

National University of Computer & Emerging Sciences
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Automated Attendance System

Project Proposal
Artificial Intelligence [AI]
Section: H

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Introduction

We're working on creating a Facial Recognition Attendance System. Our goal is to use computer vision to change how we keep track of attendance.

Our system will use cameras to process data in real-time. It will use advanced facial recognition technology to quickly identify people and record their attendance accurately. This means no more waiting in lines and no more mistakes – it will be smooth for both administrators and attendees.

Our Facial Recognition Attendance System will make attendance tracking easier and more reliable. It has a simple interface and works quickly to recognize people. This saves time and resources for organizations. Plus, by automating attendance recording, it reduces the chances of mistakes and prevents proxies in universities. This ensures honesty and responsibility in attendance tracking.

Existing System

Several existing systems similar to our Facial Recognition Attendance System have been developed and deployed across various industries and academic research projects. One notable example is the "Facenet: A Unified Embedding for Face Recognition and Clustering" system, which has gained significant traction in the field of facial recognition technology.

Facenet, developed by researchers at Google, presents a unified framework for face recognition and clustering tasks. It employs deep convolutional neural networks (CNNs) to extract high-dimensional embeddings of facial features, enabling accurate identification and clustering of faces. The system achieves state-of-the-art performance on standard face recognition benchmarks, demonstrating its effectiveness in real-world applications.

You can find the research paper on Facenet here:

https://www.cv-foundation.org/openaccess/content_cvpr_2015/html/Schroff_FaceNet_A_Unified_2015_CVPR_paper.html



Problem Statement

Our project targets two key challenges in attendance tracking: 'proxy attendance' where students mark attendance for others and the difficulty in accurately tracking late arrivals and early departures.

Another issue we're addressing is the inefficiency of existing systems, particularly in offices, which struggle to recognize females wearing a niqab. To tackle these problems, we're developing a facial recognition-based attendance system.

Proposed Solution

To address these issues, we're introducing a facial recognition-based attendance system. Our system will track attendance by identifying who attended the class, when they arrived, and how long they stayed.

Additionally, to overcome the challenge of identifying females wearing a hijab, we're implementing a new feature: attendance can also be marked by scanning fingerprints for students not recognized by the facial recognition system.

This solution will ensure accurate attendance records and alleviate the challenges associated with traditional attendance marking methods.

Salient Features

The outstanding features of our project are as follows:

1. **Automated Attendance:** We will utilize the system's camera to detect students' faces and automatically mark their attendance, recording the time of their entry into the classroom.

2. **Attendance Marking Criteria:**

- Students arriving more than 15 but less than 30 minutes late will be marked as 'Late.'
- Students arriving more than 30 minutes late will also be marked as 'Absent.'
- Students leaving the class before 30 minutes will also be marked as 'Absent,' regardless of their early arrival time.



4. Attendance Finalization And Automated Email: At the end of the 55-minute class duration, attendance will be finalized and emailed to the respective teacher in .xlsx format. This allows for any necessary human amendments due to circumstantial reasons.

5. Biometric Verification for Unrecognized Faces: Students whose faces cannot be recognized will be required to biometrically verify themselves upon entry and exit. Failure to do so within 5 minutes of entry will trigger an alarm.

Tools & Technologies

1. Face Detection with OpenCV:

We're using OpenCV to find faces in pictures or videos. OpenCV helps us work with images and do smart things like recognizing faces.

2. Excel Manipulation with Openpyxl:

We're using Openpyxl to handle Excel files. This helps us organize and manage data in Excel sheets, making it easier to work with attendance and other records.

3. Fingerprint Sensor Integration with Pyfingerprint:

We're using Pyfingerprint to connect and work with fingerprint sensors. This allows us to incorporate biometric verification, making the system more secure and efficient.

4. Facial Pattern Detection with dlib:

We're using dlib to detect specific patterns on faces. This can be useful for identifying unique facial features or expressions.

5. Email Automation with Smtplib:

We're using Smtplib to automate email sending. This helps in sending attendance reports or notifications automatically, saving time and effort.

6. Frontend Development (HTML/CSS/JavaScript):

Our frontend is being built with HTML, CSS, and JavaScript. This creates a user-friendly interface that people can interact with easily.

7. Backend Development with Django:

Our backend, powered by Django, handles data processing, user authentication, and business logic. It's like the engine behind the scenes that makes everything work smoothly.

8. Deployment using Heroku and FastAPI:

We're planning to deploy our project using Heroku for hosting the frontend and backend parts. FastAPI helps in building efficient APIs for communication between the frontend and backend systems.