



FACE RECOGNITION ATTENDANCE SYSTEM USING PYTHON

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ABSTRACT: Maintaining discipline and ensuring students acquire maximum knowledge in educational institutions necessitates an efficient attendance system. Conventional methods, such as calling roll numbers or signing against them, often consume significant time and are susceptible to inaccuracies, including proxy attendance. To overcome these limitations, an automated approach integrating facial recognition technology offers a promising solution. This system enhances user-friendliness, minimizes classroom disruptions, and ensures accurate identification, effectively eliminating fraudulent practices. By revolutionizing attendance management, facial recognition-based systems have the potential to transform practices in schools, colleges, and universities, offering broader applications and paving the way for seamless and efficient record-keeping.

Index Terms - Attendance, face identification, Recognizer, OpenCV.

- I. INTRODUCTION :** In this age of technological innovation, traditional methods of classroom management remain prevalent. Attendance, a cornerstone of classroom dynamics and directly tied to students' academic performance, demands efficiency to enhance class participation and learning. Historically, techniques such as roll call and signing against roll numbers have been employed, but these are time-consuming and prone to proxy attendance. To address these shortcomings, we propose automating the attendance process using modern technologies, ensuring a more disciplined and streamlined classroom environment. Facial recognition systems, powered by advanced software, form the foundation of this innovation. As a specialized application of image processing—a field focused on extracting actionable data from digital imagery—facial recognition offers remarkable potential. Image processing plays a pivotal role in technological advancements, utilizing algorithms to analyze digital images and derive meaningful information for human interpretation. This process, central to our project, has applications in diverse areas where imaging data can be paired with predefined algorithms. By leveraging facial recognition, which operates on the complex multidimensional structures of human facial features, this system aims to revolutionize attendance management while illustrating the expansive capabilities of image processing in modern technology.
- II. PROPOSED SYSTEM:** This project aims to develop an automated attendance system leveraging facial recognition technology to streamline classroom management. The system records video feeds, extracts facial

images, and matches them against a pre-existing database to log attendance directly into Excel files. These records can be utilized to generate detailed graphs reflecting attendance trends for the class or individual students. Eliminating the need for teachers' physical presence, the system continuously processes live video streams and updates attendance in real time. Students are required to register by providing necessary details and capturing their facial images for the database. During each session, detected faces in the live feed are compared with stored records, ensuring accurate identification and marking attendees. At the end of each session, attendance reports are automatically sent to the respective faculty members, providing an efficient, reliable, and fraud-proof solution to attendance tracking while promoting classroom discipline.

III. METHODOLOGY: In this project, we propose a method to outline a systematic approach for implementation, ensuring development is carried out in the most feasible and efficient manner. Once students are seated in the classroom, a camera positioned at an optimal height at the front captures an image and initiates the face detection process using advanced techniques. The program then automatically generates a dedicated folder in the database to store the recognized students' information. Pre-stored images of each student are retrieved from the database and utilized for the recognition process. The captured images are matched with the entries in the database to determine if the student is present. In case no match is found, the program proceeds to analyze the next image, ensuring comprehensive and accurate attendance tracking.

IV LITERATURE REVIEW: Facial recognition technology has emerged as a promising innovation in automated attendance systems, supported by advancements in computer vision and image processing. Earlier studies have criticized traditional attendance methods for inefficiencies and susceptibility to proxy practices, emphasizing the need for automation. Researchers have explored algorithms like Viola-Jones and deep learning models to enhance face detection accuracy and speed. Image processing techniques such as feature extraction and pattern matching play a pivotal role in optimizing facial recognition systems for reliable identification. Integrating databases for seamless storage and retrieval further strengthens the operational efficiency of these systems. The application of facial recognition in classrooms not only minimizes manual effort but also improves discipline and eliminates fraudulent practices. However, literature also highlights privacy concerns, necessitating ethical implementation to ensure data protection. This consolidation of findings underscores the transformative impact of facial recognition in attendance tracking while addressing the technological and ethical dimensions.

STUDY OF EXISTING RECOGNITION SYSTEM

1. Fingerprint-Based Recognition System:

- Requires students to pre-configure their fingerprints into a portable device.
- Students must record their fingerprints daily to mark attendance.
- While functional, this method can be time-consuming and cause distractions during classroom activities.

2. RFID (Radio Frequency Identification)-Based Recognition System:

- Students carry identification cards to place them on a reader for attendance logging.
- Attendance records are maintained via RS232 and stored on a connected website.
- Prone to fraudulent usage as students can exchange cards or misuse IDs to falsely mark attendance.

3. Iris-Based Recognition System:

- Involves scanning a student's iris through a camera and comparing the scanned data with pre-stored records.
- Reduces the need for paper-based attendance marking and offers secure record management.
- Raises privacy concerns and requires setting up a compatible wireless network.

4. Face-Based Recognition System:

- Utilizes high-definition cameras to detect individual faces and match them with stored images in the database.
- Efficiently logs attendance but may face challenges like inaccuracies due to improper image capture or missed individuals.
- If no match is found, the captured image is saved as a new entry.

5. Limitations of Existing Systems:

- RFID systems are prone to fraudulent usage.
- Fingerprint systems are time-consuming.
- Iris recognition systems raise concerns about privacy invasion.

6. Proposed Facial Recognition Attendance System:

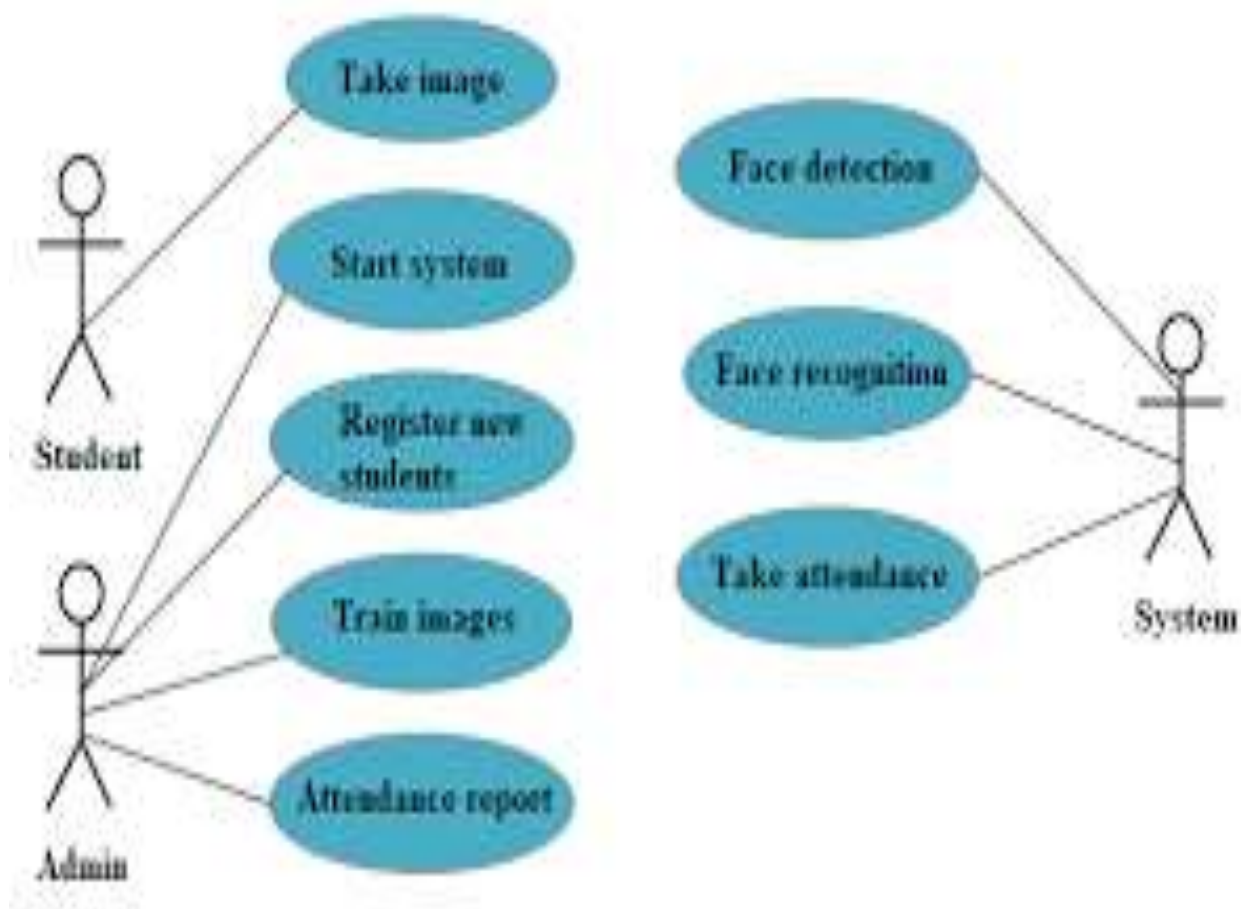
- Designed to overcome the limitations of existing systems.
- Offers a faster, secure, and user-friendly solution while minimizing the risk of fraudulent practices.



V. System Design : Video Capture: A camera is strategically placed at an optimal distance within the classroom to record videos of students during the session.

1. **Frame Extraction from Video:** The recorded video is broken down into individual frames for easier processing, enabling clear detection of students' faces.
2. **Face Detection:** The system scans each frame to identify faces within the image. Once a face is detected, the image undergoes processing to enhance clarity, ensuring the face is easily identifiable.
3. **Facial Recognition:** The detected faces are then matched against the database of pre-registered student images to confirm attendance for each individual.
4. **Post-Processing:** After recognition, the system updates an Excel sheet with attendance records. These records are typically maintained on a weekly or monthly basis to track attendance trends.

VI. System Workflow



A described block diagram above can be explained simply in following ways:

1. Collect essential information about each student, including details such as their name, roll number, student ID, branch, email address, contact number, residential address, class section, class teacher's name, and semester.
2. Capture individual photographs of the students using either a webcam or an external camera, and save these images in .jpg format for later identification.

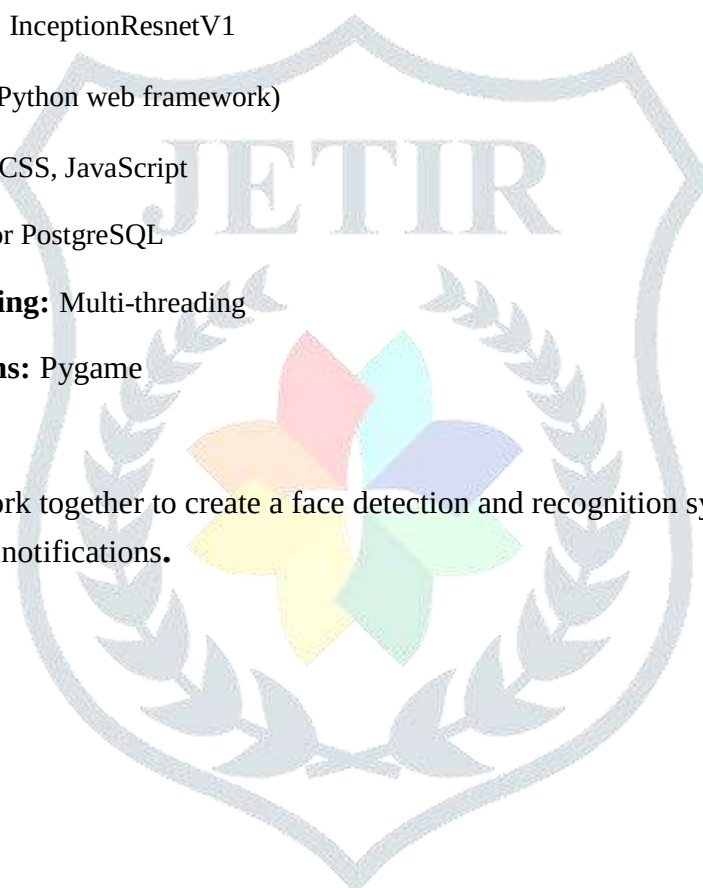
3. Use the stored image data as the basis for identifying specific students during the recognition process.
4. During attendance, the system captures live images or video footage for facial recognition. If the identification is successful, corresponding parameters will be displayed; otherwise, the system will label the individual as "unknown."
5. Once a student is identified, their attendance status and related real-time data are automatically logged in an Excel file, which is generated by the system for record-keeping.

Software Used

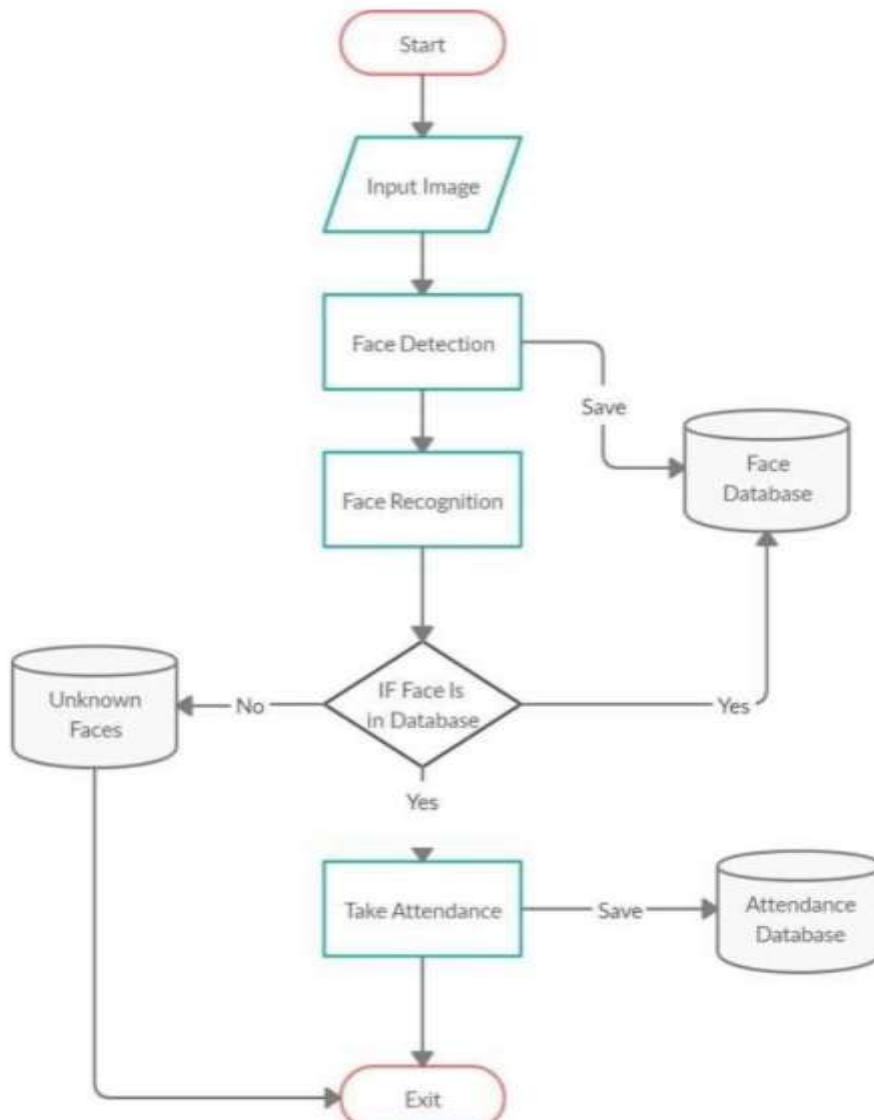
Software Components:

- 1. Face Detection:** MTCNN (Multi-Task Cascaded Convolutional Neural Networks)
- 2. Face Recognition:** InceptionResnetV1
- 3. Backend:** Django (Python web framework)
- 4. Frontend:** HTML, CSS, JavaScript
- 5. Database:** SQLite or PostgreSQL
- 6. Real-time Processing:** Multi-threading
- 7. Sound Notifications:** Pygame

These components work together to create a face detection and recognition system with real-time processing and sound notifications.

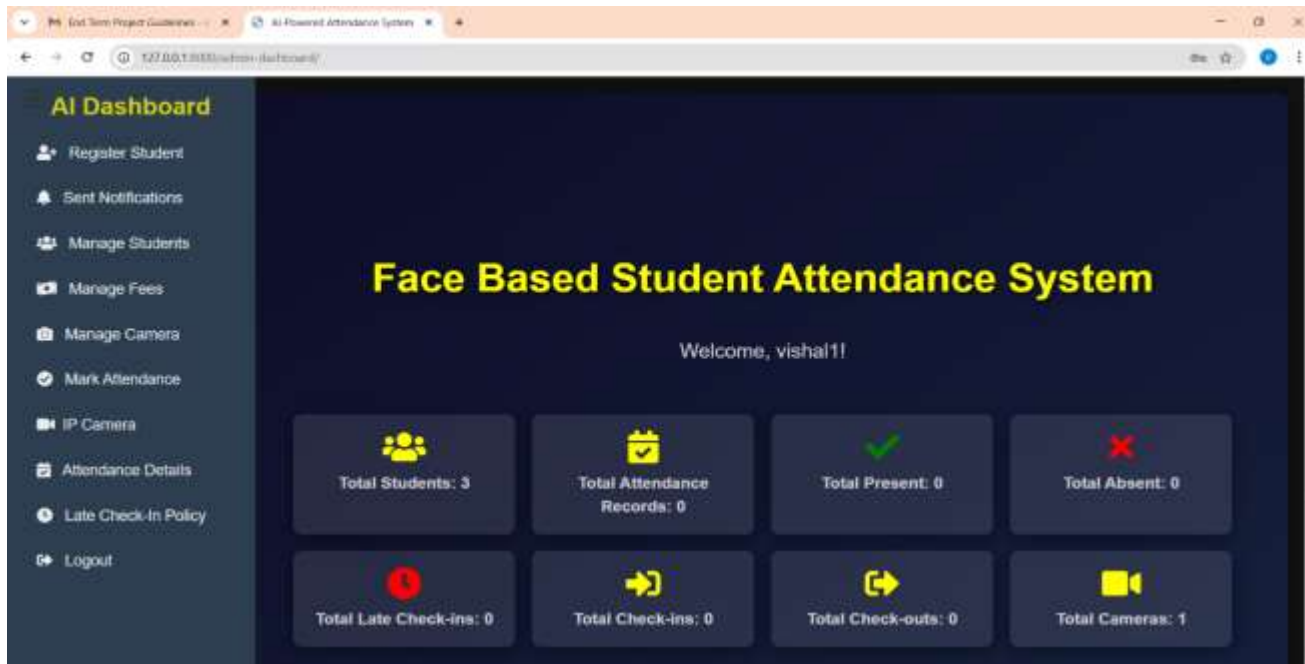


VII. Flowchart



Initially, the system begins by capturing an image through a camera, which can either be built-in or externally connected. The captured image is then stored in the database alongside other student details, such as name, student ID, roll number, contact information, and course details. The next step involves performing facial recognition on the image. If the face exists in the database, the system searches for a match; if no match is found, it is labeled as "unknown." Upon successful identification, the attendance is marked and saved in the database. Once this process is completed, the program concludes its execution, effectively implementing the flowchart

Working Interface of System



This is the opening interface of the system. On successful execution of the program this GUI will appear. Here you will see the various icons/buttons with its functioning name below image. Clicking the particular button will open another GUI window performing specialized task. As we can see, here total of 8 buttons are used . You can add more if you want. This interface is totally created using Tkinter library in python.

VIII. Conclusion:

This project outlines an automated student attendance system based on facial recognition technology. The proposed system identifies individuals by comparing facial images obtained from attendance records with the registered images. Using a facial image captured from a specific frame of the recorded video, the method accurately detects and identifies faces. Additionally, the system includes functionality to display attendance details. With the continuous advancements in digital

IX. FUTURE SCOPE :

This concept will always have room for new development ..

1. Algorithm used can be modified such that it is effective in identifying the faces irrespective of the poor lighting conditions.
2. The system can also be extended to allow better face recognition algorithm in which rotational features of face can be detected efficiently at various angles.

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