

Automatic Attendance System Using Face Recognition Technique

Mayur Surve, Priya Joshi, Sujata Jamadar, Minakshi Vharkate

Abstract: Attendance system is very important in schools and colleges' Manual attendance system has many difficulties like it may less accurate and critical to maintain. So, attendance system using face recognition technique increase the accuracy and also it required less time than other methods. There are many existing system for attendance such as face recognition using IoT, PIR sensors and so on. For face recognition, hardware devices also helpful. But challenge is that to maintain all the sensors properly without get damage. After studying all method and techniques we are trying to implement a system with Haar Cascade Algorithm which has highest accuracy among all. It is able to capture the images from 50-70cm. We are creating graphical user interface which capture the images, create the dataset and train the dataset on single click. After recognizing the face it will display name of student and roll number. That information stored in attendance sheet automatically with time and date.

Keywords: face detection, face recognition, haar features, histogram of oriented gradient

I. INTRODUCTION

As we have seen in many schools and colleges that faculty members are facing the problem of proxy attendance, maintaining all hand written document of student attendance of each batch/class every day. It is very difficult task for them.

To reduce their work many techniques are come into picture. RFID system: In this system student has to carry RFID card for attendance purpose every day.

That card consists of chip by swiping this into card reader the system will read all details of student and marks the attendance.

Biometric system: It will scan the unique part of body such as fingerprints. At initial we have to store fingerprints of each candidate in database. During attendance present fingerprint and stored fingerprint get checked.

Bluetooth system: It is used for removing proxy attendance over limited population. But it allows only eight connections at a time.

This above systems totally based on hardware device. In case of software system many face recognition techniques are used for attendance.

Eigenfaces, LBPH, fisherfaces, SIFT these are some face recognition techniques. For face detection AdaBoost, SVM based, Viola-Jones face detector these algorithms are used.

In our implementation we are using Haar cascade algorithm and AdaBoost classifier for face detection and recognition. It is divided into four steps:

Haar feature: It collects the features and expression of faces. It takes all features by analyzing all images which it captures.

Internal Image: After collecting all features it creates internal image using line feature, edge feature, four rectangle feature, etc. these are some pixel calculations.

Ada boost classifier: In this step all features from faces and uniqueness are combining together.

Cascading classifier: In this step it will classify the faces and non faces successfully. It is for testing purpose.

II. LITERATURE REVIEW

Face and Bio-Metric Based Attendance and Security System using RFID and Arduino

In this paper they had proposed an employee attendance & security system using face and Biometric integrated with Smart RFID cards using Arduino. The project was about implementation of RFID based attendance system in integration of face recognition of the particular employee with his unique employee number. With integration of finger print authentication (Bio-metric) into the system, security has been enhanced. Audio welcome message on the valid Employee attendance registration had introduced & for unauthorized entry Audio alert had introduced along with Sound Alarm[2].

Attendance System based on face recognition

This paper had focused to improve attendance system in school and colleges. Because there were many disadvantages in taking manual attendance like cost, fake attendance and it may be not accurate always. So biometric and face recognition techniques come into picture. Traditional face recognition methods were not more accurate. This paper had represented the idea that to save the time as well as enhance the security Attendance System using face recognition technique was very useful. In this idea images were capturing through camera or CCTV camera in school/college for attendance purpose. After that it first detected the face using features of eyes, nose, mouth, hairs and also different pose of face in image. There were different methods for face detection like Ada-Boost, SQMT, LBP and SNOW classifier method. Once face was detecting apply face recognition method Histogram of Oriented Gradient features (HOG), Haar Cascade features.

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Then it will compare the captured images with database. If it will match attendance is marked. If not then that image will store in unknown person database. But this method used only for small database.

The result of detection and recognition was come out using MATLAB [3]. Below block diagram shows the process and working of attendance system based on face recognition by using method :

- Histogram of Oriented Gradient features (HOG),
- Haar Cascade features.

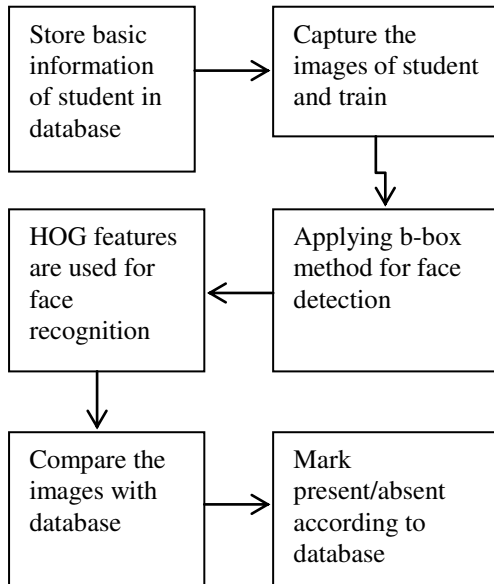


Fig 1.1 Block Diagram

Automated Attendance Mgmt System Using Face Recognition

Introduction

The basic concept behind the face recognition is image processing. There are two types of image processing:

Analog processing: It is technique which used for hard copies such as photographs and printouts.

Digital processing: It manipulates the content of digital images by PC. Basically attendance is of two types:

- Manual Attendance System
- Automated Attendance System

There were many difficulties in manual attendance like maintain all papers, mark present/absent by pen everyday so it takes more effort & it more time consuming. But this all limitation removed by automated attendance system. The main objective of paper was to gain the images or videos of student face, their position and attendance. There were some systems for attendance purpose but they had few limitations[4]:

- Biometric based system: It scans the unique part of body like finger prints and mark the attendance. But it also time consuming.
- Bluetooth System: This system is not scalable and requires 8 connections at a time.
- RFID System: In such system each person have to use RFID card for attendance for swiping. But it has difficulty when RFID card get lost.

Attendance Management Using Facial Recognition

Approaches for attendance till date

- Biometric scan: Students' finger print scan and stored in database. To mark attendance student have to use biometric system before every class.
- ID card swipe system: RFID chip fitted in ID card of students which are scanned by system and read that chip. That card must scan in every class to mark attendance. The present and absent student list will displayed to faculty[1].

Existing Algorithms

- Eigen faces: This algorithm used to extract necessary features of faces/images and encode it. For obtaining all necessary factors of faces it takes number of images & create the set. Using that set variance and co-variance matrix are calculated. Each image represent eigen vector.
- Line Edge Map: This algorithm used to extract the features of eyes, nose and mouth as they contain different more features. Using those features line mapping is done on faces. Here color images are converted to gray images as it uses gray scale method.
- Histogram of oriented gradient: This technique used for both objects and faces. All images converted to grayscale and each pixel assigned to integer. Main aim is to find the darker region of face.

Student Attendance Marking Using Face Recognition in Internet of Things

The basic idea was same behind this solution that was improving the attendance system by using face recognition technique. This will reduce proxy attendance and increase the accuracy.

Hardware Requirements:

- Microcontroller: Here Arduino Uno is used as microcontroller which is platform for implementing the sensors.
- PIR Sensor: Passive Infrared Sensor is used for measure the radiation from object and also motion of object.

In this proposed system face recognition had done by using Arduino and sensors. Overall concept in this paper divided into several steps.

- At initial step student filled the registration form along with all the details, which stored in college database. Image/picture of student also stored in database. This step required only once.
- Then camera was going to set at entrance of class along with sensor and microcontroller. Here PIR sensor used for measure the radiation from object. It also detected motion of objects.
- When student enter into the class first PIR sensor had measured the radiation of object and motion. If radiation belongs to human category then camera become activates and captures the pictures.
- After clicking the images of student it compares that image with database if image matched then it updates the database

with present. Otherwise marked as absent in database. Every updation in database about particular student sent to their parents through mail or sms every day.

- This system also worked for faculty in same manner. For faculty there was another database had created. Using this system we could also maintain faculty attendance[5].

III. WORKING SYSTEM

Our solution is implemented by Haar features and AdaBoost classifier. Here we are creating graphical user interface (GUI) for storing name and roll number of each student in file. While Information gathering of students it also generates dataset of student faces and stored in folder. After completing that, trained images also stored in folder which required for face Recognition. These are some essential and important steps in our implementation. In real time scenario when we place the camera near to classroom door which capture live data Continuously. It captures images from live streaming of that camera.

Captured images are comparing with images which are stored in folder at time of registration. If image match appropriately it shows student name and roll number on face which has been detected or recognized.

This information automatically stored in attendance sheet along with date and time. If images are not matching then, that images stored in unknown folder. It is very helpful attendance system for faculty member because it stored the attendance of student with date and time. So, faculty members easily identify which students attend the lecture on what time. Given proposed system also useful for laboratory attendance, government office attendance, institutional/organizational attendance and library attendance.

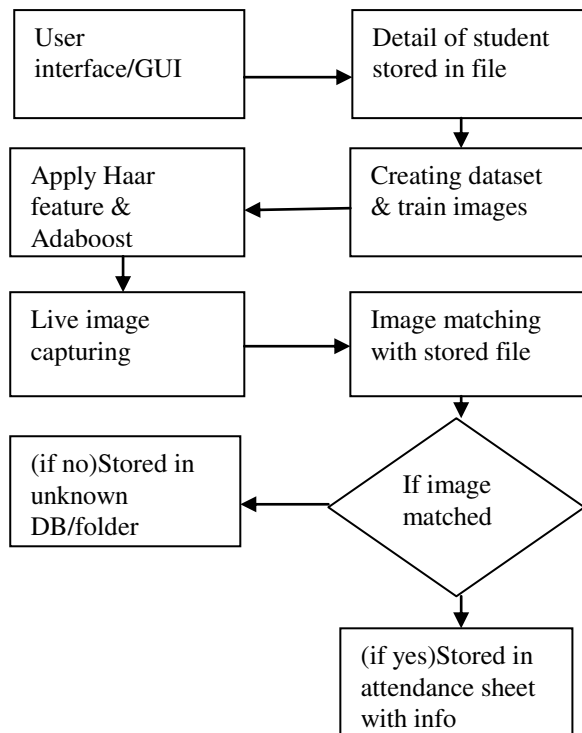


Fig 1.2 Block Diagram of System

Above block diagram explains the flow of our working system. First student register all information through GUI.

That information stored in file. After it creates the dataset of student face and train it. Then we are applying Haar feature & Ada boost classifier which are face recognition technique. It captures the live images from video stream & store in file while storing it compare the images in file whether they are matching or not with registered student. If yes then it will mark present with time and date otherwise image stored in unknown file.

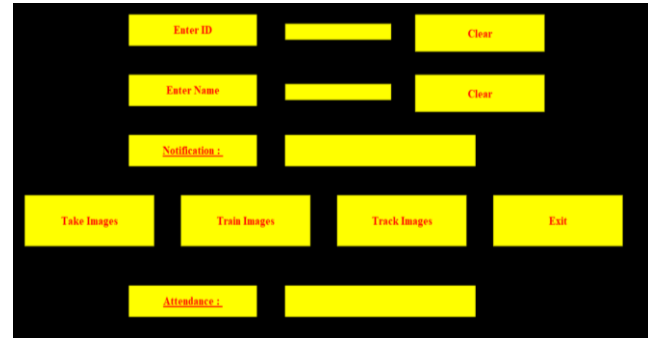


Fig 1.3 System's Dashboard

Here is our system look like, Fig1.3 shows our system dashboard in which we have to enter ID and NAME of student. After entering the ID and NAME of student we have to click on Icon named as Take Images. Then it will take image of student as shown in Fig1.4.

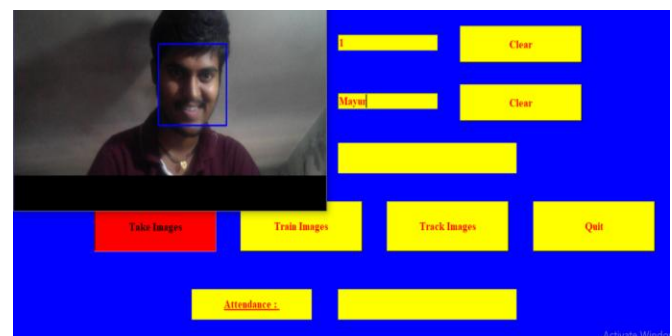


Fig 1.4 System Taking Photos

By using haar features and adaboost we have train and classify images. There is another icon named as Train Image. So, After taking image of student we have to click on Train Image which will directly get assign to ID and NAME which we have entered as shown in Fig1.4.



Fig 1.5 Face has recognized

Further is that we have to track image so we have to click on Icon named as Track Image. After tracking particular image it will show the name and Id of student on his/her detected face as shown in Fig 1.5. then the information will stored in database. After completing all this steps we have to click on Icon named as Quit so the information of student will stored in attendance as shown in Fig1.6 ,and it will generate an excel file which have been stored with students information who are present in class. This how the system works.

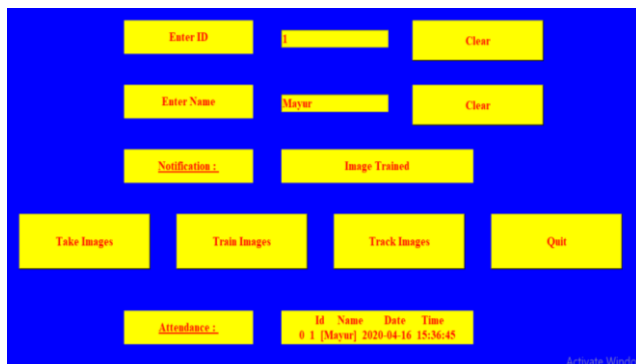


Fig 1.6 student's attendance has marked

Let us understand the system by considering the different scenario to make it simple:

1. If only one student enters the classroom then how the system works:

If one student entered in classroom at time then the images of that particular student will get capture by camera and then that Image will trained to recognize the face of the students on the basis of the stored images in the dataset.

On the basis of recognition of the face of students as shown in Fig1.8 the information related to that particular image will generate an excel file and stores students name, Roll no, Date and time. Then system will mark the students as present. One the data has been stored into the system the aim of the system is to give attendance to the present students.

2. Consider the second scenario in which multiple student enter into classroom simultaneously. In that case also it works successfully.

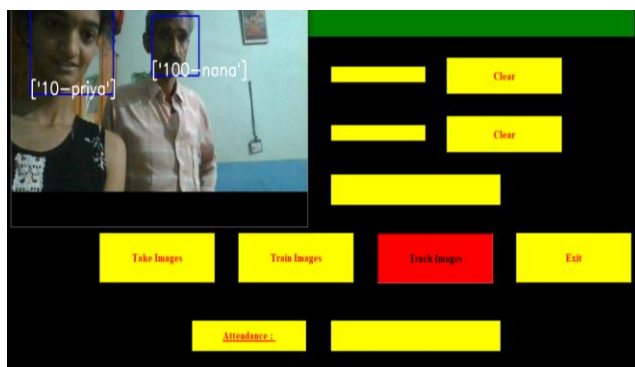


Fig.1.7 Multiple student face recognized

It can detect or recognize multiple face at time while entering in the class, at shows name of student as shown in above Fig. After recognition, when we click on exit button it will show attendance notification in attendance box. That attendance

automatically stored in attendance sheet along with id, name, date and time.

IV. RESULT

All information of student present in image stored in attendance sheet. So this system handles multiple faces at a time properly. Attendance sheet will update as shown in image.

	A	B	C	D	E	F	G
1	Id	Name	Date	Time			
2		100	[Thane]	2020-05-14	14:31:57		
3		10	[Priya]	2020-05-14	14:32:03		
4							
5							
6							
7							
8							
9							
10							
11							

Fig. 1.8 Multiple students attendances has marked

Above Fig. shows Information of student which have been stored into excel file after recognizing their faces by Fig.1.7 and Fig. 1.6. It stores all information of student either it is single face or multiple faces. System works properly in all conditions. When student enter into class (single/multiple) if they recognize their id and name stored in attendance sheet along with current date and time.

V. ADVANTAGES

1. It can handle large database and store large number of images for training
2. Accuracy of this algorithm which have been used is more than other algorithms
3. It is able to capture images from 60-80cm distance very accurately
4. Suppose in case a student enters multiple roll number by mistake at the time of face recognition it shows all roll number in output
5. Network connectivity is not required so there will be no network related problems
6. Time consumption of creating dataset and train the image is very less.
7. Human and machine direct interface is less and which reduces many errors and increases accuracy up to great extent.
8. System is simple to operate and also simple to operate with good accuracy while having the attendance of students.
9. For multiple faces also system work properly & attendance update successfully.
10. Image capturing speed also good which takes images without get struck.

VI. CONCLUSION

Basically this system work for improving attendance system in every domain like schools, colleges, organizations, institutions and companies. Capturing live images from camera and applying different techniques of face detection and face recognition which will reduce manual or traditional work. In our solution, by creating interface we generate the dataset. We trained the images using Haar Cascade and AdaBoost classifier. After completing training it will successfully detect and recognize faces and non faces. When stored images and compared images matched then attendance sheet get updated automatically with time and date. As it stored the entering time of every student it becomes easy for faculty member to keep track on time of student.

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AUTHORS PROFILE



Mayur Surve: A student pursuing BTech in Mechanical Engineering in MIT Academy of Engineering, Pune from 2017. Published a research paper on underground optical fiber communication safety an idea selected at national level SIH(Smart India Hackathon) by ministry of communication. Currently working on Machine Vision System as a mini project. Successfully

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