

AUTOMATED ATTENDANCE SYSTEM USING FACE RECOGNITION

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ABSTRACT - In the traditional attendance system, it is difficult to handle the attendance of vast students in a classroom. The process is laborious and has a high probability of error during the process of inputting data into the computer. Face Recognition is used as one of the solutions to handle a bulk of students' attendance. Face Recognition is a process of recognizing the students face for taking attendance by using face biometrics. In this paper, a computer system will be able to find and recognize human faces fast that are being captured through a camera. LBPH (Local binary pattern histogram) algorithm is used for face recognition by using Python programming and OpenCV library.

Keywords - Face Recognition, LBPH algorithm, OpenCV library.

I. INTRODUCTION

The technology aims in imparting tremendous knowledge-oriented technical innovations these days. Machine Learning is one among the interesting domain that enables the machine to train itself by providing some datasets as input and provides an appropriate output during testing by applying different learning algorithms. Now-a-days attendance is considered as an important factor for both the student and the teacher of an educational organization. With the advancement of the Machine Learning technology, the machine automatically detects the attendance of the students and maintains a record of collected data. In general, the attendance system of the student can be maintained in two different forms namely, Manual Attendance System (MAS) and Automated Attendance System (AAS). Manual Student Attendance Management system is a process where a

teacher concerned with the particular subject need to call the students name and mark the attendance manually. Manual attendance may be considered as a time-consuming process or sometimes it happens for the teacher to miss someone, or students may answer multiple times on the absence of their friends. So, the problem arises when we think about the traditional process of taking attendance in the classroom. To solve all these issues, we go with Automatic Attendance System (AAS).

Drawbacks of various Attendance systems:

- RFID-based: Fraudulent usage
- Fingerprint-based: Time consuming for students to wait and give their attendance
- Iris-based: Invades the privacy of the user.

There are two phases in Face Recognition Based Attendance System:

1. Face Detection: It is a method of detecting faces in the images. It is the first and essential step needed for face recognition. It mainly comes under object detection: for example, car in an image or any face in an image and can be used in many areas such as security, bio-metrics, law enforcement, entertainment, personal safety, etc.

2. Face Recognition: It is a method of identifying or verifying a person from images and videos that are captured through a camera. Its key role is to identify people

in photos, video, or in real-time.

1.1. LITERATURE SURVEY

Smart Attendance Monitoring System: A Face Recognition based Attendance System for classroom environment overcomes the problem of the manual method of existing system. It even captures the facial expression, lighting and pose of the person for taking attendance.

RFID based attendance system is used to record attendance. In this method, students need to place RFID and ID card on the card reader. Then the attendance is recorded for the respective student in the database. But, the problem of fraudulent access is going to rise from this method.

1.2. METHODOLOGY

Local Binary Pattern Histogram:

LBPH (Local Binary Pattern Histogram) is a Face-Recognition algorithm. It is used to recognize the face of a person. It is known for its performance and how it is able to recognize the face of a person from both front face and side face. The need for facial recognition systems increasing day by day as per today's busy schedule. They are being used in entrance control, surveillance systems, smartphone unlocking etc.

The LBPH algorithm uses 4 steps:

1. Training the Algorithm: First, we need to train the algorithm. To do so, we need to use a dataset with the facial images of the people to be recognized. It is also needed to set an ID (it may be a number or the name of the person) for each image, so the algorithm will use this information to recognize an input image and gives an output. Images of the same person must have the same ID.

2. Applying the LBP operation: The second step of the LBPH is to create an intermediate image that describes the original image in a better way, by highlighting the facial characteristics. To do

so, the algorithm uses a concept of a sliding window, based on the parameter's radius and neighbors.

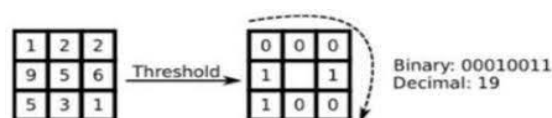


Fig 1. LBP operation

3. Extracting the Histograms: Now, using the image generated in the last step, we can use the Grid X and Grid Y parameters to divide the image into multiple grids, as can be seen in the following image:

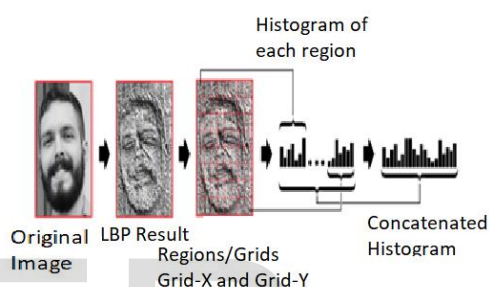


Fig 2. Extraction of Histogram

Based on the above image, we can extract the histogram of each region as follows:

As we have an image in grayscale, each histogram (from each grid) will contain only 256 positions (0~255) representing the occurrences of each pixel intensity. Then, we need to concatenate each histogram to create a new and bigger histogram.

4. Performing the face recognition: In this step, the algorithm is already trained. Each histogram created is used to represent each image from the training dataset. So, given an input image, we perform the steps again for the new image and create a histogram which represents the image. So, to find the image that matches the input image we just need to compare two histograms and return the image with the closest histogram.

II. BLOCK DIAGRAM

The five major operations performed by the Face Recognition is shown below:

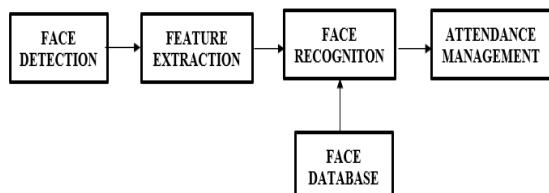


Fig 3. Block diagram of Face Recognition System

- **Face Detection:** In this step, the face is detected by the system.
- **Feature Extraction:** Here, we need to perform various operations on the test image to calculate the features such as relative positions of eyes, nose, mouth and chin.
- **Face Recognition:** The features are compared for both the test image and database image using facial recognition algorithm.
- **Face Database:** It contains the details of the registered students.
- **Attendance Management:** The attendance is recorded and saved in the Excel sheet.

III. FLOW CHART

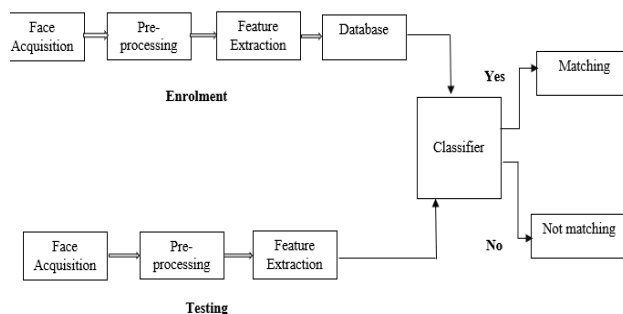


Fig 4. Work flow of the system

IV. RESULTS

1. We need to create a database. So initially we need to register the details of the students.

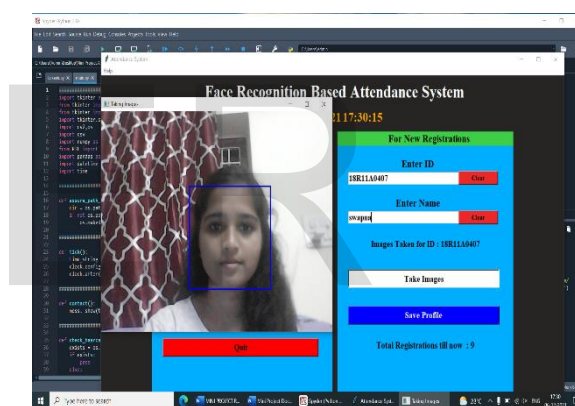


Fig 5. Registration of student details

2. After taking the images, the profile of the respective student is saved in the database.

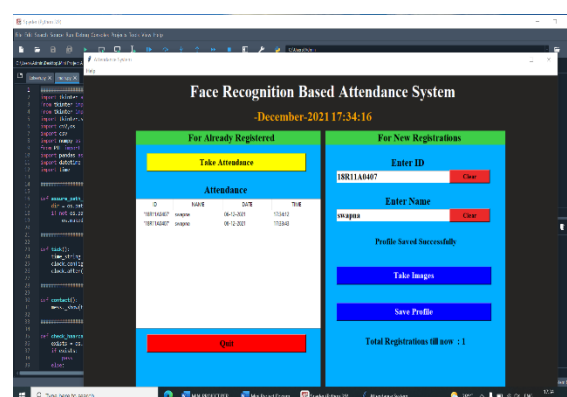


Fig 6. Profile is saved in the database

- Protect schools from threats

VI. Merits and Demerits

Merits:

- Automated Time Tracking System: Entry and exit time monitoring done manually or with other biometric systems can be fully automated with facial recognition attendance systems.
 - A Post Pandemic Requirement: Pandemic like Covid 19 can be better managed by minimizing physical contact in public places and work environments.

Demerits:

- Massive data storage burden.
- Detection is vulnerable if camera angles are not proper.

3. Now we can take the attendance using the system.

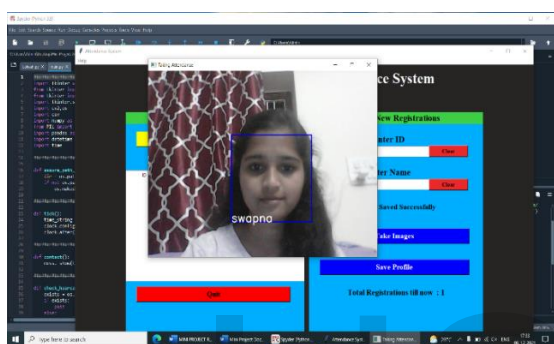


Fig 7. Identifying the student

4. Finally the attendance is saved in the Excel sheet along with date and time as shown in Fig.6.

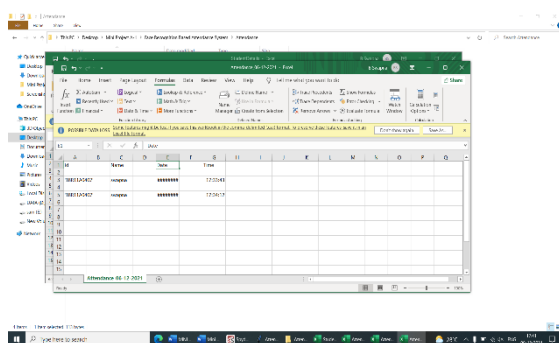


Fig 8. Attendance is marked

V. APPLICATIONS

- Diagnose diseases
- Recognize VIPs at sporting events

VII. CONCLUSION

This paper describes about the Automated Attendance System using Face Recognition. This system helps in taking the attendance automatically using machine learning algorithm. This project helps in maintenance of attendance in various applications. It also saves time and manual effort.

VIII. REFERENCES

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