

## Attendance system for students using face recognition

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### Abstract

The organization of the daily attendance is a big duty in any institute. The image processing based present marking system takes the daily attendance of students in institutions automatically. It proposes a technique to automatically take the attendance of students. The system uses face identification skill for identifying the students who are present. It is a way to record and run the attendance in a class. The system stores the information of every student and their facial features in the database. It evaluates the novel patterns with the previously stored patterns as per theinsist. The implementation is done by concept of client-server model along with concept of 'Haar Cascade'. The system used is technologically very easy and maintainable. Other methods, like fingerprint recognition can provide improved performance, those are not appropriate for natural smart interactions due to their intrusive nature.

**Keywords:** Face detection and recognition; fingerprint; attendance.

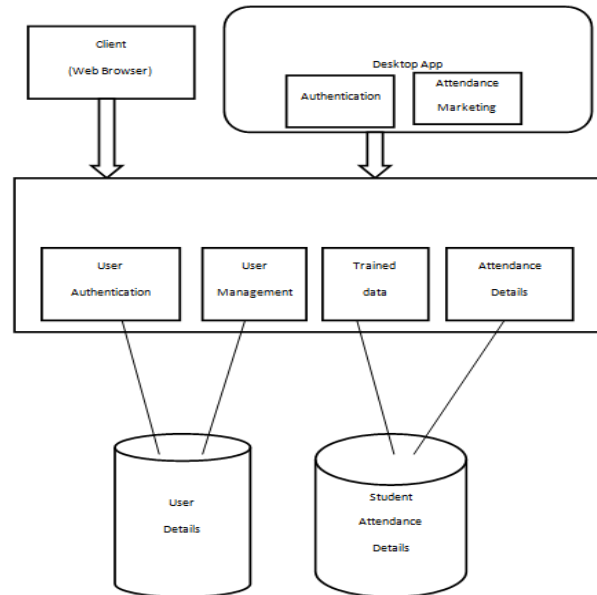
### 1. Introduction

Usually, the attendance is taken manually by means of attendance page given by the faculty members. It is a time consuming task. Moreover it is extremely difficult to confirm all the students in a large classroom surroundings with distributed branches whether the genuine students are actually responding or not. Using face identification, it proposes a technique to automatically take the presence of the students in a class. The system stores the information of each student as well as their facial and skin texture in the database and it compares the new patterns with the previously stored patterns as per the obligation. This method can broadly classified into two group: *Appearance based approach* and *feature based approach*. In the *appearance based approach*, the whole image is used as an input to the face detector. In feature based approach face detection is based on the features extracted from an image. Features can be like skin tint or edges and sometimes they have a information of the face geometry.

The face recognition is as aged as computer idea, both as of the practical significance of the topic and theoretical interest from cognitive scientists. Despite the fact that other methods of recognition (i.e. iris scans, fingerprints, etc) can be more precise, face recognition always remains a major focus of investigate because of its non-invasive nature and due to it is people's primary

method of person recognition. This tool is gradually evolving to a universal biometric solution since it requires virtually zero effort from the user end while evaluate with other biometric options.

## 2. Structural design



**Figure 1 System structural design**

The design of suggested system consist of three tier client server model. It consist of *application layer*, *presentation layer*, and *data layer*. They have the following functionalities:

Presentation Layer is the topmost layer. It is the main application that the user interacts with and feeds the input and queries. The client or user (teacher, student, parent) access the application via various browsers available with him/her, followed by which is the main application that user access to. This application first requires authentication, i.e it gives access to the authorized user that has a legal or valid id and password. In the next step, if the user is a faculty member, then that faculty will start the process of attendance marking of the students. If the user is a student or corresponding parent, with their respective ids they can view the attendance and/or analyze and compare the same with the attendance of other students as well.

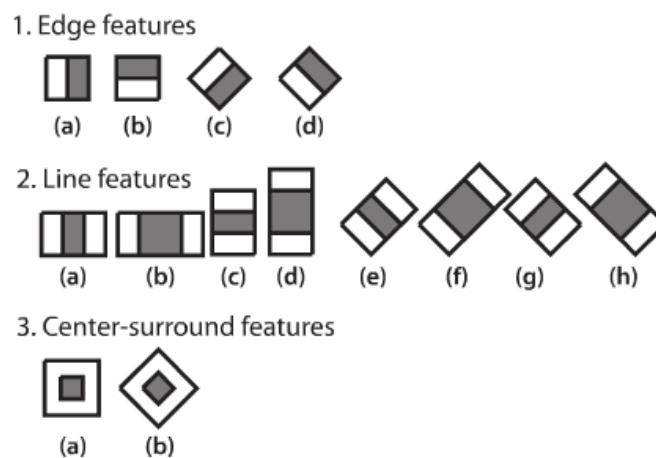
Application Layer is the middle layer sandwiched between presentation layer and data layer. It takes the input from presentation layer and forwards the same to data layer. The main task of this layer is to manage different users according to their categories, i. e teacher, student, and parent. It stores the details of these users in user details block as shown in the above diagram. The next task that this layer performs is managing the attendance details of the students. It includes maintaining and managing the trained data of students that is given as an input to the system and managing the attendances of respective students as shown in the above figure.

Data Layer is bottom most layer of our system architecture. It includes block called user details and student attendance details which consist of data that is required for the processing of information. It takes input from presentation layer.

### 3. The suggested system

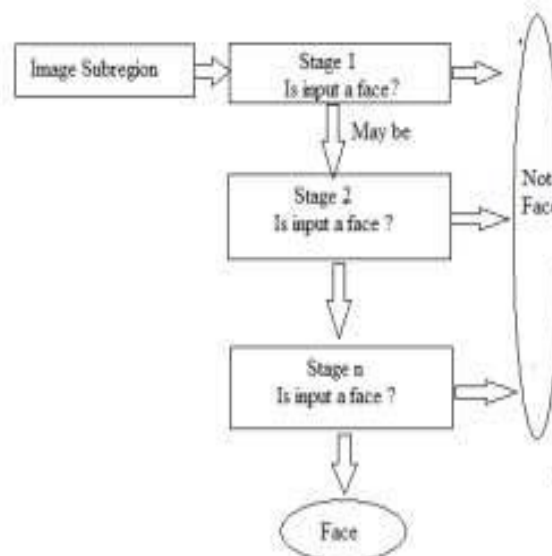
#### 3.1 Face Detection

The Open Source Computer Vision Library is used to implement the haar cascade classifier. For the recognition of the face, *haar features* are the main part of the *haar cascade* classifier. The Haar features are used to notice the presence of feature in given image. Each features result in a single value which is calculated by subtracting the sum of pixels under white rectangle from the sum of pixels under black rectangle as shown in figure. Haar like features are the rectangle features for rapid face detection. Some haar like feature are shown in figure. Instead of applying all the 6000 features on a casement, group the features into different stages of classifiers and apply one-by-one. (Normally first few stages will contain very less number of features). If a window fails the first stage, discard it.



**Figure 2 The Haar features**

The Haar feature starts scanning the image for recognition of the face from the top left corner and ends the face detection process bottom right corner of the image as shown in figure. The image is scanned several times through the haar like features in order to detect the face.



**Figure 3 The Cascade classifier**

In the suggested system, the leverage the profit of Webcam usage to capture image and for validating it from stored image and marking of an attendance. Each student's trained data is already stored at server, which would further be used for automating the registration cum notification process.

We have proposed three different models for our project:

- Admin  
Teachers and parents registration, Student Creation, Students, Teachers and Parents mapping
- Attendance Marking  
Start Attendance, Student Verification, Attendance Marking
- Parents Module (JSP)  
View Attendance, Attendance Analysis

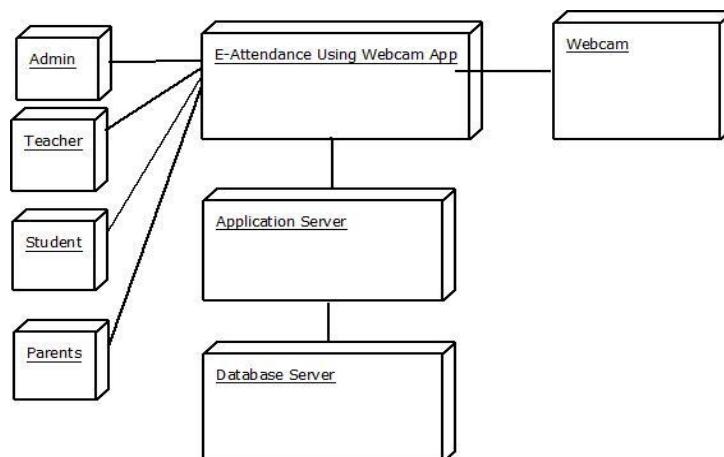
#### 4. Adopted methodology and results

As this system uses *haar cascade* concept, the implementation steps will be as:

- Step 1. Read coloured image and convert it into gray scale image.
- Step 2. Haar cascade is used to identify facial structure.
- Step 3. Normalise each input face image.
- Step 4. Conversion into comparative image vector.
- Step 5. Calculate similarity ratio with other vectors.
- Step 6. Identify minimum ratio from calculated ratios.
- Step 7. Identification of valid or invalid image structure.
- Step 8. If valid, system will identify user details from trained data.

#### 4.1 Deployment of system

The deployment of our website system is as:



**Figure 4 The Deployment Diagram**

## 4.2 Image database

The images used in our experiment contains simple background and lightly affected by the illumination. The size of the video to be captured is 640x480. All images are in JPEG format. As the algorithm used here is haar cascade, the images will be of frontal view.



**Figure 5 The Training Images**

## 4.3 Haar cascade classifier result

Provides haar cascade classifier Implementation with various trained classifier cascades .The faces detected on the training images are 98%. The accuracy maybe affected by the illumination of light leading to the results between 70-80%. To handle the large databases haar cascade classifier is the best detector in terms of speed and reliability. Even the image is affected by illumination, face detection results are more accurate using haar cascade classifier. There is no restriction on wearing glasses.

## 5. Conclusion and future scope

The automated attendance scheme is a smarter way for marking attendance. The attendance management system can reduce needless doubt by allowing parents to receive real-time information on non-attendance of the student from institutions. The service also make easy teachers' work by offering tools and a system for gathering the information about student's attendance and keeping a log about their possible tardiness at school. The future scope of this system may be as :the future advancements can be done using fully automatic web-camera to capture the images. It can be done by building an appropriate application and embedding it into mobile devices. And the biggest scope of this project is using cloud for a bigger database. Our system can be improved by incorporating video-streaming service and lecture archiving system.

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