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Face Recognition Based Attendance System

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Abstract: ***If attendance is managed manually, it can be quite taxing on the teachers. Smart and automated attendance management systems are being used to address this issue. This architecture makes it simple to address the issue of proxies and students being counted as present even though they are not. The system implemented makes use of the LBPH face recognizer to instantly recognise a person's face. Light has an impact on both Eigen and Fisher faces, and real-world lighting conditions cannot always be ideal. This issue can be solved by a change in the LBPH faces. This method decides who is present and who is not by comparing the images from the test and training sessions. A system-updated excel sheet that contains the attendance information is kept in the database. The faculty can get a copy of the attendance sheet through mail by clicking auto mail button in the GUI. The face recognizer detects faces using Haar Cascade Classifier, and recognizes the faces using Local Binary Patterns Histograms (LBPH) algorithm.***

Keywords: ***Haar Cascade, OpenCV, Attendance system, Face recognition***

I. INTRODUCTION

A facial recognition-based attendance system is the focus of this project for educational institutions. In many universities, the conventional method of commuting to work grading might be a laborious chore. Schools also have the extra duty of noting students' names next to their attendance, which might take up to five minutes for a complete session. This may take some time. The likelihood of a representative varies. As a result, numerous institutions started utilising a variety of alternative recording techniques, including the use of RFID , iris recognition , fingerprint recognition, and others. These online-based solutions can, however, be time-consuming and disruptive in their operation. A highly significant biometric feature that is both accessible and inconspicuous has been established through face recognition. face-based systems that don't take many facial expressions into account. Verification and facial recognition are the two phases of the face recognition programme. Face-to-face image processing is compared in a 1: 1 matching process for face verification, and there is a 1: N comparison process for face query images. This strategy aims to develop a travel itinerary using face recognition techniques. A person's face is regarded as a symbol of presence in this context. Facial recognition technology is becoming more and more prevalent today. We proposed a facial recognition system in the live video class in the middle of this page, and participants will be tagged when the found face is discovered on the website. The time required by this new technology will be shorter than it would be with current practises.

II. PROPOSED DESIGN

Accuracy, effectiveness, and security of attendance tracking are all goals of the proposed facial recognition attendance system. The system will utilise specialised hardware and software to capture and recognise faces, doing away with the need for manual processes like sign-in sheets or biometric systems that use fingerprints or handprints. Administrators, professors, and students/employees will all have a streamlined interface on the proposed system, making it user-friendly. Real-time attendance statistics can be generated by the system, and it offers data analysis tools for identifying attendance trends and patterns. The suggested solution will also put security measures in place to safeguard personal data and guarantee adherence to data protection laws. The suggested system's overall goal is to develop an accurate and effective method of tracking attendance that conserves time and money while enhancing accuracy and security.

III. MODULES

A. Check Camera

This module uses the OpenCV library to detect and draw rectangles around faces in real-time video captured from a webcam. It starts by importing the necessary modules and loading the pre-trained face detection cascade classifier. Then, it initializes the video capture from the webcam. Inside the main loop, it reads each frame from the video, converts it to grayscale, and applies the face detection algorithm to detect faces in the frame. For each detected face, a rectangle is drawn around it. The modified frame is displayed in a window titled "Webcam Check". The loop continues until the user presses the 'q' key, at which point the video capture is released and the windows are closed.

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B. Train Images

The model reads each image in the directory, converts it to grayscale, converts it to a numpy array, and extracts the ID from the filename (assuming that the ID is the integer after the first dot in the filename). The function used in the project returns two lists: faces contains the numpy arrays of the images and Ids contains the IDs associated with each image.

C. Recognize faces

The face recognizer detects faces using Haar Cascade Classifier, and recognizes the faces using Local Binary Patterns Histograms (LBPH) algorithm. Then, it matches the recognized faces with the faces in the student details CSV file to get the corresponding student name. If the match is above a certain confidence threshold, the program marks the employee as present and logs the attendance with the student ID, name, and time stamp in a CSV file named "Attendance-[Date]-[Time].csv". If the CSV file already exists, it will append new attendance data to the existing file. The program will continue to run until the user presses the 'q' key to quit.

D. Automatic Mail

The module imports necessary modules from the smtplib library to send an email with attachments using the Simple Mail Transfer Protocol (SMTP). It defines the sender's email address, password, and the recipients' email addresses. The email message is created using MIMEMultipart, and a CSV file attachment is added using MIMEBase. Finally, the email is sent using an SMTP server by establishing a connection, logging in, and using the sendmail method to send the message.

IV. OUTPUT

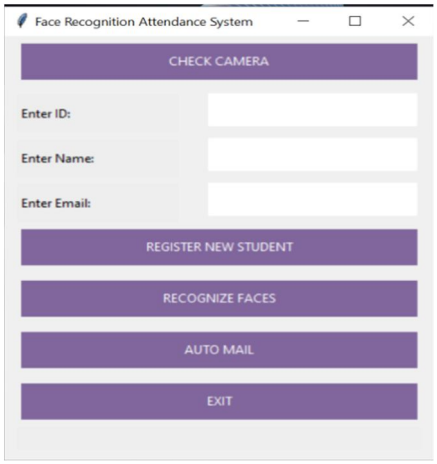


Figure 1: Graphical User Interface

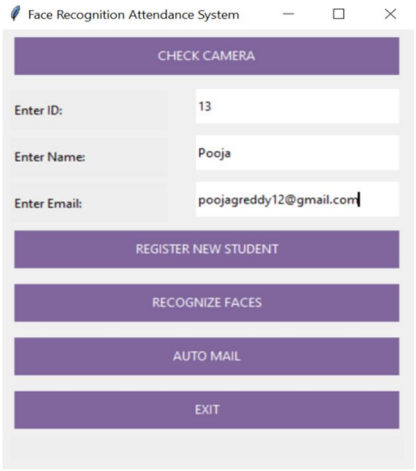


Figure 2: Enter Details for Registering new student

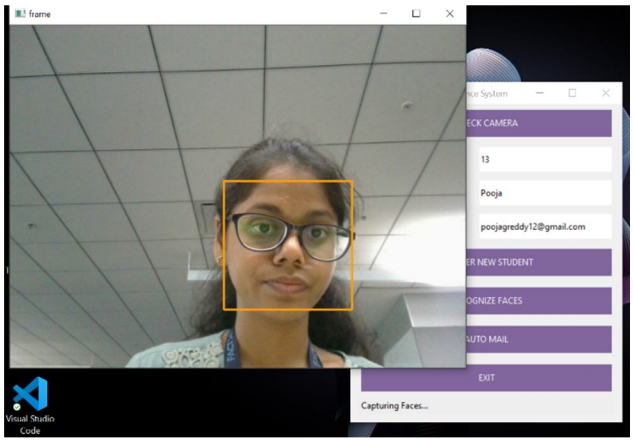


Figure 3: Capturing faces for new student registration

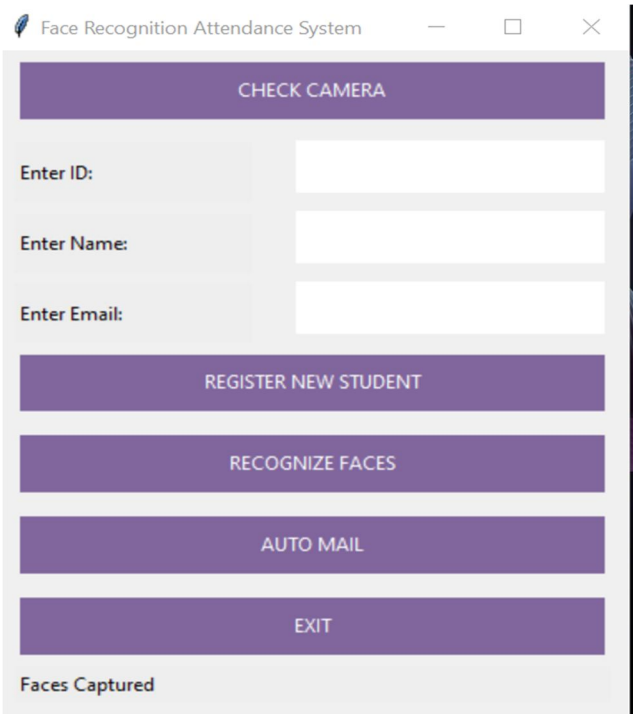


Figure 4: New student registration is complete and model has been trained

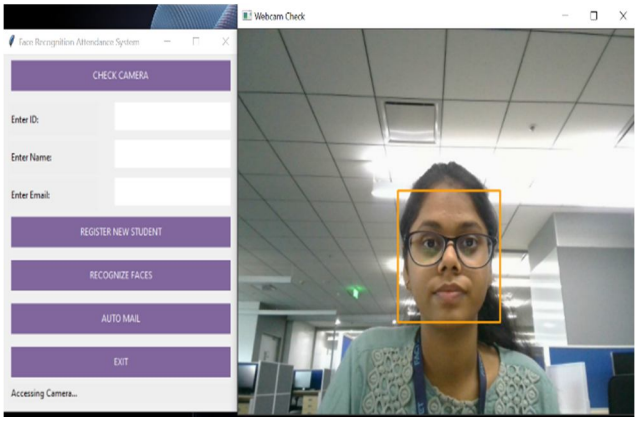


Figure 5: Check camera

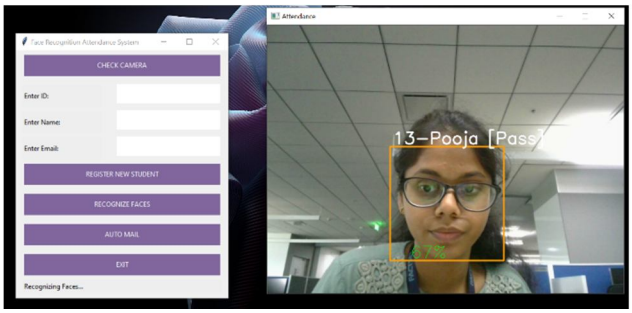


Figure 6: Attendance

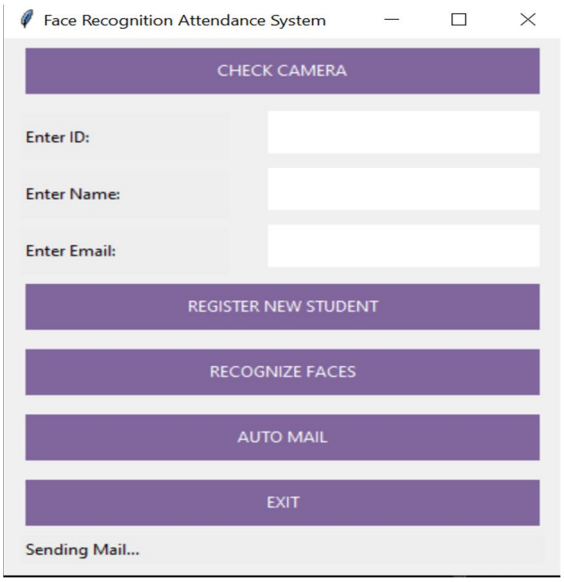


Figure 7: Sending mail using auto mail

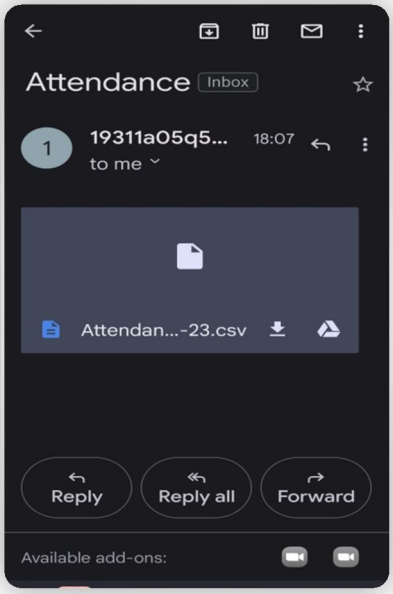


Figure 8: Mail sent through auto mail

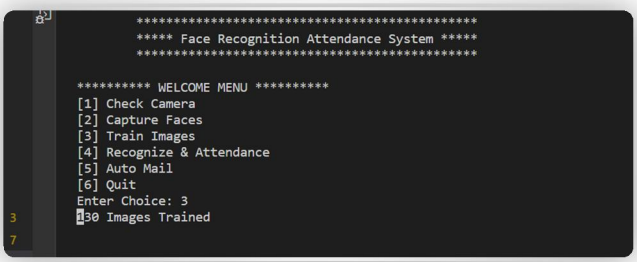


Figure 9: Command line interface

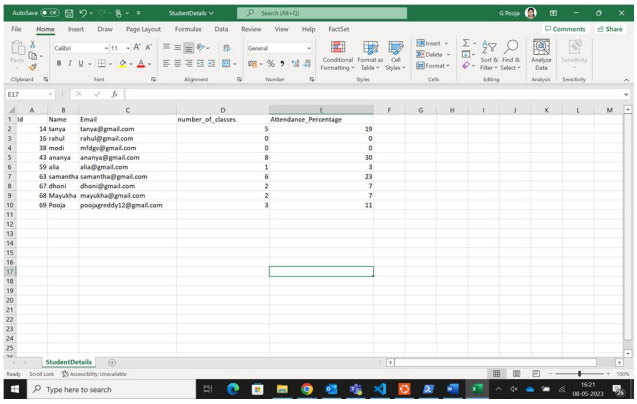


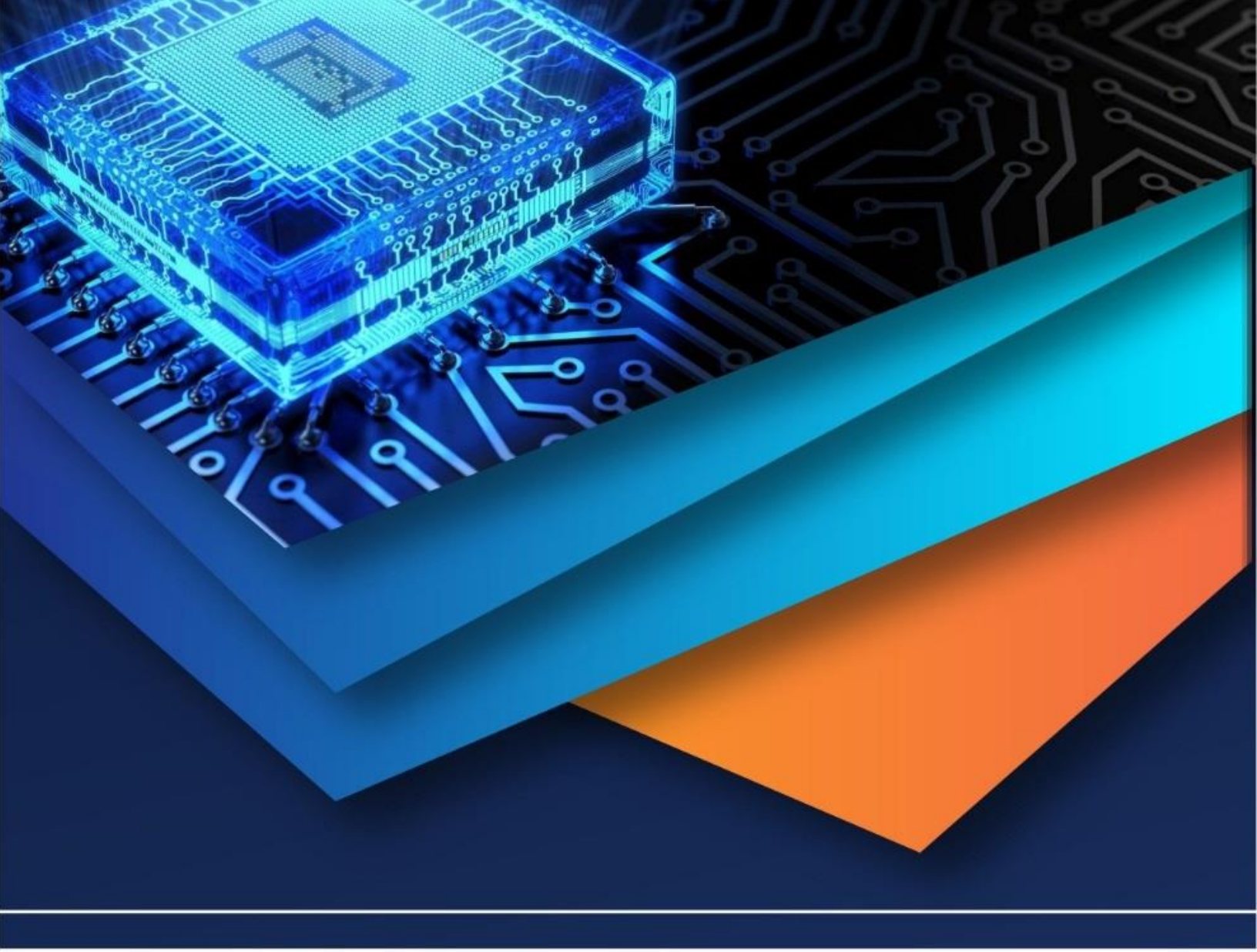
Figure 10: Student attendance

V. CONCLUSION

We successfully developed a face recognition-based attendance management system. In our system for managing attendance, students are first registered using the "Register New Student" feature; attendance may then be added using the "Recognize Faces" feature; and if the faculty wants an attendance file, they can simply use the "Automail" option, which sends mail automatically with just one click. We have used the Haar cascade algorithm for face detection and the local binary histogram pattern algorithm for face recognition.

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