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ATTENDANCE SYSTEM USING CNN FACE RECOGNITION ALGORITHM

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Abstract: An attendance system using face recognition technology with a defaulter list is a system that uses facial recognition algorithms to identify and record attendance for individuals. The system maintains a database of individuals with their images, and when an individual comes in front of the camera, the system recognizes the face and records attendance accordingly. The system also has a defaulter list, which includes the names of individuals who are expected to attend but have not done so. The defaulter list is created based on the attendance record and can be used to take appropriate actions, such as sending notifications or reminders to the individuals. The system uses computer vision algorithms to extract features from the face, such as distance between the eyes, nose shape, and mouth shape, to recognize the person. The system compares the extracted features with the features stored in the database to identify the person. The system can be used in various settings, such as schools, colleges, and offices, where attendance needs to be recorded regularly. The system can help save time and effort by automating the attendance recording process, and the defaulter list can help ensure that all individuals attend as required. Overall, an attendance system using face recognition with a defaulter list can be a useful tool in managing attendance and ensuring that individuals attend as required.

Index Terms - Attendance System, Face Recognition, Machine Learning, CNN Algorithm

I. INTRODUCTION

An attendance system using face recognition technology with a defaulter list is a system that allows for automated tracking of attendance in a given environment, such as a classroom or workplace. The system uses a camera or other imaging device to capture images of individuals, and then applies facial recognition algorithms to identify individuals and match them against a database of authorized personnel. The system can be set up to generate a list of individuals who are not present or who are late, known as the defaulter list. This list can be used for various purposes, such as tracking attendance, monitoring tardiness, or identifying individuals who are consistently absent or late. The attendance system using face recognition technology has several advantages over traditional attendance tracking methods, such as paper sign-in sheets or card-swipe systems. It can be more efficient, accurate, and secure. It can also save time and reduce errors by eliminating the need for manual data entry or verification. Overall, an attendance system using face recognition with a defaulter list can provide a powerful tool for organizations to monitor attendance and improve accountability, while also ensuring that authorized personnel are the only ones granted access to the premises.

Every organization requires a robust and stable system to record the attendance of their students. and every organization have their own method to do so, some are taking attendance manually with a sheet of paper by calling their names during lecture hours and some have adopted biometrics system such as fingerprint, RFID card reader, Iris system to mark the attendance. The conventional method of calling the names of students manually is time consuming event. The RFID card system, each student assigns a card with their corresponding identity but there is chance of card loss or unauthorized person may misuse the card for fake attendance. While in other biometrics such as finger print, iris or voice recognition, they all have their own flaws and also they are not 100% accurate [1] [19]. Use of face recognition for the purpose of attendance marking is the smart way of attendance management system. Face recognition is more accurate and faster technique among other techniques and reduces chance of proxy attendance. Face recognition provide passive identification that is a person which is to be identified does not to need to take any action for its identity [2].

Face recognition involves two steps, first step involves the detection of faces and second step consist of identification of those detected face images with the existing database. There are number of face detection and recognition methods introduced. Face recognition works either in form of appearance based which covers the features of whole face or feature based which covers the geometric feature like eyes, nose, eye brows, and cheeks to recognize the face [3].

Our system uses face recognition approach to reduce the flaws of existing system with the help of machine learning, it requires a good quality camera to capture the images of students, the detection process is done by histogram of oriented gradient. And recognizing performs through deep learning. The frontend side (client side) which consists of GUI which is based on electron JS and backend side consist of logic and python (server side), an IPC (Inter Personal Communication) bridge is developed to communicate these two stacks. The images capture by the camera is sent to system for further analysis; the input image is then compared with a set of reference images of each of the student and marks their attendance.

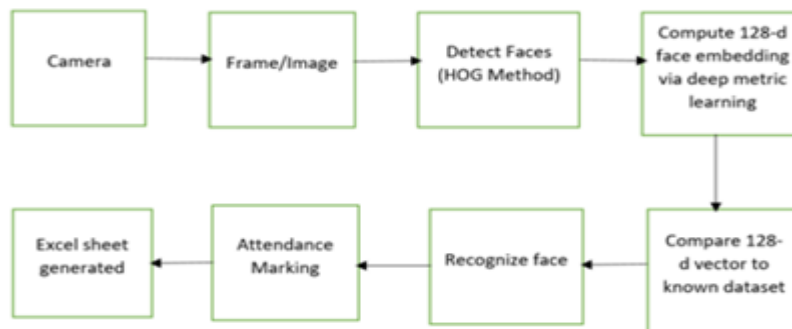


Fig.1.1: Flow of the system

II. LITERATURE REVIEW

Attendance Management System using Facial Recognition [1]: The conventional way of taking attendance leads to proxy through friends thus reducing effectiveness. So for that we choose bio-metrics but this lacks reliability and then we go for face recognition technology which is efficient & time saving. It works in 4 states as Image Capturing, Face Detection, Face Comparison and Updating of Attendance in Database.

Attendance Management System [2]: In the growing virtual world, this research paper deals about whole class attendance through face recognition that captures the image of a human entity & checks from the existing database, then result will put in MySQL having accuracy of 99%.

Implementation of Face Recognition Algorithm for Bio-metrics Based time Attendance System [3]: Face recognition starts with taking out the features of face like breadth of mouth, width of pupil in eyes & checks it from already existing database. Many papers are published that contains facial feature extraction, face recognition implementations. The major focus over it is best face recognition up-to 95% similar.

Attendance Monitoring System Based on Face Recognition [4]: Understanding the scenario, to make the different task of institutions & organizations fruitful, face recognition feature comes into use that takes out facial features & changes into numeral format. An automatic mail system sends mail to all the students or staff.

Attendance Monitoring System using Facial Recognition with Audio Output [5]: The manual approach of keeping track of class attendance and keeping a journal is ineffective. Since, bunking classes or appointing proxies for absentees has become a popular pastime among today students. Manual Attendance entry in logbooks becomes a laborious chore that can be readily manipulated. As a result, the purpose of this work is to offer an automatic attendance system.

Automatic Attendance Management System using Face Detection [6]: The automatic attendance management system will replace the time-consuming and difficult-to-maintain manual system. In this study, we shall address attendance without the need of humans. This method involves installing a camera in the classroom that captures images, detects faces, compares them to a database, and then registers attendance. If a student's attendance is marked as absent, a notice notifying their parents of their child's absence are sent. A multitude of methods exist for comparing faces. The Eigen face of the procedure is the one. Eigen faces are a set of Eigen vectors used in computer vision to solve the face recognition problem.

CNN Based Efficient Face Recognition Technique using D-lib [7]: Despite breakthroughs in face recognition, it has received a lot more attention in the scientific and business sectors in recent decades. This research proposes a Deep Learning-based face recognition system that uses Convolutional Neural Networks (CNN) with D-lib face alignment.

III. PROPOSED SYSTEM

An attendance system using face recognition with a defaulter list is a proposed system that uses facial recognition technology to automatically record attendance and identify individuals who are absent or tardy. Here are the main components and features of the proposed system:

- **Face Recognition Technology:** The system will use advanced face recognition algorithms to identify individuals based on their facial features. This technology can accurately identify people even in low-light or high-traffic environments, making it ideal for use in busy schools, universities, or businesses.

- **Attendance Tracking:** The system will record attendance automatically based on facial recognition, eliminating the need for manual check-ins or paper-based systems. This will save time and improve accuracy, as well as reducing the risk of errors or fraud.
- **Defaulter List:** The system will maintain a list of individuals who have been absent or tardy, allowing teachers or managers to easily identify students or employees who are falling behind. This list can be sorted by date or time, making it easy to track trends and patterns over time.
- **Notifications:** The system can be configured to send notifications to teachers or managers when individuals on the defaulter list are detected, allowing them to take action and provide support as needed. This can help improve attendance and performance over time.
- **Reporting:** The system will generate reports and analytics on attendance and defaulter rates, allowing administrators to track progress and identify areas for improvement. This data can be used to inform decision-making and drive positive change in schools, universities, or businesses.

Overall, an attendance system using face recognition with a defaulter list has the potential to significantly improve attendance tracking and support for students or employees who are struggling. By leveraging the latest in facial recognition technology, this system can help schools, universities, and businesses streamline attendance tracking and improve outcomes for all.

IV.SYSTEM IMPLEMENTATION

An attendance system using face recognition with a defaulter list implementation can be developed using the following steps:

- Collect a dataset of facial images for each individual who needs to be enrolled in the system. The dataset should include images captured from different angles and under different lighting conditions to improve accuracy.
- Train a machine learning model, such as a convolutional neural network (CNN), on the collected dataset. The model should be trained to recognize each individual's face and associate it with their unique identifier.
- Implement a real-time face detection and recognition system using the trained model. The system should capture images of individuals as they enter the attendance area and compare them to the enrolled dataset to determine their identity.
- Maintain a database of all individuals enrolled in the system and their attendance records. The attendance records should include the individual's name, unique identifier, and timestamp of entry.
- Implement a defaulter list feature in the system that tracks individuals who have missed a certain number of attendance sessions. The number of missed sessions required to be added to the defaulter list can be set by the system administrator.
- Generate daily reports of attendance records and defaulter lists to provide the administrator with a comprehensive overview of the attendance status of all individuals enrolled in the system.
- Add a notification system to the defaulter list feature to alert the administrator when an individual is added to the list. The notification can be sent via email or SMS.

By following these steps, an attendance system using face recognition with a defaulter list implementation can be developed to efficiently track attendance and identify individuals who have missed a certain number of sessions. This can be useful in educational institutions, workplaces, and other settings where attendance is important.

CNN Algorithm:

dlib: Dlib is a modern C++ toolkit containing machine learning algorithms and tools for creating complex software in C++ to solve real-world problems.

Face Recognition: The face recognition library, created and maintained by Adam Geitgey, wraps around dlib facial recognition functionality.

Opencv: for some image pre-processing.

Now that you have downloaded all the important libraries, let's import them to build the system.

```
import cv2

import numpy as np

import face_recognition
```

Load images: After importing libraries you need to load an image.

face_recognition library loads images in the form of BGR, in order to print the image you should convert it into RGB using OpenCV.

```
imgelon_bgr = face_recognition.load_image_file('elon.jpg')

imgelon_rgb = cv2.cvtColor(imgelon_bgr,cv2.COLOR_BGR2RGB)

cv2.imshow('bgr', imgelon_bgr)

cv2.imshow('rgb', imgelon_rgb)
```

```
cv2.waitKey(0)
```

Find the face location and draw bounding boxes: You need to draw a bounding box around the faces in order to show if the human face has been detected or not.

```
imgelon = face_recognition.load_image_file('elon.jpg')
imgelon = cv2.cvtColor(imgelon,cv2.COLOR_BGR2RGB)
#-----Finding face Location for drawing bounding boxes-----
face = face_recognition.face_locations(imgelon_rgb)[0]
copy = imgelon.copy()
#-----Drawing the Rectangle-----
cv2.rectangle(copy, (face[3], face[0]),(face[1], face[2]), (255,0,255), 2)
cv2.imshow('copy', copy)
cv2.imshow('elon',imgelon)
cv2.waitKey(0)
```

Train an image for face recognition: This library is made in such a way that it automatically finds the face and works on only faces, so you don't need to crop the face out of

Training: At this stage, we convert the train image into some encodings and store the encodings with the given name of the person for that image.

```
train_elon_encodings = face_recognition.face_encodings(imgelon)[0]
```

Testing: For testing, we load an image and convert it into encodings, and now match encodings with the stored encodings during training. This matching is based on finding maximum similarity. When you find the encoding matching the test image, you get the name associated with train encodings.

```
# lets test an image
test = face_recognition.load_image_file('elon_2.jpg')
test = cv2.cvtColor(test, cv2.COLOR_BGR2RGB)
test_encode = face_recognition.face_encodings(test)[0]
print(face_recognition.compare_faces([train_encode],test_encode))
```

V. RESULT AND DISCUSSION

An attendance system using face recognition technology can be a reliable and efficient way to manage attendance records in various settings, such as schools, universities, or workplaces. Face recognition technology can accurately identify individuals and mark their attendance without the need for manual input or human intervention.

One potential feature of this system could be a defaulter list. The defaulter list would be a record of individuals who have failed to meet attendance requirements, such as missing a certain number of classes or arriving late repeatedly. The system would automatically flag these individuals as defaulters and add them to the list.

The defaulter list can serve as a valuable tool for teachers or supervisors to monitor attendance and address any issues with students or employees who may be struggling to meet attendance requirements. The list can also help identify patterns or trends in attendance and inform decisions about interventions or support.

It is important to consider potential concerns about privacy and security when implementing a system that uses face recognition technology. Organizations must ensure that they are collecting and storing data in compliance with relevant privacy laws and regulations. Additionally, it is important to implement security measures to protect the data and prevent unauthorized access.

In conclusion, an attendance system using face recognition technology can be an efficient and reliable way to manage attendance records. The addition of a defaulter list can provide valuable insights and help address attendance issues. However, organizations must ensure that they are complying with relevant privacy laws and implementing security measures to protect data.

	A	B	C	D
1	SrNo	Rollno	Name	WBP
2	1	9821	sudarshan date	100
3				
4				

Fig.5.1: Attendance Records in Excel Sheet

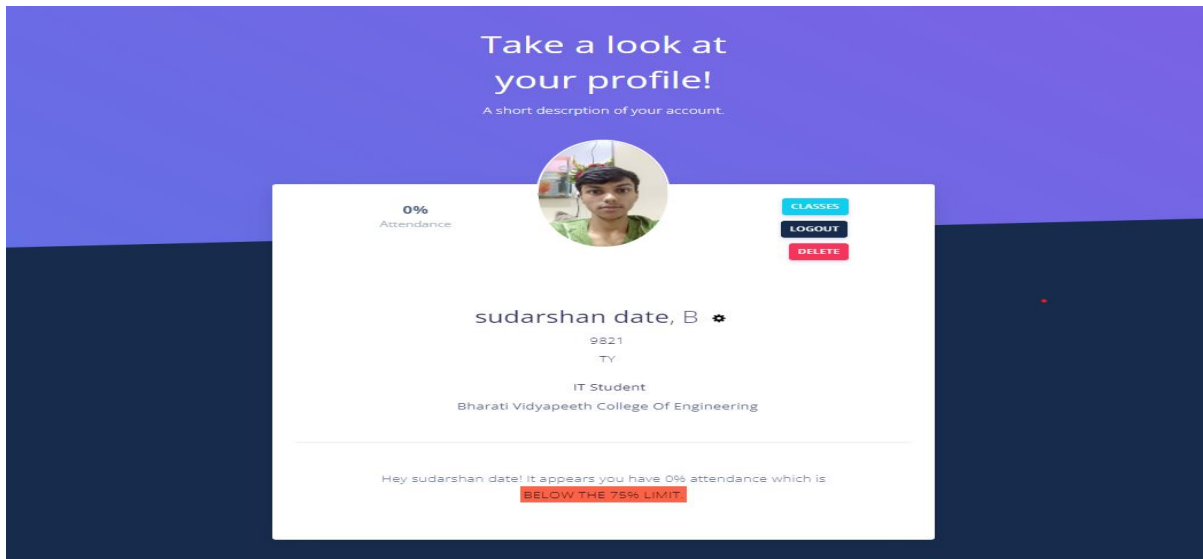


Fig.5.2: Students Profiles page

The admin upload students profile using Students Profile Page as shown in fig. 5.2.

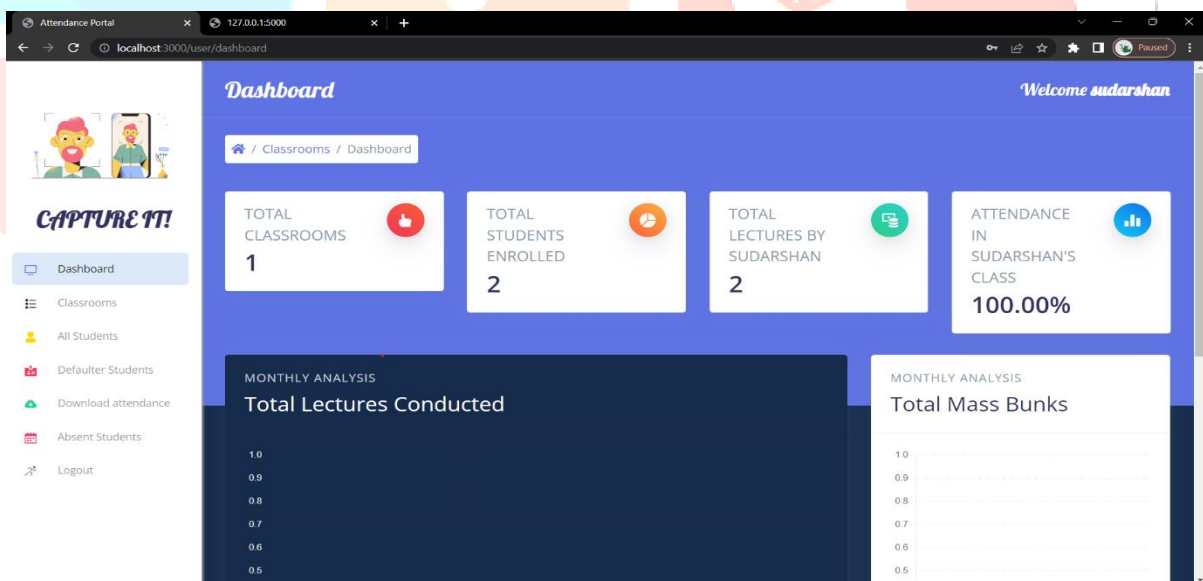


Fig 5.3: Teacher dashboard

The admin add students in classroom and then teacher takes attendance of students using Teacher Dashboard page as shown in fig. 5.3.

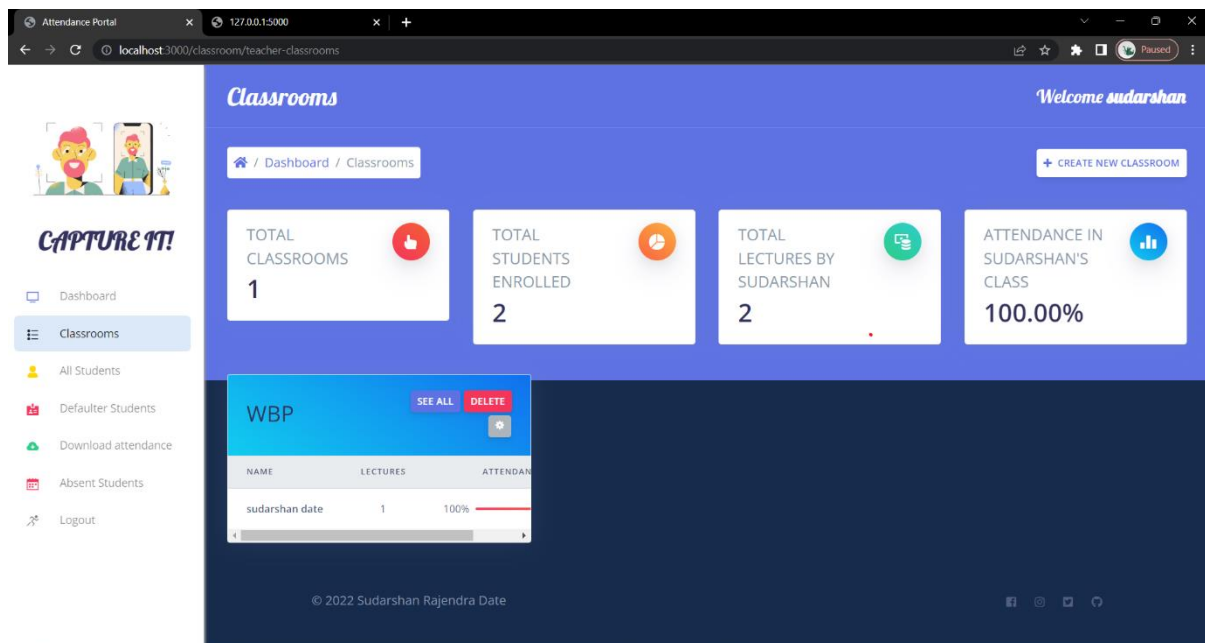


Fig.5.4: Classroom Dashboard

The admin adds classroom subject wise using Classroom Dashboard page as shown in fig. 5.4.

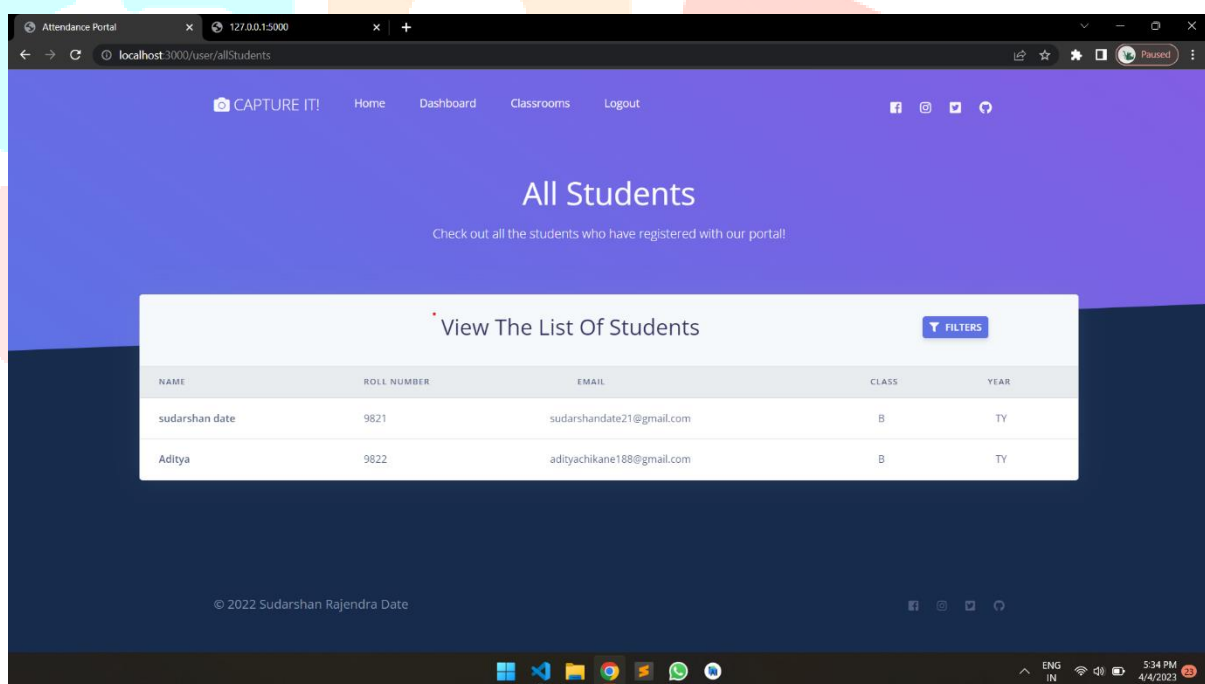


Fig.5.5: All students List

The teacher can view all student of respective class using all student page as shown in fig.5.5

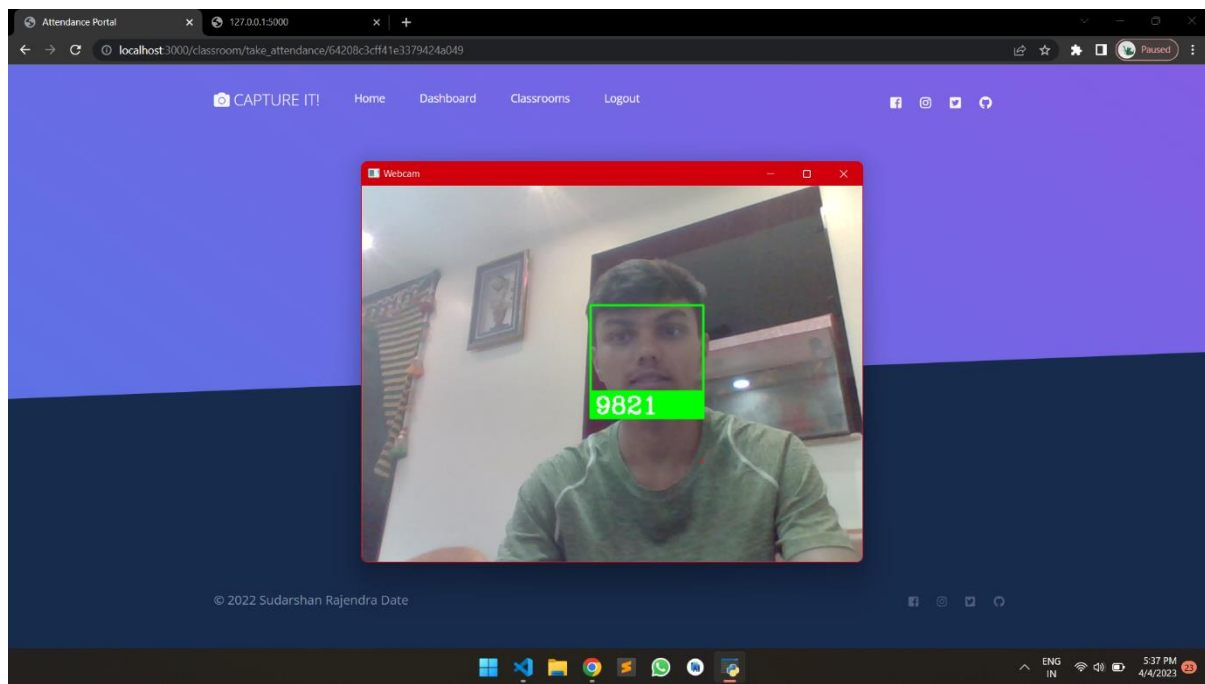


Fig.5.6: Taking Attendance

The teacher takes students attendance using Capture It page as shown in fig.5.5

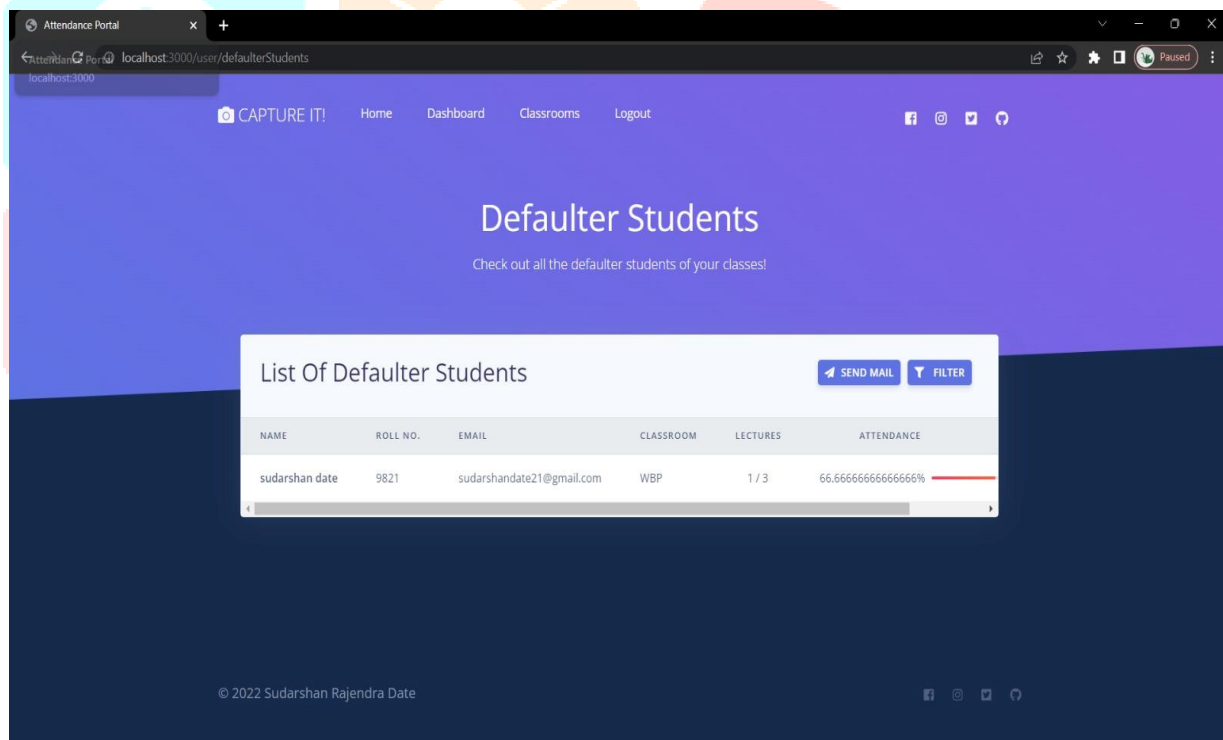


Fig.5.7: Defaulter Student

The email is send to those students who are in defaulter list using Defaulter Students page as shown in fig. 5.7

CONCLUSION

An attendance system using face recognition technology can provide an efficient and accurate way to keep track of employee or student attendance. With the use of facial recognition, individuals can easily be identified, and attendance can be automatically recorded without the need for manual input.

One potential feature of such a system could be the creation of a defaulter list. This list would consist of individuals who have consistently failed to attend classes or work shifts. By identifying these individuals, management can take appropriate action, such as counseling or disciplinary action, to improve attendance and ensure productivity.

In conclusion, a face recognition-based attendance system with a defaulter list could be an effective tool for managing attendance in educational institutions or workplaces. The use of facial recognition technology can help reduce the likelihood of errors and improve efficiency, while the defaulter list can provide a means of addressing attendance issues in a timely and effective manner. However, it is important to ensure that such systems comply with data protection and privacy regulations to prevent any misuse of personal information.

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