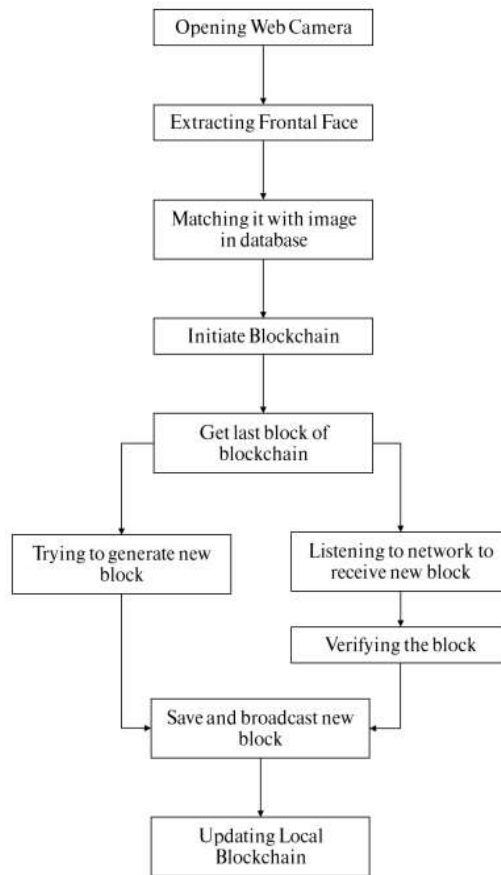
5. METHODOLOGY

This describes the steps that were followed to accomplish the specified objectives of this research with an elaboration of the reason why the chosen approach is preferred. It consists of the techniques and tools that were used in data collection, study, and analysis of the research to further comprehend the requirements of the system. The achievability analysis tools and techniques of the proposed system, the system implementation, testing, and validation processes are all enclosed in this chapter.

The main technologies used in the system are as follows:

• Open CV (version 4.6.0) Open CV is an open source/free technology that is used for image processing. The latest version of it is 4.6.0. OpenCV was developed with the motivation of automating the image-processing system.

• Ethereum block chain the current value of each ether is approximately 1,28,337 INR. All the services of Ethereal are free by default. It securely implements the application code and also verifies it.

• Solidity is an object-oriented programming language that was created specifically by the Ethereal Network team for use in developing and implementing smart contracts.
 • Truffle Suite Truffle suite package comes up with tools for implementing and migrating contracts as well as setting up a block chain network locally.
• Meta mask It is a wallet for interacting with web3 accounts and conducting transactions between them.
• Flask It is a web framework that is written in Python Language. Flask is useful for creating single-page applications as it provides app routes that speed up the whole working of the website.

Facial Recognition Module: This module is responsible for capturing and processing facial data from cameras, identifying individuals, and verifying their attendance.

Block chain Integration Module: Implement block chain technology for storing and securing attendance records in a decentralized and immutable ledger.

User Management Module: Manage user profiles, permissions, and access control, ensuring that only authorized users can interact with the system.

 Data Preprocessing Module: Prepare and clean the attendance data before storing it on the blockchain, ensuring data quality and consistency.

Real-time Monitoring Module: Enable real-time attendance tracking and monitoring for administrators, including live updates

Smart Contracts Module: Develop and deploy smart contracts on the block chain to automate attendance record-keeping and enforce security and access rules.

Data Visualization Module: Create a user-friendly dashboard for administrators to view attendance data, generate reports, and analyze attendance patterns.

Security and Privacy Module: Implement security measures to protect both facial recognition data and attendance records, addressing privacy and data.

User Interface Module: Design a user-friendly interface for students, employees, and administrators to interact with the system, allowing them to mark attendance or view their

Machine Learning Model Module: If needed, build and train machine learning models for facial recognition and attendance verification.

Compliance and Reporting Module: Implement features for regulatory compliance, auditing, and generating compliance reports.

Maintenance and Update Module: Develop a system for updating and maintaining the software, including patches, upgrades, and and improvements.

7. RESULT

8. CONCLUSION

the integration of block chain technology with facial recognition-based attendance recording systems provides a secure and efficient solution for monitoring attendance. The technology offers several benefits, including increased security and transparency, as well as a more efficient and streamlined process for recording and processing attendance data. However, the implementation of the technology also faces several challenges and limitations, including privacy concerns, implementation costs, and accuracy issues. Therefore, it is important to consider these challenges and limitations when implementing the technology and to evaluate and optimize the performance of the system to ensure that it provides accurate and reliable results.

FUTURE SCOPE Enhanced Accuracy and Efficiency: Future advancements in machine learning algorithms can lead to improved accuracy in facial recognition, making the attendance monitoring system more reliable and efficient. This could involve developments in deep learning architectures, better feature extraction techniques, and optimization of algorithms for real-time processing.

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