



## “Face Recognition Based Student Smart Attendance System Using Viola Jones Algorithm”

Rutuja Hanmant Patil<sup>1</sup>, Snehal Dipak Gosavi<sup>2</sup>, Rutuja Sandesh Patil<sup>3</sup>, Mrs H. S.Majgaovkar<sup>4</sup>

*UG Student, Nanasaheb Mahadik College of Engineering, Peth*

*Assistant Professor, Department of Computer Science and Engineering,*

*Nanasaheb Mahadik College of Engineering, Peth*

**Abstract**—A webcam based student attendance system is an application of image processing using face recognition and detection technique. The objective of this project is to capture student attendance automatically using Viola Jones algorithm using python framework. Manual attendance record system isn't efficient and requires time to rearrange record and to calculate average attendance of every individual student. The proposed attendance system is intended to replace manual model. In this system, the webcam is fixed in classroom and it will capture the faces of students and then it is recognized with database and then attendance will be marked. The advantage of this project is to overcome the fake attendance which was marked in manual attendance.

**Keywords**— Face detection, Face recognition, Viola Jones Face Algorithm, Attendance Reports

### I. INTRODUCTION

The handwritten records used in colleges or schools are time expensive. The proposed student attendance system is intended to replace the manual model. The attendance system first requires the student registration; in that student is registered with their roll number, name, class, department and training set i.e. face. The lecture details and attendance start time is properly inserted by respective teachers so that the proper reports are generated successfully. Student's context such as facial expression is taken into consideration. Face recognition is among the most productive image processing applications and has a pivotal role in the technical field. Recognition of the human face is an active issue for authentication purposes specifically in the context of attendance of students. Attendance system using face

recognition is a procedure of recognizing students by using facebiostatistics based on the high definition monitoring and other computer technologies. The development of this system is aimed to accomplish digitization of the traditional system of taking attendance by calling names and maintaining pen-paper records. Present strategies for taking attendance are tedious and time -consuming. Attendance records can be easily manipulated by manual recording. The traditional process of making attendance and present biometric systems

are vulnerable to proxies. This paper is therefore proposed to tackle all these problems.

### II. LITERATURE SURVEY

The handwritten records used in colleges or schools are time expensive. The proposed Students Attendance System is intended to replace the manual model. Students context such as facial expression is taken into consideration.

It is possible to estimate attendance automatically whether each student is present or absent by using face recognition technology. We are concerned with the method to use face image processing technology. We are proposing a method that takes the attendance using face recognition based on gray scale image.

A straight forward and efficient solution to the problem of tracking regions undergoing geometric distortion, changing illumination, and partial occlusion. The method is simple and efficient, yet robust to reasonable deviations from underlying motion and illumination models. For example, although we have modelled the face as a rigid object undergoing limited motion in our experiments, the algorithm can still track the subject as he or she is changing expression or, as illustrated in the previous section, performing out-of-plane rotations.[2]

Our hypothesis is that robust, adaptive, multi-object tracking can serve as the basis for systems that detect and classify activities in extended sites. Although the work reported here is still in progress, we have already demonstrated the use of such tracking information in multi-camera calibration, rough site modelling, object detection, object classifier hypothesis is that robust, adaptive, multi-object tracking can serve as the basis for systems that detect and classify activities in extended sites. Although the work reported here is still in progress, we have already demonstrated the use of such tracking information in multi-camera calibration, rough site modelling, object detection, object classification.[3]

RFID tags come in two general varieties which are passive and active tag. Passive tags require no internal power source, thus being pure passive devices (they are only active when a reader is nearby to power them), whereas active tags require a power source, usually a small battery.[6]

Idea was to take real time students attendance using personal mobile phone with-out any wastage to time. Using NFC chips on each seat, the app on the mobile phone is used to read the NFC chip. NFC chip has encrypted data that contains information such as the building number, the classroom number, and even the seat number in the case of a student using this attendance system during an exam. Providing teachers a new technology to attains overall attendance of a student directly without any manipulations from attendance sheet. No students can mark attendance for other unintentionally or deliberately. With this idea in mind, we have worked together to make this design idea come to life.[7]

The proposed Attendance System is intended to replace the manual model. The Attendance System first requires the student registration; in that student is registered with their roll number ,name, class, department and training set i.e. face. The lecture details and attendance start time is properly inserted by respective teachers so that the proper reports are generated successfully.[4] It is possible to estimate automatically whether each student is present or absent by using face recognition technology. We are concerned with the method to use face image processing technology. We are proposing a method that takes the attendance using face recognition based on continuous observation:

- Register Records - Register Records which requires more paper work to maintain the attendance and requires more time to calculate the average attendance of each individual student.
- Thumb Scanner - Thumb Scanner consists of automated method of recognizing a person based on unique physical characteristic such as thumb or fingers of hand. Thumb Scanner requires student has to wait in queue. Thumb scanner is useful for only limited people's attendance.
- Smart Card - Smart card system has the same problem as with Thumb Scanner. There is possibility that not ignored is the miss-use of smart card for attendance, a student can carry two or more smart cards and can record the attendance of other students also.

Information and Communication Technologies are increasingly entering in all aspects of our life and in all sectors, opening a world of unprecedented scenarios where people interact with electronic devices embedded in environments that are sensitive and responsive to the presence of users. Indeed, since the first examples of intelligent buildings featuring computer aided security and fire safety

systems, the request for more sophisticated services, provided according to each users specific needs has characterized the new tendencies within domestic research. The result of the evolution of the original concept of home automation is known as Ambient Intelligence (Aarts AND Marzano, 2003), referring to an environment viewed as a community of smart objects powered by computational capability and high user-friendliness, capable of recognizing and responding to the presence of different individuals in a seamless, not-intrusive and often invisible way. As adaptivity here is the key for providing customized services, the role of person sensing and recognition become of fundamental importance.[5]

### III. EXISTING SYSTEMS

#### A) Register Records

Attendance is maintained manually by entering the whether student present or absent .So more paper work is required to maintain the attendance and it is time consuming. Manual attendance record system isn't efficient and needs time to rearrange records and to calculate the average attendance of every individual student.

#### B) Thumb Scanner and Smart Card

Thumb scanner consists of automated method of recognizing a person based on unique physical characteristic such as thumb or fingers of hand. For attendance using this system student has to wait in queue. So this system is not efficient for student attendance as there are number of students.

Smart card system takes more time for huge number of students and also there is waiting queue of students for attendance. There is possibility that not ignored is the miss-use of smart card for attendance, a student can carry two or more smart cards and can register the attendance of other students also.

### IV. PROPOSED SYSTEM ARCHITECTURE

The proposed system is very simple, effortless, and manageable with lucid operations. It embraces a database of student's faces and their details like name, enrolment number, and course. Two or more cameras depending on the need and size of the classroom are to be accommodated on the ceiling of the classroom covering the entire area. These cameras will capture images several times during a lecture. this will increase the efficiency of the system because if the camera will not cover some students then other cameras will capture their faces. There are numerous expressions and poses possible which a student can perform. if at a particular instance system fails to detect faces due to unfavorable poses then the system can detect those faces at another instance of image acquisition. Once the image acquisition is done when the teacher triggers the system by making a click on the start button thereafter system will undergo face detection. after the faces are detected in an image taken by all cameras at all given instances then detected faces will be compared with stored images of the students in the database. Once the face is matched then present is marked in front of its corresponding enrollment number and name in excel format. Though there are multiple cameras and multiple

instances, there is a possibility of redundant faces. Collaborated results will be generated by excluding redundant faces of the same student so that single attendance is given to that student during a lecture.

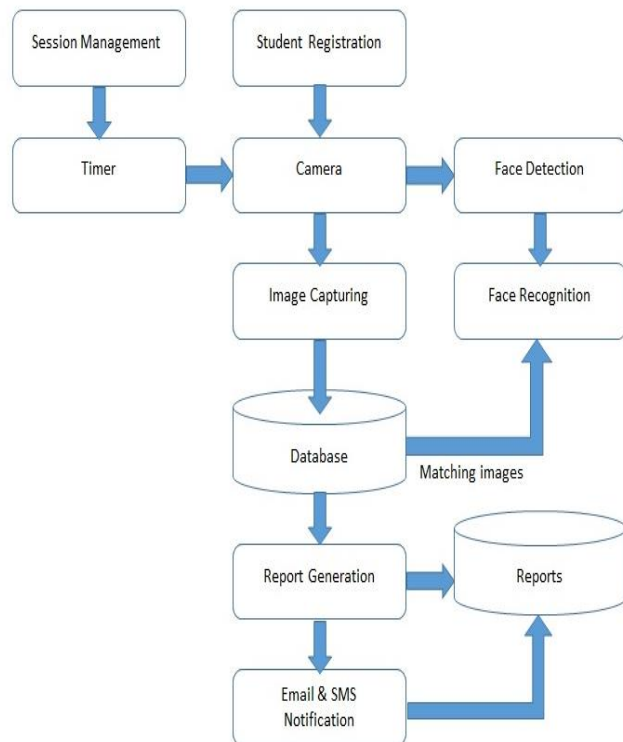


Fig. 1 Architecture of the system

Steps for implementation:

A) Gathering student details

Students details like name, student ID, profile information with image are collected and stored in the student database.

B) Attendance through camera

Camera is placed exactly at a position from where camera can capture images of student's face. The face image will be detected from the captured current frame or Image by using **Viola Jones face detection algorithm [1] [9]**.

### FACE DETECTION USING VIOLA JONES FACE ALGORITHM

The Viola Jones Face algorithm is a widely used mechanism for object detection. The main property of this algorithm is that processing is slow, but the detection is fast. This algorithm uses Haar basis feature filters, so it does not use multiplications.

Detection happens inside a detection window. A minimum and maximum window size is chosen, and for each window size a sliding step size is been chosen. Then the detecting window is moved across the image as follows:

1. Set the minimum window size, and the sliding step corresponding to that size.
2. For the window size chosen, slide the window vertically and horizontally with the same step. At every step, a set of N face recognition filters is

applied. If one filter provides a positive answer, the face is detected in the current widow.

3. If the size of the window is the maximum, then stop the procedure immediately. Otherwise increase the size of the window and correspondingly slip the step to the next chosen size and go to the step 2.

### HAAR FEATURES

A Haar-like feature considers adjacent rectangular regions at a specific location during a detection window, sums up the pixel intensities in these regions and calculates the difference between them. This difference is then used to make subsections of an image.

#### Steps:

1. Load the image.
2. Convert it into gray-scale, so that we can detect faces easily.
3. Apply the haar classifier of face and eye.
4. The faces are detected and other part of image is discarded.

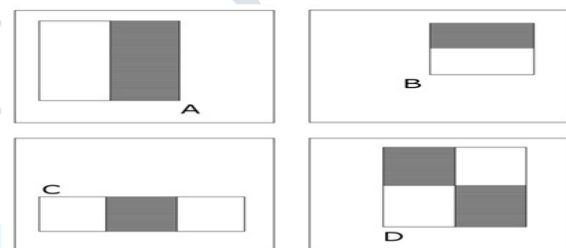


Fig.3 HAAR Feature

#### C) Face recognition

Faces from captured images are compared with stored face images by using **Viola Jones Face Algorithm [10]** and according to the result system will mark the attendance of the students. The resultant data will be stored into the database.

### V. METHODS OF IMPLEMENTATION

The main part is to detect the faces from current frame or from image captured by camera. Then the captured images will send for storing purpose. The stored image of camera will then be compared with the images stored in the database. So, we've mentioned technique for face detection using Viola Jones face algorithm or using framework OpenCV. The method follows steps as given below.

Step 1: Capturing the current frame or image using camera .

Step 2: Then convert the image into grayscale as shown in fig.2





Fig.3 Grayscale image

$$h(\mathbf{x}) = \text{sgn} \left( \sum_{j=1}^M \alpha_j h_j(\mathbf{x}) \right)$$

## VII. CONCLUSION

In this paper, in order to obtain the attendance of students, we proposed Students Attendance System based on face detection and recognition method. The detection and recognition is done by converting normal image into grayscale image taken by camera. The faces are detected by current frame captured by camera and compared with stored faces. In proposed system all attendance reports are generated.

## VIII. REFERENCES

Step 3: The faces are detected by face method [9] based on haar features and face marked as shown in fig.4.



Fig.3 Face Detection

- Face Detection using Viola Jones face Algorithm.
- Storing the details in the database.
- Automatic attendance by face recognition using the HAAR feature.
- Reporting by month wise, subject wise, date wise.
- Alerting SMS and Email.

## VI. MATHEMATICAL MODEL

The speed with which features may be evaluated does not adequately compensate for their number, however. For example, in a standard 24x24 pixel sub-window, there are a total of  $M = 162,336$  [4] possible features, and it would be prohibitively expensive to evaluate them all when testing an image. Thus, the object detection framework employs a variant of the learning algorithm AdaBoost to both select the best features and to train classifiers that use them. This algorithm constructs a “strong” classifier as a linear combination of weighted simple “weak” classifiers.

- Ms. Patil Priyanka, Mrs. Shinde Shraddha, “Webcam Based Attendance System”. Second International Conference on Computational Intelligence Applications 2011.
- G. D. Hager, and P. N. Belhumeur., Efficient region tracking with parametric models of geometry and illumination, IEEE Trans. PAMI, vol. 20
- W. E. L. Grimson, C. Stauffer, R. Romano, and L. Lee., Using adaptive track-ing to classify and monitor activities in a site, in Proc. IEEE Conf. CVPR.
- Santa Barbara, CA., Trans. on systems, man, and cybernetics part C: Appli-cations and Reviews, Vol.34, NO.3, AUGUST 2004.
- S. L. Wijaya, M. Savvides, and B. V. K. V. Kumar, Illumination-tolerant face verification of low-bitrate JPEG2000 wavelet images with advanced correlation filters for handheld devices, Vol.44, pp.655-665, 2005.
- Mahyidin, M.F. Student Attendance Using RFID System. 2008 December 2012; Available from: <http://umpir.ump.edu.my>
- Gatsheni, B.N., R.B. Kuriakose, and F. Aghdasi. Automating a student class attendance register using radio frequency identification in South Africa. in Mechatronics, ICM2007 4th IEEE International Conference on. 2007.
- URL, [http://en.wikipedia.org/wiki/Viola%E2%80%93Jones\\_object\\_detection\\_framework](http://en.wikipedia.org/wiki/Viola%E2%80%93Jones_object_detection_framework)
- Sayan Seal, Aishee Sen, Ritodeep Mukerjee and Asit Kumar Das, *Department of Computer Science and Technology Indian Institute of Engineering*

*Science and Technology, ZShibpurHowrah, India,*  
vol. 02 , may 2020

[10] Clyde Gomes , Sagar Chanchal and Tanmay Desai , *Department of Computer Engineering Premier Automobiles Road Kurla(W) , Class Attendance Management System using Facial Recognition*, vol,07, no. 3, Mar 2020

[11] Sandhya Potadar, Riya Fale, Prajakta Kothawade, *International Journal of Engineering Research & Technology (IJERT)* “Attendance Management system using Face Recognition” Vol. 10 Issue 08, August-2021

