IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 2, April 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

Face Check Attendance System

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ABSTRACT: The development of a Face Check Attendance System app represents a significant advancement in modern attendance tracking methods, aiming to address the shortcomings of manual processes through the integration of face recognition technology. This system not only serves as a reliable attendance tracking tool but also doubles as an access control mechanism by enrolling organization personnel or students through facial registration and subsequently recognizing them via captured facial images to mark their attendance in a centralized database. The face recognition module utilizes TensorFlow, a powerful machine learning framework, trained on a labeled dataset to achieve high accuracy in recognizing faces. Additionally, Flutter, a cross-platform UI toolkit, is employed for frontend development, ensuring a seamless and intuitive user experience across various devices and platforms. The integration of TensorFlow and Flutter allows for efficient deployment of the app, providing users with a convenient and reliable solution for attendance management. This paper discusses the implementation of the Face Check Attendance System app, highlighting the key technologies utilized and their contributions to improving attendance tracking processes.

KEYWORDS: TensorFlow, Face Recognition, Flutter, Attendance System, Machine Learning

I. INTRODUCTION

Attendance tracking is a critical aspect of educational institutions and organizations to monitor the presence of students and employees efficiently. Traditional manual attendance-taking methods are prone to errors and inefficiencies, prompting the adoption of automated systems to streamline the process. Our proposed solution leverages cutting-edge technologies, specifically face recognition, to revolutionize attendance tracking. By integrating face recognition technology into the attendance system, we aim to provide a reliable and convenient solution that enhances accuracy and saves time and resources.

In contrast to biometric systems that can only authenticate one person at a time, our system harnesses the power of face recognition models built upon the "labelled faces in the wild" dataset. This dataset comprises diverse facial images with corresponding labels and serves as the foundation for our system's accuracy. Utilizing state-of-the- art deep learning techniques, our system transforms each facial image into a 128-bit encoded vector. This vector representation is then used in conjunction with TensorFlow, a powerful machine learning framework, for classification tasks.

Face recognition technology has widespread applications, including authentication, crowd identification, and liveness detection. In our system, we capitalize on the capabilities of TensorFlow for facial recognition, ensuring high accuracy and robust performance. By employing Flutter, a cross-platform UI toolkit, for frontend development, we ensure a seamless and intuitive user experience across various devices and platforms.

This paper presents a comprehensive overview of our proposed face check attendance system, covering the methodology, implementation details, results, and conclusions. Through our innovative approach, we anticipate significant benefits such as improved accuracy, cost-effectiveness, and reduced administrative burden, making attendance tracking more efficient and reliable for educational institutes and organizations alike.

II. RELATED WORK

A computer vision technique called face recognition examines facial feature data to identify an individual. According to experimental data, the video face recognition system can identify faces up to 82% of the time. About 60%less time is

spent with the facial recognition attendance system when compared to the conventional check-in approach [1]. Many facial recognition systems require the input image to be taken under specific parameters, such as controlled lighting, a specific viewing angle, and the absence of any obstructions between the subject's face and the camera. Underregulated circumstances, they are referred to as facial recognition [2]. Due to their inability to be satisfied, these constraints limit the applications of facial recognition in many real-time scenarios. Techniques that do not require rigorous control over humans are necessary for real-time applications in order to recognize faces [3]. Under uncontrolled circumstances, these kinds of devices require face recognition. Thus, this work suggests one such system; nevertheless, the system's limitation is that it requires one image as input and one person per image, which makes it difficult to use in real-time applications such as attendance systems [4]. The main function of biometrics systems is to record and compare biometric features. A person's identifying characteristics are registered when they utilize a biometrics system for the first time, serving as a baseline for comparison in the future. For later use, this reference can be kept on a laptop or server [5]. This real-time GUI-based facial recognition system was developed using Open Face, an open-source technology. Open Facial is a facial recognition program created by Carnegie Mellon University that is based on Open CV. One of the most popular methods for displaying a face image is HOG [6]. The automatic attendance tracking system that does not require human intervention is the topic of this study. This approach involves installing a camera in the classroom, which takes a picture, recognizes faces, compares them to a database, and then logs attendance. Eigen faces are a set of Eigen vectors that are utilized in computer vision to solve the face recognition problem [7]. The author integrated 3 Face Authentication, Raspberry Pi, and NFC technology to be used on the mobile device [8]. An automated approach for managing attendance was proposed by the authors. Based on face detection and identification algorithms, this system recognizes the student when he walks into the classroom and automatically logs his attendance [9]. There is currently a great opportunity to do exciting research in this area because the biometric recognition-based attendance tracking system for education sectors is underutilized [10]. The most popular networking tool that caters to a wide range of user needs and provides an answer for any problem description is the internet. Using the right technology is necessary to create a well-organized and visually appealing web [11]. An ordered sequence is produced by concatenating the patches that make up a face image in raster scan order.Using this order information, DICW finds the best alignment between the query sequence and all sequences of the enrolled subject to calculate the image-to-class distance between a query face and those of that subject [12].

III. PROPOSED SYSTEM

A. Data Collection and Preprocessing:

InThe first step in our methodology involves collecting a dataset of facial images for training the face recognition model. We gather images of individuals who will be enrolled in the attendance system, ensuring diversity in facial expressions, lighting conditions, and backgrounds. These images are then preprocessed to standardize their size, orientation, and color, improving the robustness of the model.

B. Model Training with TensorFlow:

Once the dataset is prepared, we use TensorFlow, a powerful machine learning framework, to train the face recognition model. We employ deep learning techniques, such as convolutional neural networks (CNNs) and transfer learning, to extract discriminative features from the facial images. The model is trained to map each input image to a high-dimensional feature space, where similar faces are clustered closely together.

C. Feature Encoding and Classification:

During training, the face recognition model learns to encode each facial image into a fixed-length vector representation. We utilize state-of-the-art deep metric learning techniques to ensure that similar faces are mapped to nearby points in the feature space. Once trained, the model can efficiently classify new facial images based on their encoded representations

D. Integration with Flutter for Frontend Development:

In parallel with model training, we develop the frontend of the Face Check Attendance System app using Flutter, a

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cross-platform UI toolkit. Flutter allows us to create a visually appealing and user-friendly interface that works seamlessly across Android and iOS devices. We design the app to capture facial images using the device's camera and communicate with the trained face recognition model for attendance tracking.

E. Deployment and Testing:

After the development phase, we deploy the Face Check Attendance System app on test devices to evaluate its performance in real-world scenarios. We conduct extensive testing to assess the accuracy, speed, and reliability of the face recognition model and the overall usability of the app. Any issues or bugs identified during testing are addressed and resolved iteratively.

F. Evaluation and Optimization:

Finally, we evaluate the performance of the Face Check Attendance System app based on predefined metrics, such as accuracy, efficiency, and user satisfaction. We analyze the results obtained during testing and identify areas for optimization and improvement. This may involve fine-tuning the face recognition model, optimizing app performance, or enhancing user experience based on feedback from users and stakeholders.

IV. APP FLOWCHART

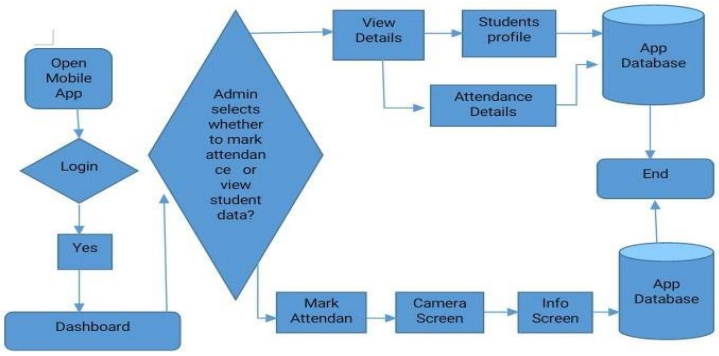

Fig.1. Flowchart of the app

Step 1: Login Authentication

Open the mobile app and enter the login credentials provided by the administrator, including email ID and password. Upon successful authentication, the app redirects the user to the dashboard page.

Step 2: Dashboard Navigation

The dashboard page presents three sections for user interaction:View Student Details
Mark Attendance Today's Attendance

Fig. 2. Dashboard of the app

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Step 3: View Student Details

Upon selecting the "View Student Details" option, the user is directed to the student details page.
Here, users can access two sub-options:View Student Profiles

Fig. 3. Students ID consisting of their details

Step 4: View Attendance Details

Selecting the "View Student Profiles" option allows users to browse through individual student profiles.
Choosing the "View Attendance Details" option displays a comprehensive overview of each student's attendance history stored in the app database.

Fig. 4. Students ID Lisr with their name icons

Step 5:Mark Attendance:

If the user selects the "Mark Attendance" option from the dashboard, the app navigates to the camera screen.
Users are prompted to scan their image using the device's camera. Upon scanning, the captured image is processed and stored securely in the app database for attendance tracking purposes.

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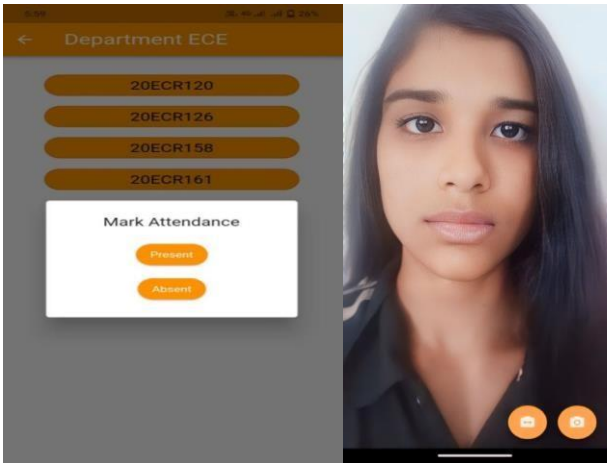

Fig.5. Marking Attendance of the students

Fig.6. Scanning images of the students

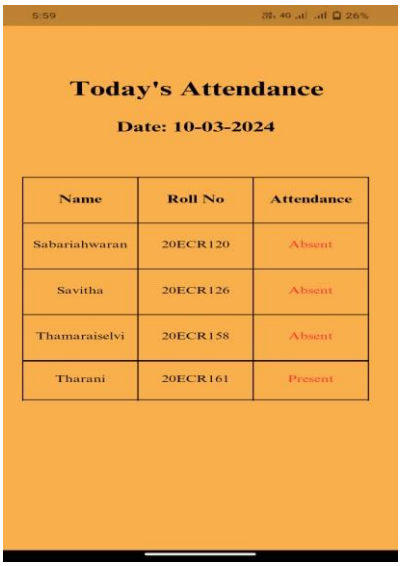

Fig.7. Today Attendance of the students

Step 6: Today's Attendance

Upon selecting the "Today's Attendance" option, users can view the updated version of the attendance records for the current day. The app displays a summary of attendance data, including the names of students or employees marked present on that particular day.

Step 7: Usage Completion

Users can seamlessly navigate between these features to access the functionality offered by the Face Check Attendance app. Upon completion of the desired actions, users can log out or exit the app as needed, ensuring security and privacy of data.

V. RESULTS AND DISCUSSIONS

After successfully implementing the above-mentioned system, we tested the code. The Face Check Attendance System app was successfully implemented.

The Face Check Attendance System app demonstrated promising outcomes in terms of functionality, accuracy, and usability. Through intuitive design and seamless navigation, users could easily access features such as face detection, recognition,and attendance tracking. The facial recognition component, powered by supervised learning techniques, showcased satisfactory performance in identifying individuals based on their facial features. While the model exhibited high accuracy in classifying known faces and verifying attendance records, further optimization may be necessary to address challenges like varying lighting conditions and facial expressions in real-world scenarios.

The successful development of the Face Check Attendance System app underscores the potential of leveraging innovative technologies for attendance tracking and management. Future iterations may focus on enhancements such as real-time face detection, improved model accuracy, and expanded functionalities to cater to diverse user needs. With ongoing refinement and development, the app has the potential to streamline attendance tracking processes across educational institutions, workplaces, and other organizational settings, offering a more efficient and user-friendly alternative to conventional methods.

VI. CONCLUSION AND FUTURE WORK

The development of the Face Check Attendance System app represents a significant step forward in leveraging technology to enhance attendance tracking and management processes. Through the integration of innovative technologies such as facial recognition and machine learning, the app offers a robust and user-friendly solution for accurately recording attendance in various settings. The Face Check Attendance System app holds great promise for revolutionizing attendance tracking processes in educational institutions, workplaces, and other organizational settings. With continued development and innovation, the app has the potential to become a valuable tool for improving efficiency, accuracy, and user experience in attendance management.

There are several avenues for future development and enhancement of the app. Firstly, further refinement of the facial recognition model is warranted to improve accuracy and performance, particularly in challenging conditions such as low light or varying facial expressions. Additionally, the app could benefit from the implementation of real- time face detection capabilities to streamline the attendance tracking process further. Moreover, there is potential to expand the functionality of the app to support additional features and use cases. For example, integration with existing student or employee databases could facilitate automatic enrollment and management of attendance records. Furthermore, incorporating features such as notifications for absentees or reporting tools for administrators could enhance the app's utility and value proposition. Additionally, the app could be extended to support multiple platforms, including web and desktop, to cater to a broader audience. Furthermore, localization efforts could facilitate adoption in diverse geographical regions by offering support for multiple languages and cultural contexts.

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