

# **Automatic Attendance System Using Facial Detection and Recognition Technique**

**Syed Ibrahim**

*Student*

Department of Computer Science and engineering  
School of Engineering and Technology, Jain University  
Abstract

## **Abstract:**

A lot of precious time is wasted in taking attendance in schools, universities and other training institutes. Although the process of taking attendance may seem to be very simple and an easy task, the irony lies in the fact that this easy process is tiresome and grueling routine. In this paper, I propose a framework that takes the participation of students for classroom lecture. The proposed system framework takes the participation naturally utilizing face identification and recognition. This participation is recorded by utilizing a camera connected as a part of front of classroom that is continuously catching pictures of students, detect the faces in image and contrast the distinguished appearances and the database and mark the attendance. This paper first audits the related works in the field of participation administration and face acknowledgment.

At that point, it presents our framework structure and plan. Finally, experiments are implemented and it shows the improvement of the performance of the attendance framework.

**Keywords:** Facial Recognition, Automatic Attendance, PCA, Eigen Faces

## **1. Introduction:**

Maintaining The Attendance Is Essential In Every One Of The Foundations For Checking The Performance Of Students. Every Institute Has Its Own Method In This Regard. Some Institutes Take Attendance Manually Using The Old Paper And File-Based Approach And Some Have Adopted Method Of Automatic Attendance Using Some Biometric Techniques. Each Organization Has Its Own Technique. Regardless Of The Fact That There Are Various Other Reliable And Accurate Methods Of Identification (Such As Fingerprints, Or Iris Scans), Face Recognition Remains A Major Focus Of Research Because It Is People's Primary Method Of Person Identification.

It Is Exceptionally Hard To Confirm Every Student In A Substantial Classroom Environment With Disseminated Branches Whether The Verified

Students Are Really Reacting Or Not. Consequently, This Paper Is Proposed To Handle Every One Of These Issues. Framework Is Such That It Uses Face Detection And Recognition Algorithms Which Automatically Detect And Registers Student Attending On A Lecture. Face Detection and Recognition Is Often Referred To As, Analyses Characteristics of a Person's Face Image Input Through A Camera. It Measures Overall Facial Structure, Distances Between Eyes, Nose And Mouth. Hence, This System Handles All The Issues Which Occurred In Traditional System.

The System Is Developed For Deploying An Easy And A Secure Way Of Taking Down Attendance. The Images Of All The Authorized Student Are Captured And Stored Into Database. The System Then Stores The Image By Mapping It Into A Face Coordinate Structure. Which Student Are Present Or Face Detect By Camera That Will Be Present In

Class Otherwise Absent Student. That Recorded Into Database And Find Total Number Of Present Students Calculate And Will Send A Report To The Parent Of Absent Student Via Message Or An Email.

## 2. Working of the Proposed System:

The Proposed Attendance System Mainly Consists Of Four Phases; Image Acquisition, Face Detection, Feature Extraction, Face Recognition. The Working Of The System Is Depicted As Follows:

### A. Image Acquisition:

The System Consists Of A Camera That Captures The Images Of The Classroom And Sends It To The Image Pre-Processing. Then That Image Is Sends For Face Detection.

### B. Face Detection:

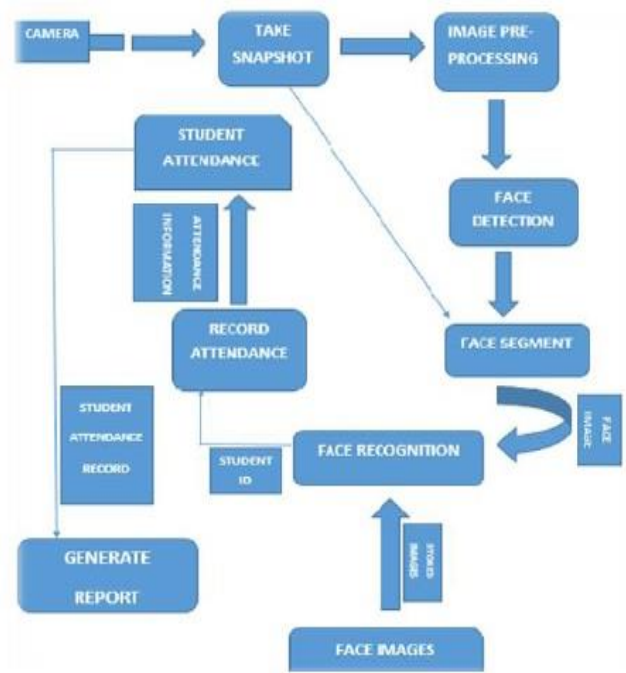
This Process Separates The Facial Area From The Rest Of The Background Image. The Faces Which Are Stored In the Database.

### C. Feature Extraction:

Feature Extraction Is Done For Distinguishing Faces Of Different Student. In This System, Eyes, Nose And Mouth Are Extracted. Feature Extraction Is Helpful In Face Detection And Recognition.

### D. Face Recognition:

The Face Image Is Then Compared With The Stored Image. If The Face Image Is Matched With The Stored Image Then The Face Is Recognized. Then For That Particular Student The Attendance Is Recorded.



## 3. Modules of Proposed System

### A. Student Management:

This Constitutes The First Phase Of Our Project Module. This Section Consists Following Parameters:

1. Student Registration Form: The Student Appears As A New Candidate For Registration. Registration Consists Of Adding Each Candidate's Personal Details.

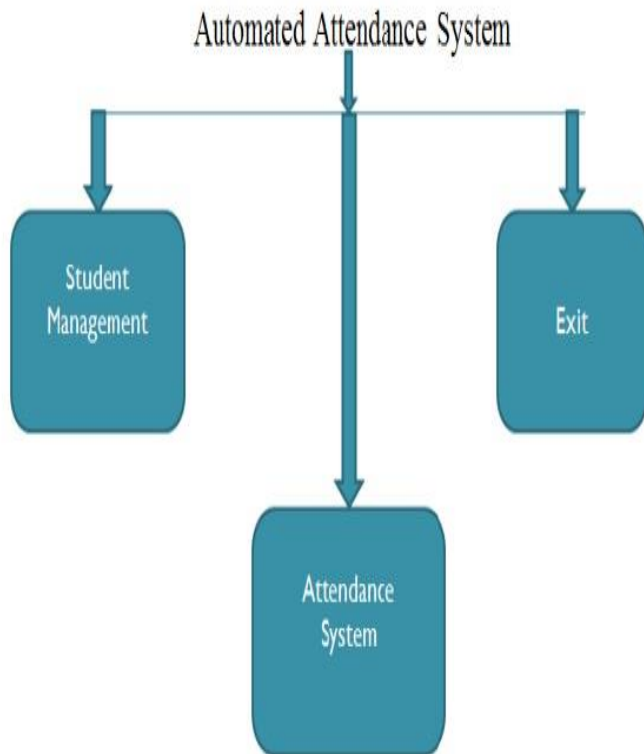
2. Student Face Detection: The Newly Registered Candidate's Face Gets Detected for the Very First Time and Stored in the Database.

### B. Attendance System:

This Constitutes The Second Phase Of Our Project Module. The Recognition Of Each Individual Student Takes Place By Extracting The Common Features Of Each Individual By Using Image Integral Method. Then The Face Image Is Matched With The Image Stored In The Database (MS SQL) And The Attendance Is Marked For The Candidate Only If The Facial Feature Of The Newly Captured Image Matches With The Already Stored Image.

### C. Exit:

It Takes The Control Out Of The Module.



### 4. Algorithm for Face Detection and Recognition:

1) In This System, We Utilize Haar Cascade Classifier Which Is Generally Based On Feature Abstraction, I.E., We Use Viola- Jones Detector.

2) Object Detection Utilizing Haar Feature-Based Classifiers Is An Effective Object Detection Strategy Proposed By Paul Viola And Michael Jones In Their Paper, "Rapid Object Detection Uses A Boosted Cascade Of Simple Features" In 2001.

3) It Is A Machine Learning Based Methodology Where A Cascade Function Is Prepared From A Great Deal Of Positive And Negative Pictures. It Is Then Used To Identify Objects In Different Pictures.

4) Steps Of Viola-Jones Detector:

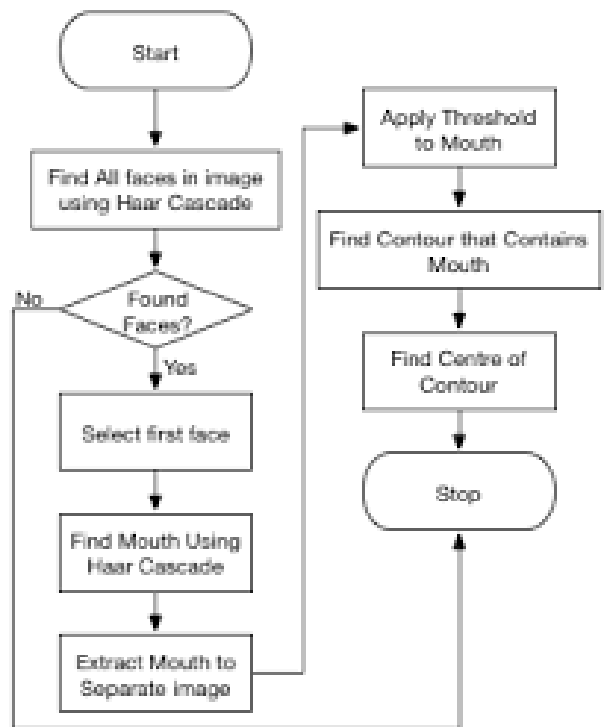
- Calculating The Integral Image- Summed Area Table Necessary For Quick Calculation.
- Haar-Like Features- Simple Rectangular Features That Achieve Just Above Random.

- Adaboost Learning Algorithm- Creates A Small Set Of Only The Best Features To Create More Efficient Classifiers.

- Cascade Filter- Discards Negative Windows Early To Focus More Computational Time On Possible Positive Windows.

### PCA (Principal Component Analysis):

PCA Was Invented In 1901 By Karl Pearson. PCA Method Has Been Widely Used In Applications Such As Face Recognition And Image Compression. PCA Is A Common Technique For Finding Patterns In Data, And Expressing The Data As Eigenvector To Highlight The Similarities And Differences Between Different Data [1]. Principle Component Analysis (PCA) Is A Mathematical Procedure That Uses An Orthogonal Transformation Convert A Set Of Values



Of Possibly Correlated Face Images Into A Set Of Value Of Uncorrelated Variable Called Eigen Faces. The Number Of Eigen Faces Always Less Than Or Equal To The Number Of Original Face Images. The Following Steps Summarize The PCA Process.

. Let  $\{D_1, D_2 \dots D_M\}$  Be The Training Data Set. The Average Avg Is Defined By:

$$Avg = \frac{1}{M} \sum_{i=1}^M Di$$

2. Each Element In The Training Data Set Differs From Avg By

The Vector  $Y_i = D_i - Avg$ . The Covariance Matrix Cov Is Obtained As:

$$Cov = \frac{1}{M} \sum_{i=1}^M Y_i \cdot Y_i^T$$

3. Choose  $M'$  Significant Eigenvectors Of Cov As EK's, And

Compute the Weight Vectors  $W_{ik}$  For Each Element In The Training Data Set, Where K Varies From 1 To  $M'$ .

$$W_{ik} = E_k^T \cdot (D_i - Avg), \forall i, k$$

## B. Igen Faces:

Eigenfaces Is The Name Given To A Set Of Eigenvectors When They Are Used In The Computer Vision Problem Of Human Face Recognition. [2] It An Efficient Method Used In Face Recognition Due To Its Simplicity, Speed And Learning Capability.

### Recognizing a Face: [3]

Step 1: Obtain A Test Image, I

**Step 2:** Subtract The Mean Image A From The Test Image.

$$D = I - A$$

**Step 3:** Find Its Projection On The Face Space.

$$P = \text{Eigenfaces} \cdot X_d$$

**Step 4:** Find the Euclidean Distances Of This Projection To

The Projection of the Images Already In The Face Space. Find

The Lowest Euclidean Distance. If This Distance Is Lower Than

A Predetermined Threshold Then It Is A Successful Match.

Else It Is A Failure.

**Step 5:** Optionally If A Face Image Occurs Multiple Times But

Is Not Found Within the Training Database It May Be Added

To The Database and the Eigenvectors Maybe Recomputed So

That This Face Can Be Recognized From the Next Trial. This

Process Can Be Automated.

## 5. System Implementation:

We Create Software Which As Separate Login For Students And Faculty. While The Student May Only View His/Her Attendance Report, The Faculty May Update, Delete Or Alter The Records As Per Their Convenience. The Software Is Connected To A Database For Storing Of The Student Information. The System Consists Of A Camera (CCTV Camera) That Capture Image Of The Student Sitting In The Classroom Automatically Or Manually By The Teacher. The Images Are Taken and Matched with Database to Mark the Attendance in the Student's Database. At The Time Of Admission, Facial Images Of Individual Students Are Stored In The Student Database. Here All The Faces Are Detected From The Input Image And The Algorithm Compare On Face With The Database. Remaining Student Are Marked Absent. This Propose Is Save Time And This Is Highly Secure Process No One Can Mark The Attendance Of Other.

For Face Detection We Have Used PCA. Principle Component Analysis Is An Efficient Method For Face Recognition. The PCA Algorithm Making A Frame On Face For Detecting The Boundary Of Face And Features Are Used Eigen Faces. [4]

## 6. Flow Chart:

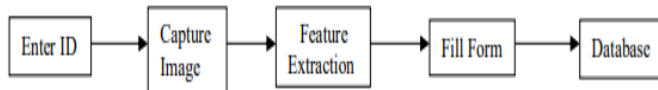
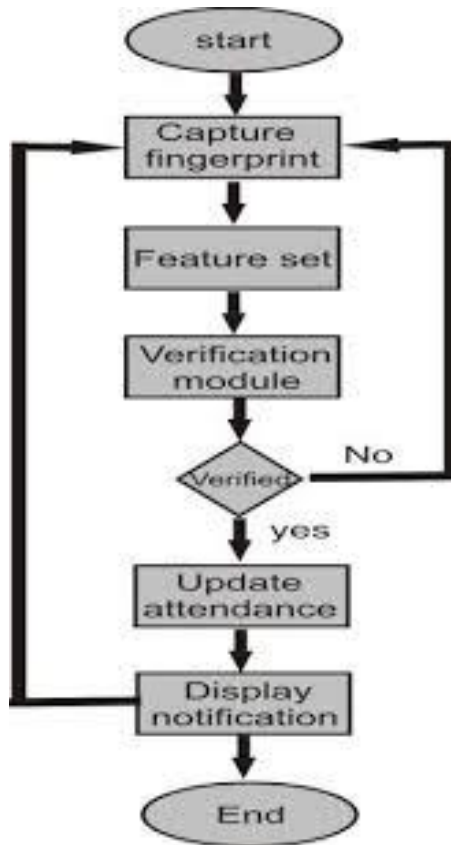


Figure: Student Registration Flow

## 7. Conclusion:

We Come To Realize That There Are Extensive Variety Of Strategies, For Example, Biometric, RFID Based And So Forth Which Are Time Consuming And Non-Efficient. Therefore, To Overcome, This Above Framework Is The Better

And Reliable Solution From Every Perceptive Of Time And Security. In This Way We Have Accomplished To Add To A Reliable And Effective Participation Framework To Distinguish Faces In Classroom And Recognize The Faces Accurately To Mark The Attendance. The Scope Of The Project Is The System On Which The Software Is Installed, I.E. The Project Is Developed As A Desktop Application, And It Will Work For A Particular Institute. But Later On, The Project Can Be Modified To Operate It Online.

## 8. References:

1. Nirmalya Kar, Mrinal Kanti Debbarma, Ashim Saha, And Dwijen Rudra Pal,” Study Of Implementing Automated Attendance System Using Face Recognition Technique”,In Proc. International Journal Of Computer And Communication Engineering, Vol. 1, No. 2, July 2012.
2. Navarrete, Pablo; Ruiz-Del-Solar, Javier (November 2002). "[Analysis And Comparison Of Eigenspace-Based Face Recognition Approaches](#)" (PDF). *International Journal Of Pattern Recognition And Artificial Intelligence*. **16** (7): 817–830. [Doi:10.1142/S0218001402002003](#).
3. Rajib Saha, Debotosh Bhattacharjee, “Face Recognition Using Eigenfaces” In International Journal Of Emerging Technology And Advanced Engineering, Volume 3, Issue 5, May 2013
4. Vaishali M. Bodhe, Sagar M. Bhakre, Sneha D. Ikhari, “Student Attendance System By Face Detection “ In International Journal Of Innovative Research In Computer And Communication Engineering, Vol. 5, Issue 3, March 2017