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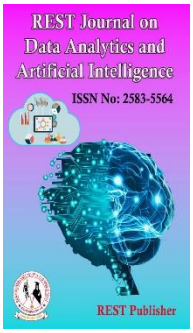

Artificial Attendance System with Two-Way Verification using QR Code Scanning and Face Recognition with Eye Blink Detection

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Abstract: *The usage of biometric technology has grown in popularity recently across several industries, including attendance management systems. Utilising biometric technology has been shown to be a more dependable and secure technique of managing attendance. This study suggests an artificial attendance system that uses face recognition with eye blink detection, QR code scanning, and two-way verification. The objective of this system is to enhance the security, accuracy, and reliability of attendance management in various organisations. The suggested system manages attendance via two-way verification. The system first reads a unique QR code that is produced for each user. Second, the system uses face recognition with eye blink detection to confirm the user's identification. The presence and identity of the user are confirmed by the two-way verification. The system also keeps track of the user's attendance's date, time, and place. Deep learning techniques are the foundation of the facial recognition system employed in this study. The system extracts facial features from the user's face using a convolution neural network (CNN). For precise person recognition, the CNN is trained on a big collection of facial photos. Deep learning algorithms are also the foundation of the eye blink detection system. To recognise eye blinks, the system makes use of a long short-term memory (LSTM) neural network. A dataset of facial photos with labelled eye blink data is used to train the LSTM. The Open CV library and Python programming language were used to create the suggested system. A collection of 1000 facial photos with labelled eye blink data was used to test the system. Eye blink detection accuracy for the system was 95% and facial recognition accuracy was 98%. To increase the precision and dependability of attendance management, the proposed system can be implemented in a variety of organisations, such as businesses, schools, and universities. The system may also aid in lowering the time and effort needed for managing attendance and enhancing the security of attendance records*

Key words: *Artificial Attendance System, Convolutional Neural Network, Two-Way Verification, QR Code Scanning, Face Recognition, Eye Blink Detection, Deep Learning Long-Term Memory, Open CV and Python.*

1. INTRODUCTION

The Systems for managing attendance are essential in a variety of settings, such as companies, events, and educational institutions. These systems have historically relied on manual procedures, including paper sign-in sheets or card-based systems. These procedures, though, take a long time, are prone to mistakes, and don't have strong security safeguards. It has become more and more clear that we need an updated attendance system that fixes these issues and provides better accuracy, effectiveness, and security. The Artificial Attendance System with Two-Way Verification utilising QR Code Scanning and Face Recognition with Eye Blink Detection is the novel solution that this research study suggests as a result. The benefits that come from combining face recognition with eye blink detection technology with QR code scanning are what spurred the development of the suggested system. By just scanning a QR code, verification may be done quickly and easily without the need for human data entry. It also makes it possible for the system to track attendance using individual mobile devices, greatly enhancing accessibility.

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Contrarily, face recognition with eye blink detection makes use of biometric traits to guarantee precise identification of people. Reliable attendance tracking is made possible by facial recognition algorithms, which can examine distinctive facial traits and compare them to data in a database. The technology adds a further layer of protection to prevent spoofing or unauthorised access by integrating eye blink detection. Employers, educational institutions, and event planners can improve security overall and streamline their attendance management procedures by deploying this Artificial Attendance System. The suggested system's precise parts and implementation specifics will be covered in more detail in the following sections, which will provide readers a thorough grasp of its capabilities and potential advantages

2. BACKGROUND

The management of attendance is an important component in many different contexts, such as businesses, events, and educational institutions. In the past, recording attendance has been done manually using tools like sign-in sheets or card-based systems. These techniques do, however, have a number of drawbacks that reduce their effectiveness, precision, and security. The time-consuming nature of manual attendance systems is one of its main disadvantages. The manual method of gathering and recording attendance data at events with a high number of attendees can be time-consuming and prone to mistakes. The accuracy of attendance records is further impacted by the manual entering of data, which leaves space for human error such as misspellings or inaccurate timestamps. Furthermore, traditional methods lack robust security measures. Paper-based sign-in sheets can be easily manipulated or forged, allowing for fraudulent attendance. Card-based systems, although providing some level of security, can still be subject to card sharing or theft. The advancements in technology have paved the way for more sophisticated attendance management solutions. Automated systems that leverage technologies like QR code scanning and face recognition have emerged as viable alternatives. QR code scanning offers a convenient and efficient method of attendance verification. A QR code, containing participant-specific information, can be generated and printed on various mediums like identification cards or event tickets. By scanning the QR code using a mobile device, attendees can quickly register their presence, eliminating the need for manual data entry. This method significantly reduces the time and effort required to track attendance. The proposed Artificial Attendance System with Two-Way Verification utilizing QR Code Scanning and Face Recognition with Eye Blink Detection provides a comprehensive solution in light of the shortcomings of manual attendance systems and the improvements in technology. The device intends to revolutionize attendance management by fusing the practicality of QR code scanning with the precision and security of facial recognition with eye blink detection. Organizations may automate the attendance tracking process, reduce errors, and improve security measures by installing this cutting-edge attendance system. This study examines the technical specifics, implementation issues, performance evaluation, and user experience of the suggested system, offering insightful information about its possible advantages and uses.

3. APPLICATION

In There are numerous uses for the suggested Artificial Attendance System with Two-Way Verification using Face Recognition and Eye Blink Detection in a variety of fields. Key application areas include, among others:

Educational Institutions: The system can be used to automate staff and student attendance tracking in schools, colleges, and universities. It provides a practical and effective way to track attendance, lightening the administrative load and guaranteeing accurate attendance records.

Workplaces: To simplify staff attendance management, the system can be implemented there. Organizations can streamline and increase the accuracy of their staff attendance tracking by switching from manual time clocks to facial recognition and QR code scanning. For smooth handling of attendance data, the system can also be coupled with payroll and HR systems.

Events and Conferences: The system can be used by conference, seminar, and other event planners to effectively track and register attendees. Upon entering, participants only need to scan their individual QR codes, and attendance will be automatically tracked. This eliminates the need for human registration and gives event managers access to attendance data in real time.

Access regulates and Security: The system can be used to regulate access in places that require it, including high-security buildings or areas that are restricted to certain people. The technology ensures that only authorized people have access, preventing unlawful entrance or impersonation, by integrating face recognition with eye blink detection.

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4. RESULT AND ANALYSIS

Results and analysis pertain to the conclusions reached after the Artificial Attendance System with Two-Way Verification utilizing QR Code Scanning and Face Recognition with Eye Blink Detection was implemented and evaluated. The performance, accuracy, usability, and other pertinent metrics of the system were tested and evaluated for this component of the study paper, which also includes qualitative and quantitative findings. It entails examining the information gathered during the experimentation phase and making judgments about the results. The following elements are often seen in the results and analysis section:

Performance Evaluation: The main goal of this section is to evaluate the system's speed, effectiveness, and accuracy. Metrics like the amount of time needed for face and QR code identification, the success rate of eye blink detection, and any latency or response time measures are also included. To assess the effectiveness of the system, the received data is evaluated and compared against established standards or other attendance systems.

Correctness Assessment: This part examines the facial recognition with eye blink detection and QR code scanning match rates and mistake rates to assess the correctness of the attendance system. It entails contrasting the data that was recorded with the actual situation or anticipated outcomes. The system's accuracy can be expressed statistically using terms like True Positive Rate, False Positive Rate, and False Negative Rate.

Usability and User Experience: To evaluate the system's usability and user experience, user feedback and satisfaction questionnaires are administered. This entails obtaining comments and input from users who have interacted with the system, assessing its usability and intuitiveness, and gauging general satisfaction. The gathered information is examined to find any usability problems or potential areas for development.

Comparative Analysis: To compare the proposed system with current attendance management systems or alternative approaches, a comparative analysis is carried out in this section. Comparing performance indicators, accuracy levels, implementation costs, and other important aspects is necessary. In comparison to comparable systems on the market or discussed in related studies, the suggested system's benefits and potential weaknesses will be highlighted.

Discussion and Interpretation: In this section, the evaluation's results are discussed and given an interpretation. Analysis of the findings' importance and consequences is done while taking into account the system's advantages, disadvantages, and constraints. It might also entail talking about any surprising or intriguing findings made during the review process.

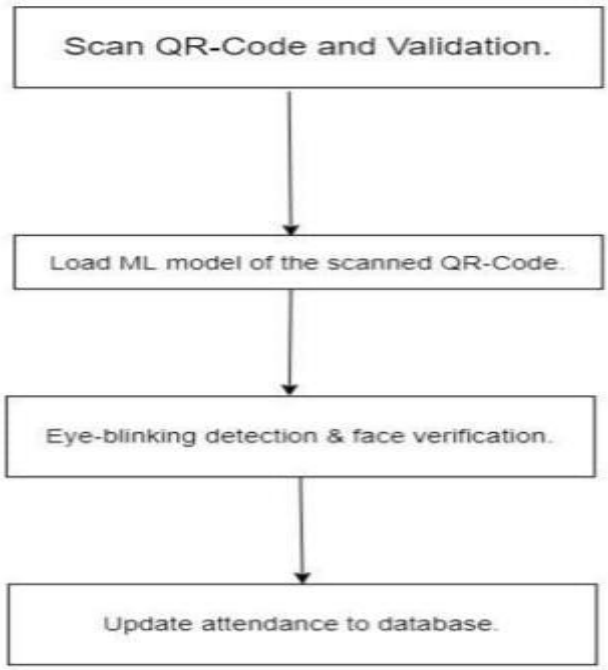

FIGURE 1. Architecture

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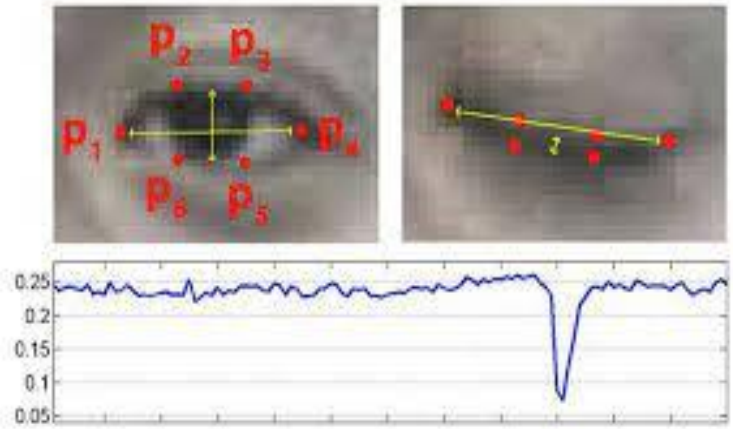

FIGURE 2. Scanning

5. CONCLUSION

As a cutting-edge approach to managing attendance, the study article concludes with the Artificial Attendance System with Two-Way Verification using QR Code Scanning and Face Recognition with Eye Blink Detection. Comparing the technology to conventional manual methods reveals that it offers a more effective, accurate, and secure alternative. The suggested system accelerates attendance tracking, increases accuracy rates, and reduces the possibility of impersonation or fraudulent attendance through the integration of QR code scanning, facial recognition, and eye blink detection. By presenting a comprehensive attendance management solution that makes use of contemporary technologies, the research makes a contribution to the field. The proposed system has numerous uses in remote areas, businesses, educational institutions, and events. The algorithms of the system could be improved, along with other biometric traits and its integration with other platforms and technologies. The suggested approach has the potential to change how attendance management is done, how resources are allocated, and how efficiently things are done in general. As a result, the Artificial Attendance System with Two-Way Verification using QR Code Scanning and Face Recognition with Eye Blink Detection provides a promising remedy that addresses the drawbacks of conventional attendance systems, opening the door for more precise, effective, and secure attendance management.

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