

## A Review Paper on Automatic Attendance System using Face Detection

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### **Abstract**

*Attendance marking in a classroom is a very time consuming task. It is a very hard for lecturers to take attendance in a class of very large number of students. This also reduces the time of lecture. These images are compared using SURF matching algorithm with the stored images of students. These two algorithms are implemented in MATLAB. The system can be operated automatically or manually. The focus is to make a fully automatic system which works on basis of time-table of class-room. We make a standalone application for this automatic attendance system which can work on any 64-bit computer with no need of MATLAB software.*

**Keywords:** *MATLAB, viola-jones, face detection, SURF matching, attendance system*

### **INTRODUCTION**

In every organization whether it be a business organization or educational institution there is always a need to maintain a record of employees or students. In educational institution it is a regular activity to take attendance in each lecture but taking attendance is sometimes very time consuming specially in case of large class situation. In a class of large number of students it is a very tedious work to take attendance of each student. By calling roll number of every understudy kills lecture time as well as staff feels extra strain of calling a considerable rundown of roll no. In this paper, we propose a framework that automatically takes the participation of understudies for every classroom address. Our framework takes the participation naturally utilizing face acknowledgment. In this paper we proposed a method to take automatic attendance of students without interacting with students. We make a system in which CCTV camera takes image automatically only when lecture has been started.

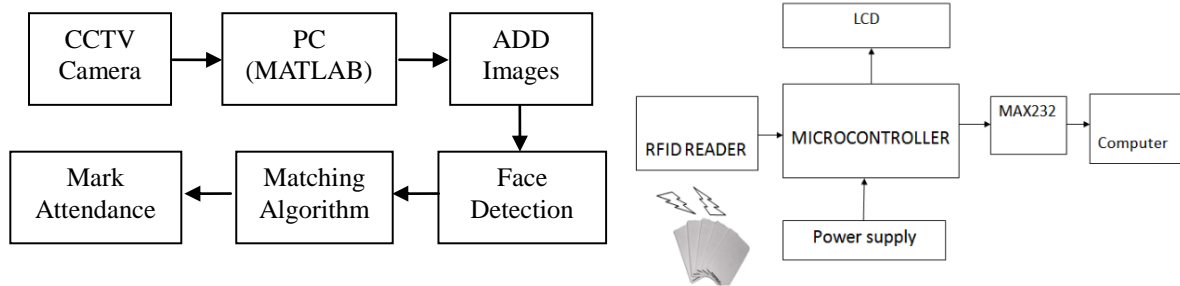
To detect the faces we use MATLAB computer vision system toolbox. In this package there is function named `vision.CascadeObjectDetector` which makes a System object accompanies a few pre-trained classifiers for distinguishing frontal confronts, profile confronts, noses, eyes, and the abdominal area.

We have created two Microsoft-Excel spread sheets. One spread sheet contain time table of every lecture it contains the starting time of lecture also the starting time of camera. Other spread sheet contains roll no. of all the students and there are different sheets for different lectures. CCTV camera will capture image in each lecture according to the time set in the first spread sheet. The faces of all the students are then detected from the captured image then images are matched with database images.

The coordinated pictures are put away in database then their participation is checked (P for present and A for missing) in particular address sheet and date section.

After marking attendance matched image and captured image database are cleared. Now, the software will wait for next

lecture and the whole process will be repeated again.



**Fig: 1.** (a),(b) Block Diagrams of Automatic Attendance System.

### Literature Review

The literature survey, there are numerous papers having various strategies and algorithms which are used for face recognition. Face detection is now been very beneficial in unique fields that are one of the demanding issues in processing. Over the past many years there was a lot of studies has been finished on this subject. Some of the principal algorithms for face detection are (PCA), guide Vector Machines, Eigen faces technique, Eigen faces with PCA technique, AdaBoost algorithm, Neural Networks approach. Face detection is accomplished by way of unique processes which includes characteristic primarily based technique, holistic method.

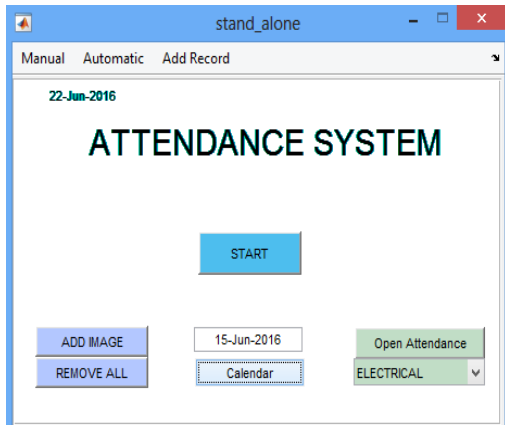
A research paper [1] on “Rapid Object Detection using a Boosted Cascade of Simple Features” is given by Paul Viola and Michael Jones which is also know Viola-Jones algorithm. This paper is one of the oldest and very useful methods to detect object with high detection rates.

The research based on improving YCbCr color space-based skin model to extract human skin regions and the connected components analysis is used to define face region. Another paper [3] given by Zulhadi Zakaria and Shahrel A. Suandi which is

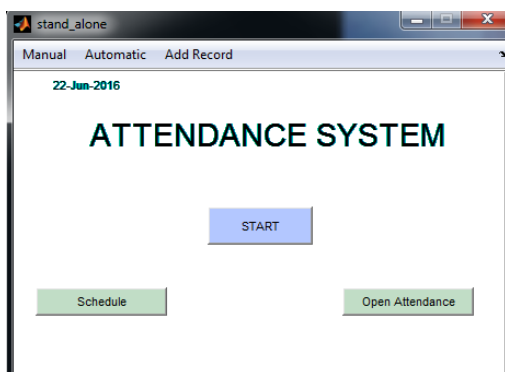
used for face detection using combination of neural network and adaboost. This paper introduces a mix of two surely understood calculations, Adaboost and Neural Network. This strategy uses Haar-like components to extract the face quickly utilizing basic picture. A course Adaboost classifier is utilized to expand the face discovery speed. Because of utilizing just this course Adaboost creates high false-positives; neural system is utilized as the last classifier to check face or non-face. For a faster processing time, hierarchical Neural Network is used to increase the face detection rate.

### ATTENDANCE SYSTEM

Attendance System works on two modes one is manual mode and other is automatic mode. Both modes are synchronized by schedule of class. In schedule of class there is a list of lectures with their time of lecture. The working of CCTV is only done when the System time matches with schedule time. If the lecture is passed then program waits for next lecture. CCTV camera will not start until system clock matches with lecture time. Once the System time matches with Schedule time of a particular lecture our program will start to work on image capturing, face detection, matching faces and other operation.



**Fig: 2.** Manual Mode of Attendance System in a Standalone Application.



**Fig: 3.** Automatic Mode of Attendance System in a Standalone Application.

Attendance system is made on MATLAB software. Firstly we test our program in MATLAB and once it works well then we make its GUI (Graphic user interface) and make a standalone application.

### Schedule of Class

The Schedule of class is made according to the lecture time.

	A	B
1	SUBJECT	TIME
2	ELECTRICAL	9:15
3	CONTROL SYSTEM	11:15
4	MATHS	13:15
5	SOFTWARE LAB	14:15
6	SIGNAL AND SYSTEM	15:15
7		

**Fig: 4.** Excel spreadsheet having schedule of class

CCTV camera works only if the time of lecture matches with the system clock. This Schedule of class is used to make the system automatic. Our program runs according to the schedule of lectures. In MATLAB we read this excel sheet with this column. Firstly we take the value of B:2 and convert it into date and time format then we compare this with our system clock. This comparison will continue unless it matches with system time. After the matching of system time with lecture time our CCTV will start to capture the images of class-room capturing of images will go for 2-3 minutes (arbitrary). All captured images are now stored in a database.

### Face Detection

Face detection is equal for both guide mode and automated mode of operation. For face detection we use imaginative and prescient device Toolbox which having many capabilities related to item detection a number of them are Cascade item detector , Histogram of oriented Gradients (HOG), and local Binary pattern (LBP) features.

Detector = vision.CascadeObjectDetector(Name, Value) it configures the cascade object detector object properties.

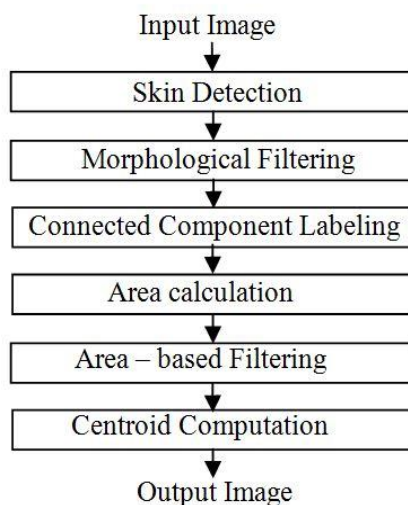
BBOX = step(detector, I) returns BBOX, a M-by-4 grid characterizing M bouncing boxes containing the distinguished articles. This technique performs multiscale object identification on the information picture, I. Every line of the yield matrix, BBOX, contains a four-component vector, (x y width height), that indicates in pixels, the upper-left corner and size of a bouncing box. The information picture I should be a grayscale or real nature (RGB) picture.



**Fig: 5.** Detected face of students in live class-room by using Viola-Jones algorithm method.

We also detect faces of student by using skin segmentation this is also very fast method to detect large number of faces in image. The limitation is that accuracy to detect faces is very poor. If the background color matches with the skin color then background color is also detected and there was an error in face detection. Accuracy is also poor because in this method decide the value of YUV which greatly depend on chrominance value (i.e., U-V component).

Skin segmentation is a very fast method of detecting face as it only finds skin color in image while in Viola-Jones method we having different classifiers which scan whole image and remove all the weak classifiers which make it a slow process to detect face but very accurate.



**Fig: 6.** Software Algorithm for Face Detection using Skin Segmentation.

**Face Matching**

Face matching can be done by using many methods some of the main methods are Eigen value, correlation coefficient, SURF features extraction, Harris features extraction and Histogram method. In this method of we use SURF (Speeded Up RobustFeatures) feature extraction method. SURF feature extraction method work in three main steps.

**Record the Attendance from Matched Images**

The matched images are stored in the database with their roll numbers. These roll numbers are now used to mark the attendance in the excel sheet.

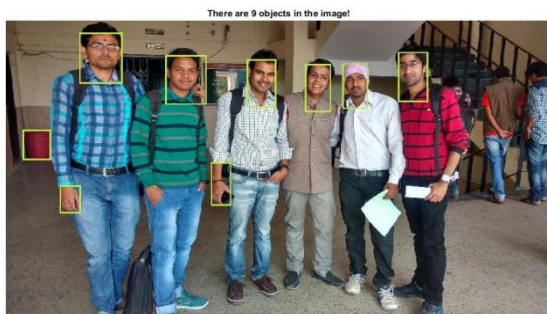
G3		6/30/2016		
	A	B	C	D
1		NAME	Jun	Jun
2	ELECTRICAL		15	23
3			15-Jun-16	23-Jun-16
4	0103ei101001	AA	A	A
5	0103ei101002	BB	A	A
6	0103ei101003	CC	A	A
7	0103ei101004	DD	A	A
8	0103ei101005	EE	A	A
9	0103ei101006	FF	P	P
10	0103ei101007	GG	P	P

**Fig: 7.** Marking of Attendance from Matched Images in Manual Mode.

**EXPERIMENT AND RESULT**

**Experiment with Face Extraction**  
*Face Extraction by using Skin Segmentation Method*

In this experiment, we perform skin segmentation method in several images but one common error is that it detects hand also because colour of hand matches with skin colour.



**Fig: 8.** Faces and Non-Faces Detected by using Skin Segmentation Method.

**Face Extraction by Viola-Jones Algorithm Method**

Viola-Jones is capable of processing images extremely rapidly while achieving high detection rates.



**Fig: 9.** Faces Detected by using Viola-Jones Method.

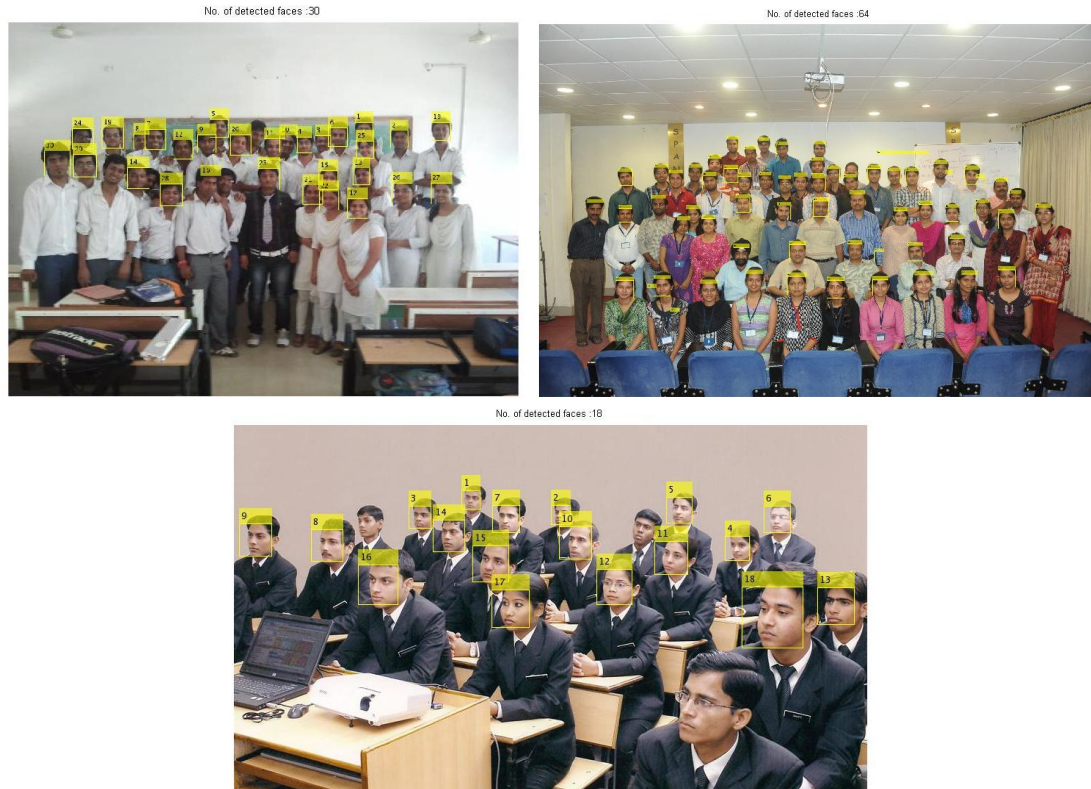
It quickly discards background regions of the image but it also having some failure modes. The main reason of failure are it can detect faces that are tilted up to about  $\pm 15$  degrees in plane and about  $\pm 45$  degrees out of plane. The detector becomes unreliable with more rotation than this. We also noticed that harsh backlighting in which faces are very dark while the background is relatively light sometimes causes failure.

**Table: 1.** Comparison between Detection Rate of Skin Segmentation and Viola-Jones Algorithm.

Images	Detection Rate				
	Total Persons	Skin Segmentation		Viola-Jones Algorithm	
		Face	Non-face	Face	Non-face
Image1	6	9	3	6	0
Image2	18	14	4	18	0
Image3	22	22	0	20	0
Image4	52	10	2	41	0
Image4	64	5	0	58	6

The comparison between these two method one is by using Viola-Jones Algorithm and other method uses Skin segmentation clearly shows that for less

number of persons both the methods have good accuracy but for large number of persons Viola-Jones method is more efficient to apply for face detection.



*Fig: 10. Output of Our Face Detector on Number of Test Images.*

## CONCLUSION

We having different difficulties during the making of such system but the main difficulty are the accuracy which will overcome by using Viola-Jones method. Face matching is one another problem which will greatly affected by intensity of light, face orientation and some other practical difficulties. We perform different experiments on different matching methods from the result we come into conclusion that SURF feature extraction is of high accuracy to match the faces. For single image it may not detect all faces to overcome this problem we can take multiple images with different angles.

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