

Automated Attendance Application using Facial Recognition and Geolocation

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Abstract— Every day, a lot of institutions and organizations waste a lot of time and energy keeping track of attendance and granting access to each individual. Using an access control and attendance tracking system is essential to giving locations like educational institutions superior security. A physical access control system is crucial for safeguarding infrastructure systems, where it is necessary to maintain attendance records, provide prompt access, and secure sensitive regions. This project focuses on a few useful tactics. An acceptable, dependable, accessible, efficient, and economical attendance and access control system will be suggested by the proposed work. The suggested concept includes two distinct approaches for controlling access and keeping track of attendance depending on security level.

Key words—Access control, Attendance monitoring, Face Recognition, Geolocation

I. INTRODUCTION

Our reliance on a vast array of digital applications is growing as the digital world continues to expand. Many times, the most important thing to worry about is making sure that access to these apps is secure and verified. In educational institutions, tracking attendance and allowing access to authorized users is crucial, and the development of these systems is rapidly expanding. It is essential that a location or area to which access is provided be restricted to authorized users only. In addition to access attendance monitoring, reliable person-verification and authentication approaches are becoming more and more important due to the associated problems of impersonation, spoofing, proxy, phishing, and information theft. The issues include: Inadequate visitor and authorized user access procedures; and Inadequate attendance tracking.

The following stages make up the overall system design: Gathering user data, such as the IMEI number,

geolocation and face photo. Attendance is tracked and recorded, and the data is validated using previously collected data. As a result, authorized users are granted access, and attendance is tracked. Unauthorized users are not allowed access.

II. RELATED WORK

Student attendance system in classroom using face recognition technique: Here this technique gives an idea of recording attendance using face recognition technique. Faces are recognized using cameras and the verification is done. Then the attendance is marked. This method is suitable only for moderate number of people and the results obtained are nearly 87% accurate. This method fails to recognize people in bulk quantity and causes error in results also the students do not have access to the system.

Attendance Monitoring System of Students Based on Biometric: This line of track mainly involves extraction of minutiae points from the model fingerprint images and fingerprint matching based on the number of minutiae pairings among to fingerprints. This system ignores the requirement for stationary materials and personnel for keeping of records. The main objective of this project is to develop an embedded system, which is used for security applications.

Due to technical challenges, many colleges continue to use pen and paper to mark attendance.

III. TECHNOLOGY STACK

A. Flutter

Google developed and supports an open-source framework called Flutter. Using a single codebase, Flutter enables frontend and full-stack developers to

create an application's user interface (UI) for several platforms.

Dart is an open-source programming language used by Flutter. Many of Dart's advantages are employed in Flutter, as Dart is well-suited for creating user interfaces.

With Flutter, developers can create cross-platform applications using a single codebase and programming language for many platforms.

B. Facial Recognition

A facial recognition system is an advanced technique that uses an algorithm to analyze a digital picture in order to confirm or determine someone's identification.

It selects specific facial features from a picture and compares them to faces that were previously collected in a database.

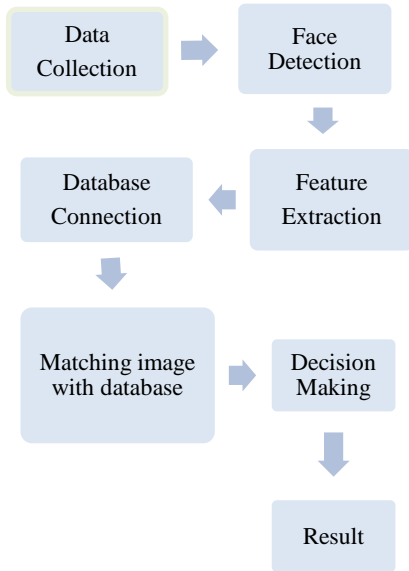


Fig. 1 Process of Facial Recognition

Using regions with convolutional neural networks (R-CNN) for facial recognition and classification: R-CNN is a two-step detection technique. The initial stage determines a subset of areas in a photo that may contain an item. The second step classifies the item in each area.

The R-CNN detector initially creates region proposals with an algorithm like Edge Boxes. The proposed portions are clipped from the image and resized. Next, the CNN categorizes the cropped and resized areas. Finally, the region proposal bounding boxes are refined using a support vector machine (SVM) trained on CNN data.

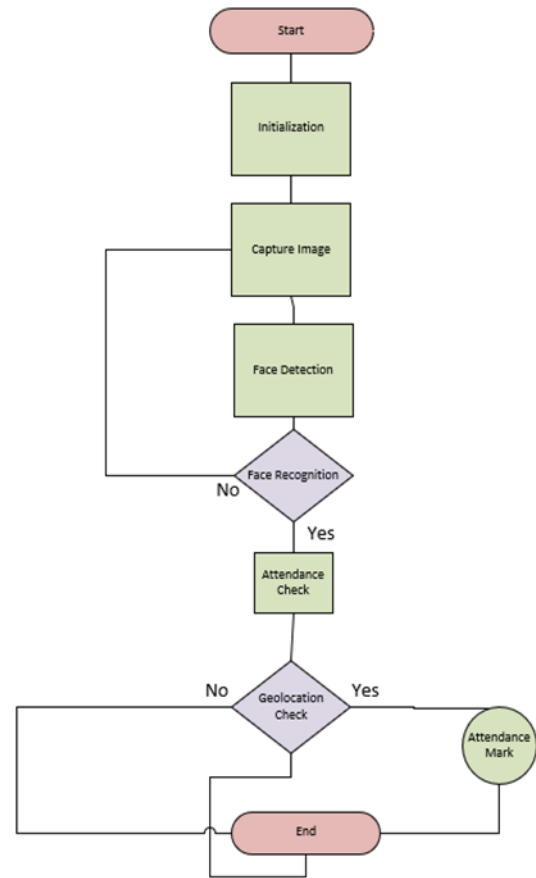


Fig.2 Working of R-CNN for object detection

Models for the object detection utilizing regions with CNNs rely on the following three steps: 1. Identify regions in the image that may contain an item. These regions are known as region proposals. 2. Extract CNN features from region proposals. 3. Classify the objects based on the extracted features.

C. Geolocation

GPS (Global Positioning System) technology is included in the majority of modern mobile phones. When an employee or student uses a mobile app to record their attendance, the app can use the GPS data on the device to locate the location of the user.

D. Node.js

Network applications can be made scalable and effective with the help of Node.js, a server-side JavaScript runtime. Node.js may be used as the backend server for a backend attendance system that uses face recognition and geolocation. It can handle

logic, database connectivity, and interaction with other services.

E. Database

To store attendance records, user information, and other important data, we will use MongoDB.

Interaction with the database will be done using a Node.js package such as Mongoose.

IV. METHODOLOGY

The below figure gives the idea of proposed methodology after collecting the IMEI number from the user. The user will enter the login credentials provided by admin and then go through the following process:

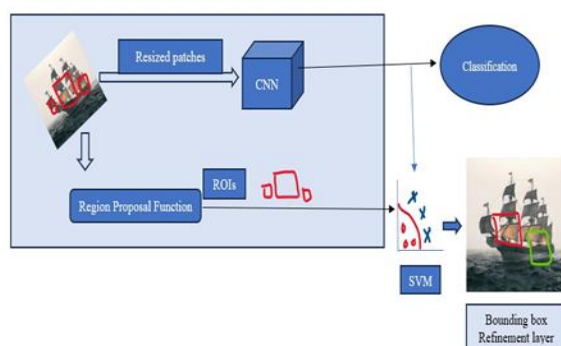


Fig 3. Process of attendance monitoring after user login and collecting IMEI number

V. CONCLUSION

The implemented approach has several advantages over the previous technique, including the ability to conduct lectures with full attention. Because it is totally automated, the likelihood of error in attendance input is reduced. Although the app choices are specific to college standards, the principle of the application is applicable to any academic or organizational level. Face recognition can help decrease RFID card misuse. Linking this software to user information, which users use to check their attendance, will save faculty time and resources significantly. Users will be able to view their attendance on a mobile app and apply for leave. The geolocation service will notify the administrator if the user is not present at the location specified by the administrator. The collection of an IMEI number from the user aids in the authentication of the device, ensuring that no other individual can access the same ID.

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