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An Attendance System based on the Principle of Facial Recognition

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ABSTRACT: In most educational institutions the student's attendance is taken manually by using an attendance sheet, given by the faculty member in a class. The Current attendance marking methods are monotonous and time consuming. Manually recorded attendance can be easily tampered with. And it is also very difficult to actually verify the status of each student in a classroom environment with distributed branches whether the students are actually responding or not. Hence this paper is proposed to tackle these issues. Authentication is a significant issue in system control in computer-based communication. Human face recognition is an important branch of biometric verification and has been widely used in many applications, such as video monitor systems, human-computer interaction and network security. Face recognition technology is the least intrusive and one of the fastest biometric technologies invented so far. The accurate recognition of a person is the sole aim of a face recognition system and this identification may be used for further processing. The methods to exploit this physical feature have seen a great change since the advent of image processing techniques. It measures overall facial structure, distances between eyes, nose, mouth, and jaw edges. Here, the camera detects and recognizes the person based on these features. The proposed system will update the attendance once the students face is matched with the template database.

KEYWORDS: Facial Recognition, Haar Cascade, OpenCV, Attendance Management, Biometric Identification.

I. INTRODUCTION

As we have seen in many schools and colleges, faculty members are facing the problem of proxy attendance, maintaining a handwritten record of student attendance of each class every day which is also very time consuming. So, it is a very difficult task for them. And here our project comes into the Picture. Biometric Identification solves the above mentioned problem, as it cannot be manipulated easily and is done in a small amount of time. Face recognition technology is the least intrusive and one of the fastest biometric technologies invented so far. The purpose of developing attendance management systems is to computerize the traditional way of taking attendance. Automated Attendance Management System performs the daily activities of attendance marking and analysis with reduced human intervention. The prevalent techniques and methodologies for detecting and recognizing faces fail to overcome issues such as illumination, variations, rotation, and occlusions. The system integrates techniques such as image contrasts, integral images, color features and cascading classifiers for feature detection. The system provides an increased accuracy due to use of a large number of features of the face. We use the python modules namely Face Recognition and OpenCV in our system. The Python Module Face recognition Recognize and manipulate faces from Python or from the command line with the world's simplest face recognition library. Built using dlib's state-of-the-art face recognition built with deep learning. The model has an accuracy of 99.38% on the Labeled Faces in the Wild benchmark. This also provides a simple face_recognition command line tool that lets you do face recognition on a folder of images from the command line. Initially, the algorithm needs a lot of positive images (images of faces) and negative images (images without faces) to train the classifier. Then we need to extract features from it. But we do not need to do that since OpenCV (a python module) has a trainer and detector built in it using which you can create your own classifier. But if you do not want to do that then OpenCV already contains many pre-trained classifiers for face, eyes, smile, etc. Those XML files can be downloaded from the haarcascades directory. So using these Modules we have created a system which gives us an increased accuracy (nearly 100%) in most of the cases considered.

**II. LITERATURE SURVEY**

This section basically shows the various systems based on similar technologies which we used as inspiration for the development of our proposed system. These papers describing this are discussed here. The Table gives an overall summary of the referred systems and also gives a remark on their performance.

NO	TITLE	Authors	Methodology used	Accuracy	Year Published
1	Smart Attendance Management System Using Face Recognition	Kaneez Laila Bhatti, Laraib Mughal, Faheem Yar Khuhawar, Sheeraz Ahmed Memon	Histogram of oriented gradient method is used to detect faces in images and deep learning method is used to compute and compare feature facials.	84%	2019
2	Attendance Monitoring Using Face Recognition with Message Alert	E.Francy Irudaya Rani, R.Vedhapriyavadhana, S.Jeyabala, S.Jothi Monika, C.Krishnammal	The camera detects and recognizes the persons while they enter the door and then sends their personal information to the host to generate a 3D Facial Model.	69%	2018
3	An Automatic Attendance System Using Image processing	Aziza Ahmedi , Dr Suvarna Nandyal	Face detection techniques such as Ada-boost algorithm to detect the faces in frames/images.	74.5%	2015

4	Automatic Attendance Management System using Face Recognition	Jomon Joseph, K. P. Zacharia	Face Recognition using Principal Component Analysis and Eigenfaces for Recognition.	60%	2013
5	Advanced Attendance Marking system using facial Recognition	Jarugula.Vamsikrishna, Kollipara.Anudeep, L.Jegan Antony Marcilin, V. Balamurugan	Multiple user faces are detected and recognized with the database trained multiple texture based notability.	73%	2019

III. METHODOLOGY

Typically this process can be divided into four stages,

1. Dataset Creation

Images of students are captured using a webcam. Multiple images of a single student will be acquired with varied gestures and angles. The images are cropped to obtain the Region of Interest (ROI) which will be used in the recognition process. And then these images will be saved as the names of respective students in a folder.

2. Face Detection

The Haar Cascade algorithm needs to be trained to detect human faces before it can be used for face detection. This is called feature extraction. Face detection here is performed using Haar-Cascade Classifier with OpenCV. It has got three parameters to consider- scaleFactor, minNeighbors, minSize. scaleFactor is used to indicate how much an image must be reduced in each image scale. MinNeighbors specifies how many neighbors each candidate rectangle must have. Higher values usually detect less faces but detect high quality in image.

3. Face Recognition

Face recognition process can be divided into three steps- prepare training data, train face recognizer, and prediction. Here training data will be the images present in the dataset. They will be assigned with an integer label of the student it belongs to. These images are then used for face recognition. Later, during the recognition process histogram of the face to be recognized is calculated and then compared with the already computed histograms and returns the best matched label.

4. Attendance Updation

Faculties will be updated with monthly attendance sheets at the end of every month. After the face recognition process, the recognized faces will be marked as present in the excel sheet and the rest will be marked as absent. The list of absentees will be mailed to the respective faculties.

PROJECT FLOW

1. After we run the project we have to register our face so that system can identify us, so click on register new student
2. After we click a small window will pop up in that we have to enter our ID and name and then click on Take Image button
3. After clicking the Take Image button A camera window will pop up and it will detect our Face and take upto 50 Images (we can change the number of images it can take) and stored in the folder named Training Image. the more you give the image to the system, the better it will perform while recognising the face.

4. Then we have to click on the Train Image button. It will train the model and convert all the images into numeric format so that the computer can understand. we are training the image so that next time when we will show the same face to the computer it will easily identify the face.
5. It will take some time(depends on your system).
6. After the training model clicks on Automatic Attendance ,we have to enter the subject name and then it can fill attendance by our face using our trained model.
7. It will create .csv file for every subject we enter and separate every .csv file according the subject
8. We can view the attendance after clicking the View Attendance button. It will show records in tabular format.

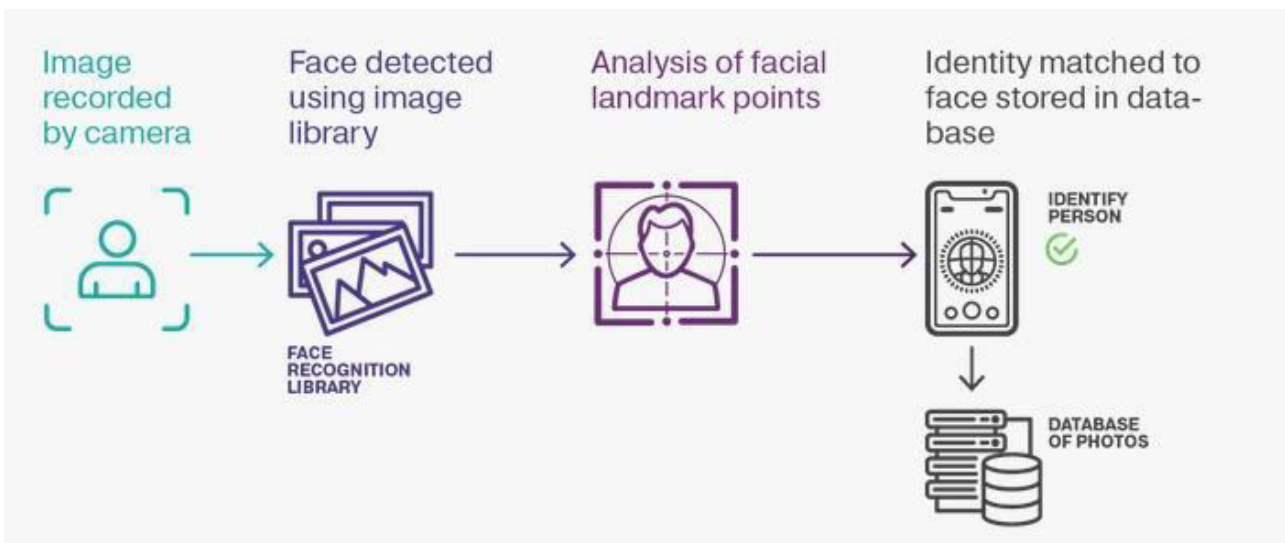


figure 1. System Model

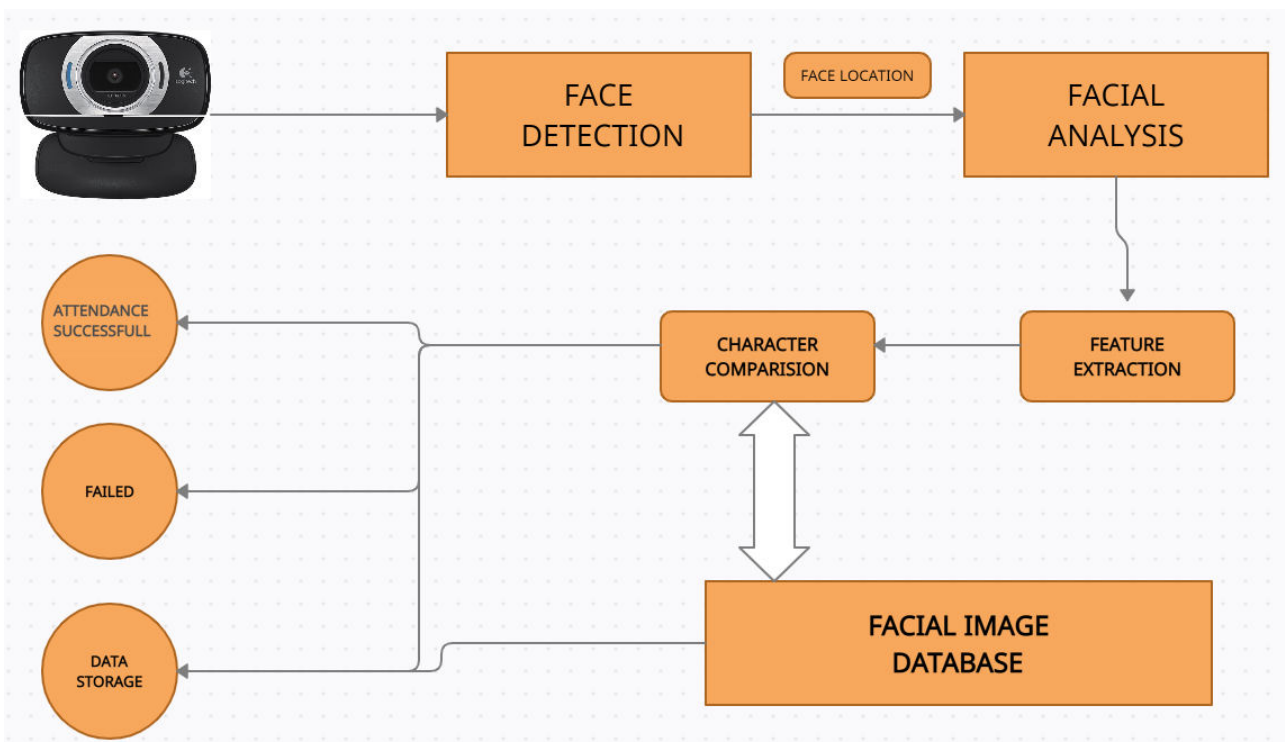


Figure 2. Architecture of the proposed system

The above illustration, Figure 3 shows the overall architecture of the system in a simplified way, with all the necessary checkpoints and phases.

IV. ISSUES IN THE PREVIOUS WORK

- 1) Accuracy of recognition is low due to lack of training done in system
- 2) Previous analysis cannot deal with:
 - Faces having wrinkles, beard, spectacles etc.
 - Faces with changes in skin colour.
 - Lack of light in the cameras surrounding. and similar problems
- 3) Few of the papers have also stated that their results and performance are dependent on some standard databases.
- 4) Some of the systems are highly sensitive to pose variations.
- 5) The training data of some systems show that the module can get confused between two similar face structures which can cause some irregularities/ inappropriate behaviour in the system.
- 6) In some of the systems due to lack of training data, unexplained irregularities such as display of wrong information etc. has occurred.

V. PLAN OF ACTION

Keeping in mind of the issues surveyed by comparatively analyzing through the papers studied in detail, we have chosen in our current work to overcome the following issues:

- 1) Currently, the system has reached the accuracy level up to 80% for the current training data. It can further be improved to obtain higher accuracy levels.
- 2) We are planning to make the system even more user friendly by making changes in the UI and make it easier to use as it is made for the use of supervisors, faculty, etc.
- 3) We also plan to train more data, to make sure that the errors are at a minimum.
- 4) We are also planning to integrate a detailed report system in our project which will provide the students/employee a detailed report at the end of each month.
- 5) We are planning to make a mail integrated system.

VI. RESULTS AND SNAPSHOTS



Figure 3. Front Page

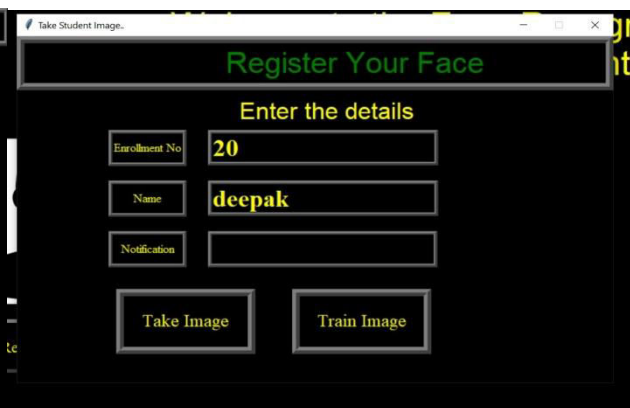


Figure 4. Entering Details

Attendance of AI

Enrollment	Name	2021-06-09	2021-06-15	2021-07-02	2021-07-05	2021-07-07	Attendance
20	['deepak']	1.0	1.0	1.0	1.0	1.0	100%
30	['etal' 'SHEET']	0.0	0.0	1.0	0.0	0.0	20%
21	['RAHUL']	0.0	0.0	0.0	0.0	1.0	20%
25	['Baskar']	0.0	0.0	0.0	0.0	1.0	20%

Figure 5. Attendance Sheet

VII. CONCLUSION

Facial Recognition based attendance management system is designed to solve the issues of existing manual and monotonous systems. We have used face recognition concepts to mark the attendance of students and make the existing system even better. The proposed system will be able to mark the attendance via face ID. It will detect faces through the webcam and then recognize the faces. After recognition, it will mark the attendance of the recognized student and update the attendance record. Hence with the help of an automated attendance system we were able to get our desired results and our productive time was saved. We have also dismissed the probabilities of marking the proxies which occur due to the manual attendance system. For such a complex process we don't require any peculiar hardware, simply camera and database servers are required.

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