# Face Detection based Attendance System using Open CV Approach

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**Abstract:- Attendance management has never been an easy task for college or hostel management. There are many problems while taking attendance. They can take attendance in a variety of ways like the teacher taking the attendance orally, fingerprint based attendance, sign based attendance system. But these are time-consuming and difficult-to-implement processes.Also there may be chance of fraudlent attendance in girl's hostel. So, having a face-detection-based attendance system helps in these situations.This system uses LBPH (Local Binary Pattern Histogram) algorithm for training and detecting the images. The first task is to register the students and take their images. The second task is to train their images. The third task is to detect their faces and mark the attendance. As the face is used for taking attendance, this approach removes the possibility of fraudulent attendance.This system also reduces the paper work for storing the attendance.**

*Keywords:- Face Detection, Attendance Management, LBPH Algorithm, Tkinter, OpenCV.*

## I. INTRODUCTION

The human face plays important role in our daily lives, especially to identify the people. Face recognition is a type of technique that takes a person's facial images and stores them as a unique face print to identify them. Because of its vast application, face recognition technology has attracted the interest of numerous researchers. As it is a contactless procedure, this technology overtakes the problems of other recognition techniques such as fingerprint and iris recognition. This systems may also detect a person from a distance.This technology is currently used at many public places to identify criminals and also used in offices to check the regularity of their employees.

A face recognition system is a piece of computer software that can be used to identify or validate a person by comparing patterns based on theirfacial features. In this system, OpenCV, Face Recognition, TKinter, Pandas, Datetime libraries were used. **OpenCV** and **Face Recognition** are the main modules for  face  recognition. Using these modules, the system first takes the images of the student and save them in thedatabase, which inturn  used for training purposes.Finally, when the system camera is turned on, the system detects the faces and marks them as present.

**OpenCV** is a computer vision, machine learning, and image processing toolbox that is free to use. It can recognise products, persons, and even human handwriting in photographs and videos.

The most widely used graphical user interface approach is **Tkinter**. It's a Python interface to the Python Tk GUI toolkit.

**Pandas** is built on top of the Numpy library, which can handle multi-dimensional arrays. It's one of the most well-known data manipulation packages, and it's included in almost every Python distribution. It's compatible with a variety of Python data science modules

Classes for manipulating dates and times may be found in the Python **Datetime** package. These classes deal with dates, times, and time intervals.

Our main objective is to develop a smart computer based attendance to monitor the attendance of students regularly and effortlessly.

- **ORGANISATION**
  The following is the format of this paper: The second section discusses literature reviews. The proposed framework is described in Section 3. And the section 4 describes about the Results and Analysis.

## II. LITERATURE SURVEY

The whole debate in this part relies around the many literature survey articles to which we alluded[1]. Real-time computer vision methods are employed in automatic attendance management systems. This study proposes a novel approach to automated attendance management systems that incorporates computer vision techniques. The suggested system incorporates real-time face recognition algorithms into an existing Learning Management System (LMS), which automatically detects and registers students in attendance at a lecture. Combining machine learning algorithms with adaptive techniques of detecting face changes over time, the device works as a complement for instructors.

Software that recognises faces The Lecture Attendance System[2] is a system that keeps track of students' attendance in class. Face recognition is used to take attendance automatically. However, because the face detection rate is insufficient, it is impossible to accurately assess attendance using each face recognition result independently. We provide a technique for accurately calculating attendance based on all face recognition data gathered from continuous observation in this study.

Attendance in the classroom is automatically recorded. [3] In today's world, RFID (radio frequency identification) is one of the most widely utilised automated identification technologies. To make the most of this technology, there is a lot of research and development going on in this subject, and many new applications and research areas will emerge in the next years

[4] Face Recognition Using Machine Learning Attendance Tracking Software In every firm, keeping track of attendance is the most challenging task. In this study, we proposed an automated attendance management system that handles the issue of face recognition in biometric systems under various real-time conditions such as lighting, rotation, and scale.

[5] Face recognition utilising the LBPH algorithm is the one we employed in our system. The LBPH stands for linear binary pattern histogram, which compares each image's pixel to its neighbours. Histograms are created based on the lbvp values of those pixels. As a result, each image in the collection is compared using this histogram. It will be returned if it is closely matched.

[6] This research proposes a technique for calculating each student's attendance based on continuous observations. To assess attendance, students' whereabouts and facial photographs are reviewed. Two cameras are put on the classroom wall because the system's concept is so simple. The first is to find a student's seat in the classroom, and the second is to picture a student in the classroom using a camera. The database will then contain attendance mapping software..

[7] This study presents a framework for dealing with natural language processing. One is a web-based programme, and the other is a traditional application. Both of them are linked to a single centralised database. Face detection is accomplished using the Haar cascade approach, while face recognition is accomplished using the PCM method. Natural Language Processing (NLP) is a research framework built under SMRT-FR that allows machines to break down and comprehend human language. Its purpose is to manage and process both applications. Employees will be able to manage their authorizations via an interface or SMS, and the NLP programme will handle the requests. The result will be handled under various circumstances.

## III. PROPOSED SYSTEM

This section describes about the architecture of proposed system and methodology.
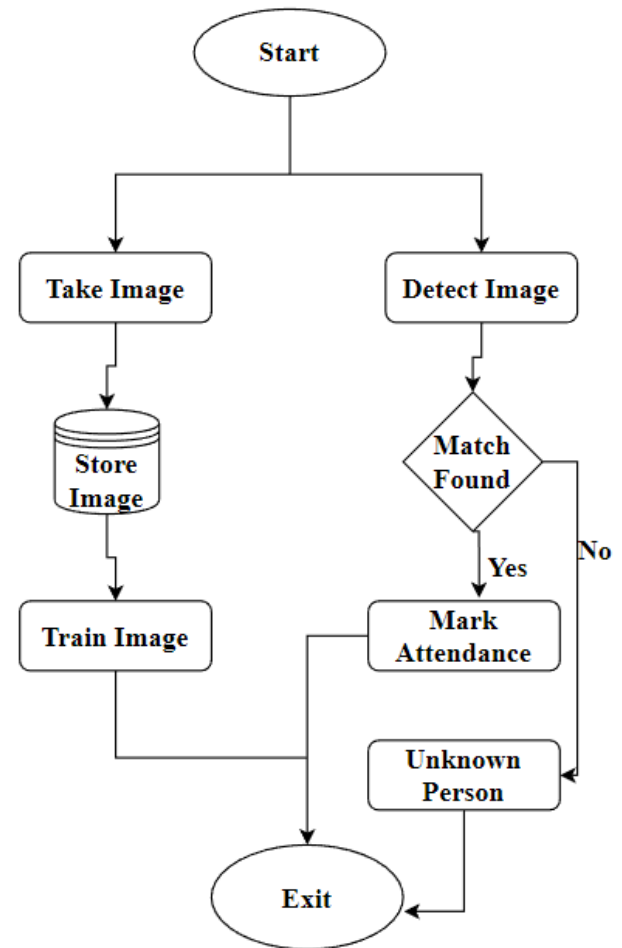
### A. Architecture



Fig .1: Proposed system diagram

The proposed system clearly describes the whole process of what will be happening in the application from the start to the end.

### B. Methodology
This system contains various modules like:
- Registering the students and taking images.
- Training the images .
- Detecting the images and marking attendance.

After taking the images of the students, they are converted into grayscale and stored in the dataset. The conversion is shown in the below figure 2.
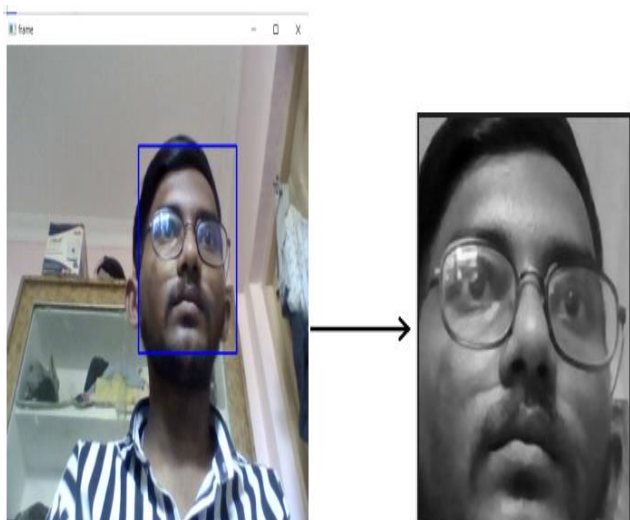
Fig . 2: Image Processing

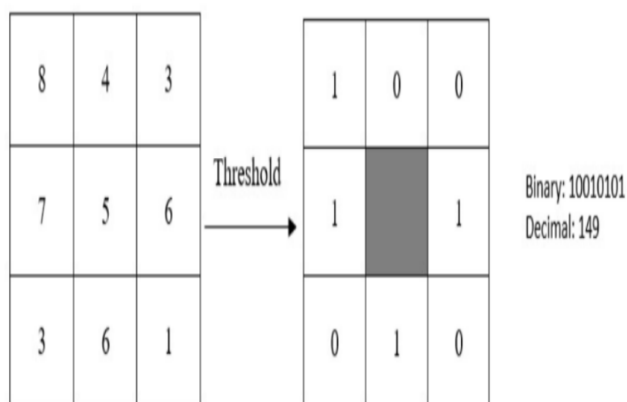The below figure represents the LBP value.



Fig. 3: LBP value

By using the intensity of the centre picture element as a threshold, if the neighbour pixel has more intensity, then it is assigned as 1 or else 0. Hence, each pixel is associated with an eight digit binary number which is known as LBP value.
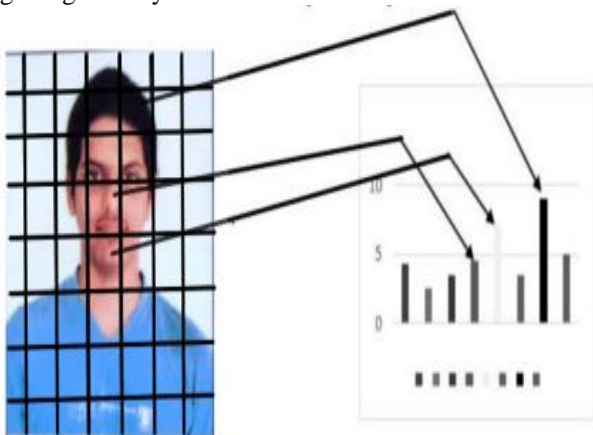


Fig .4: Working of LBPH Algorithm

The feature vector of an image is obtained with the help of LBP values that were calculated before. Now, the image is split into smaller parts. For example, an image is split into 64 parts and each part has a histogram constructed. It can be seen in figure 4. Now, after all the histograms are obtained, these are combined into one and the result is a face vector, which in turn is a big histogram that gives us the global description of the image.

a) Take Images

At first details of the student are entered and take their images during the joining of the students into the organisation or hostel. By using the Video Capture( ) method of cv2 library we take the images of a person standing infront of the camera until the desired number is reached, in this system we take 60 images of each person. The captured images are now saved in the Training image folder. When clicked on take image the student student details are saved as shown in figure 5.The details of students are stored in the Student Details folder.
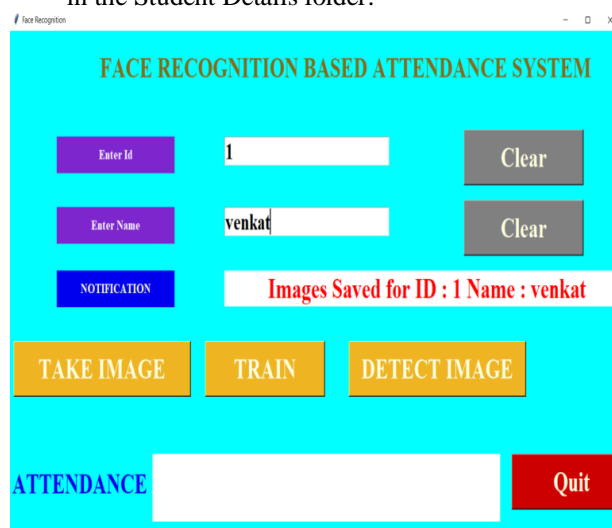


Fig. 5: Images Saved

Figure 5 decribes about, that the images are saved for the given Id and Name.

b) Train Images

Images are trained using the images in the Training Image folder when clicked on train button. It is shown in figure 6. The more the dataset is, the more is the accuracy of detection. During training of the images, we first get the path of all files in the folder and then loop through all the image paths and load the Ids and the images after creating an empty face list and id list. This system uses LBPH algorithm for training the images.
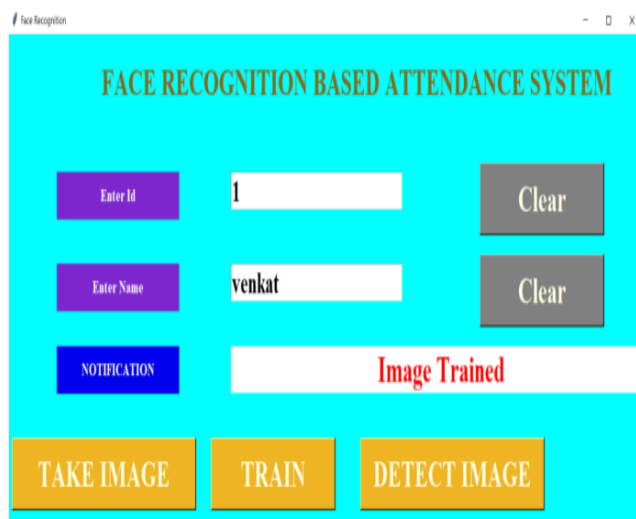
Fig. 6: Train Images

After loading, images are converted to grayscale.To manipulate, to open and to save images we use PIL(python image library).Then they are converted to a numpy array. Finally, we extract id from the image, the face from the training image sample and return the list.Images trained status will appear on the GUI screen.

c) Detect Images

This is where the actual algorithm works to detect images and to store the attendance. First we capture the image of the student and convert into grayscale to compare. Here, we use pandas library to read the csv file which contains the details of the student. If the image is matched with anyone in the dataset then the name and roll number of the student are displayed on the window as shown in figure 7.
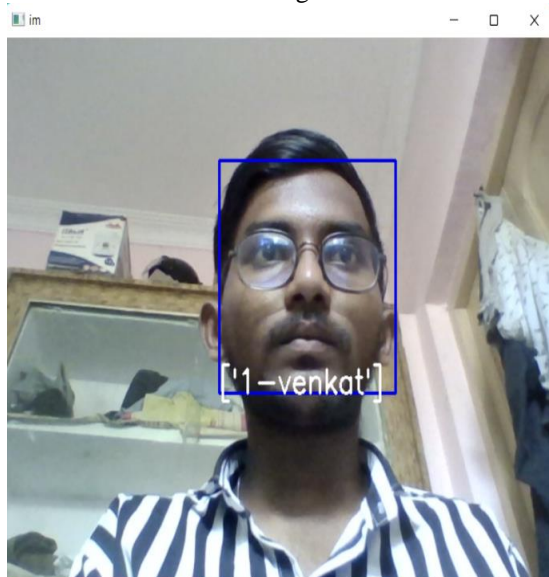


Fig.7: Detecting Saved image

On the other hand, if the image doesn't match with any of the images in the dataset then it displays "Unknown" on the frame as shown in figure 8.
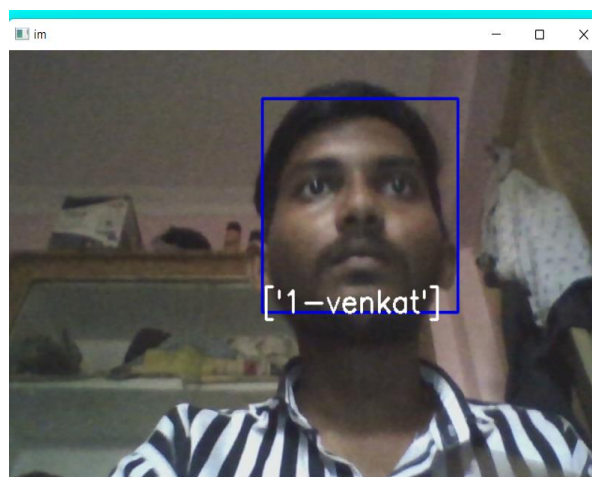


Fig. 8: Unknown Image



Fig. 9: Detect without glasses

Some times there is a chance of a person wearing accessories like glasses, masks, etc. In such cases, there may be, a little chance of inaccurate detection. But here we can see our code detected the image even with out glasses as shown in figure 9.

## IV. RESULTS AND ANALYSIS

This section explains the system's output and outcomes. The final output is a GUI(Graphical User Interface) with different options as shown in figure 10.
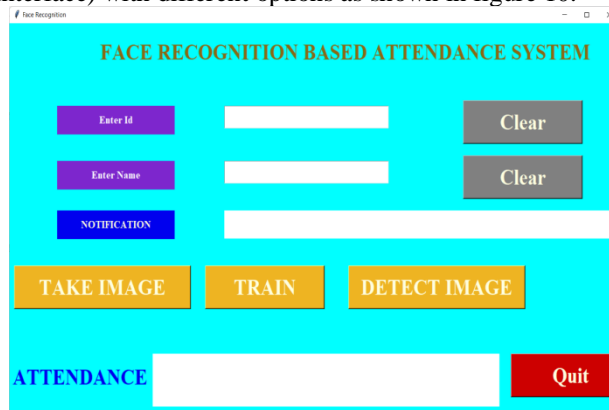


Fig. 10: Final Output Screen

After detecting the face of the student, the attendance is displayed on the Gui as shown in figure 11 and also stored in the excel sheet as shown in figure 12.



Fig. 11: Attendance Displayed in GUI



Fig. 12: Attendance stored in Excel sheet

## V. CONCLUSION AND FUTURE WORK

This Face Detection Attendance System is designed to implement the attendance activities in government schools and colleges mainly in girl's hostels effortlessly in an organised manner. This can be further extended to other private instutions, also can be used in orphanages and other organisations.

In the future, some of the additional features can be included like, edit & delete the student details in the GUI and also generating excel sheet for the absentees.

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