# Automated Attendance Marking and Management System by Facial Recognition Using Histogram

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***Abstract*— In proposed system an automated attendance marking and management system is proposed by using face detection and recognition algorithms. Identification of human faces by the unique characteristics or features of their face is known as Face recognition. Currently, Face recognition technology is the fastest growing technology. Instead of using the traditional methods, this proposed system aims to develop an automated system that records the student's attendance by using facial recognition technology for those who are present during lecture hours. The main objective of this work is to make the attendance marking and management system fully automatic, simple and easy. In this work the facial recognition of face is done by image processing techniques. The processed image is used to match with the existing stored record and then attendance is marked in the database correspondingly. Compared to existing system traditional attendance marking system, this system reduces the workload of people and also saves times. This proposed system is been implemented with 4 modules such as Image Capturing, Segmentation of group photo and Face Detection, Face comparison and Recognition, Updating of Attendance in database.**

***Keywords— Histogram, Haar Cascade, Recognition, Eigen values, LBP, Machine Learning***

## I INTRODUCTION

Facial recognition is a process of identifying a person's face by comparing and analyzing patterns based on the unique facial contours of the face. This is done using biometric software. Earlier face recognition is used mostly for security purposes, but now it is been used in all fields. There are many different face recognition techniques for identifying person's face, some of them are adaptive regional blend matching method and generalized matching face detection method.

The face recognition system works based on the values of the nodal points on the person's face. The values measured with each nodal points helps in identifying and verifying the person's face. These values captured from the face's nodal point are given to other applications or software to easily and accurately identify the person.

Machine learning can be applied, which can provide a system that can automatically learn and takes decision on its own experience without any explicit programming. The main aim of using machine learning is to allow the computers to learn and take decision automatically without any human interference. It can access data and learn on its own by the instruction given earlier or from past experience and makes better decision.

## II EXISTING SYSTEM

### *A. Traditional Method*

In Traditional methods attendance are marked in classroom during lecture hours by lectures manually. This takes more time as many students are in lecture hall and it is high difficult to identify who skips the class.

### *B. Biometric Method*

In biometric method attendance are taken by comparing person's facial contours. But it is very tedious and takes more time [2].

### *C. RFID Method*

In this system Radio Frequency Identification (RFID) cards are placed in identity cards of students. This card is placed into the RFID reader before entering into the classroom [1]. The major drawback in this system is that unauthorized can use the identity card and put attendance [2].

### *D. Eigen Value Method*

The existing system was developed using Eigen Value Algorithm. This algorithm has many short comings. This algorithm can be applied for circumstances where light conditions are bright and does not change. This can't be applied for taking attendance in the class rooms, as the light conditions always plays a major role on day to day activities [3,4].

## III PROPOSED SYSTEM

In order to overcome the shortcomings of the existing system this proposed system is developed. The proposed system worked based on histogram algorithm. This algorithm requires many positive and negative images in order to train the classifier. This system comprises of four modules. The algorithm of the proposed system is explained below:

***Algorithm:***

***Step 1:*** *Capture the image using camera and upload the picture.*

***Step 2:*** *Segment the face of person and detecting face from the captured image by using Haar cascade algorithm.*

***Step 3:*** *Identify the face by trained dataset using histogram values.*

***Step 4:*** *If the student is enrolled in database then mark the attendance in database.*

The Fig. 1 shows the architectural diagram for the proposed system.



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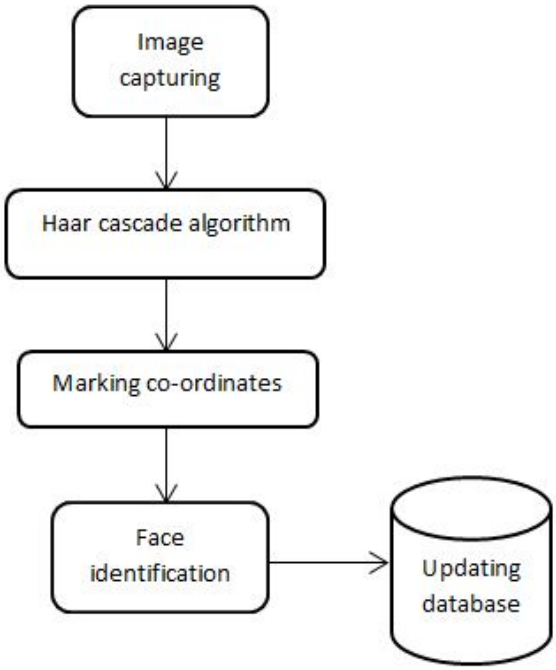


Fig. 1: Proposed system architecture

### A. *Image Capturing*

In this images are captured from camera. This will takes 5 pictures for an interval of 5 minutes. Then these pictures are uploaded. This process takes place every 40 minutes. The Fig. 2 shows the process of Image capturing.

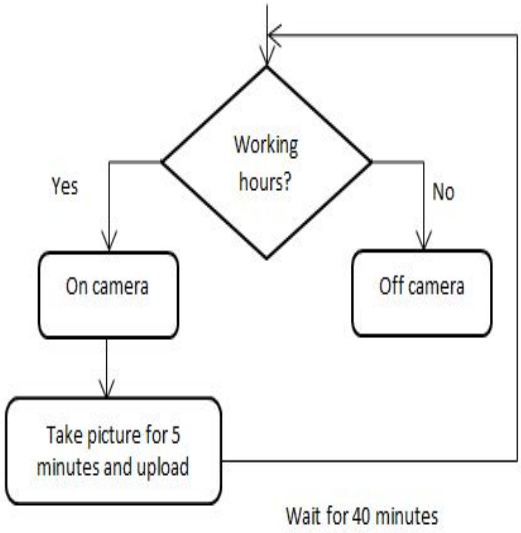


Fig. 2: Image Capturing

### B. *Face Segmentation*

Using Haar cascade algorithm, person's face is segmented. It takes features such as edge, line, four-rectangle are taken. As explained in Fig. 3 using this Haar Cascade algorithm segmentation is done and coordinates are marked.

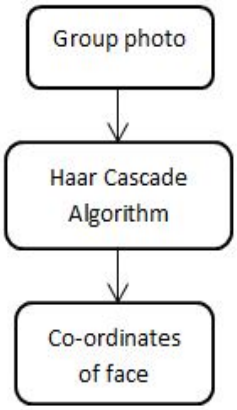


Fig. 3: Face Segmentation

By using this algorithm, face is identified. The Fig. 4 shows how the features are detected by using Haar Cascade.

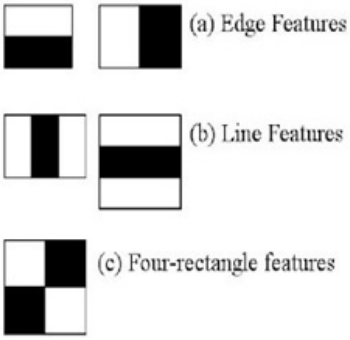


Fig. 4: Haar Cascade Features.

### C. *Face Identification*

The proposed system uses the algorithm called the Histogram for face identification purpose. This system functions the same in all the light conditions. This feature of this is considered as the most valuable feature of the algorithm.

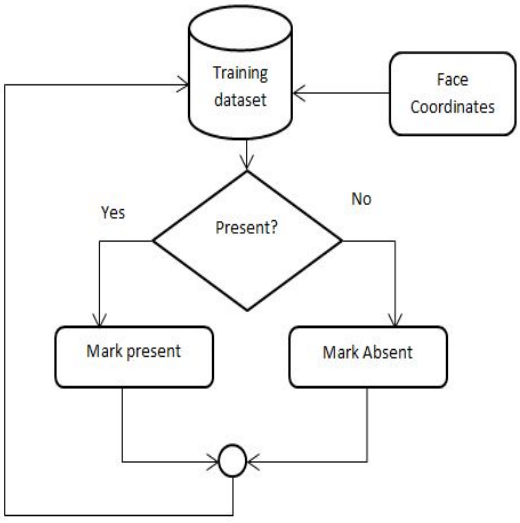


Fig. 5: Face identification

In this algorithm, the image is processed to form a matrix [5,6]. The values are processed to form the Histogram which is unique for each face. This histogram values are then used for identification of the individual faces. Once the individual faces are identified, their presence is marked as shown in Fig. 5.

### D. *Updating Database*

Each individual face is identified and if the person is enrolled then the attendance is marked. Each and every entry is updated in the database. These details is then made available to be viewed by the students, staffs, administrators. The privilege of modification the database is provided to the administrators. The Fig. 6 shows how updating is done in database.

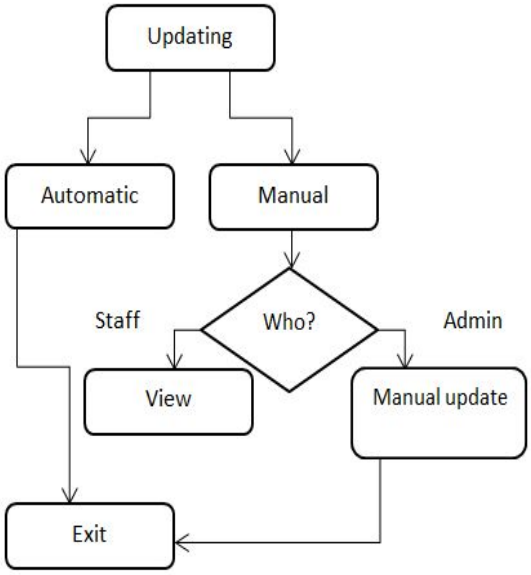


Fig. 6: Updating Database

## IV IMPLEMENTATION

### A. *Implementation of Haar Cascade*

Haar feature-based cascade classifiers is a classifier used for object detection. This classifier follows machine learning approach in which a cascade function is trained from the image to detect objects in other images.

Fig. 7: Haar Cascade identification

The training is done by giving positive and negative image to the classifier. Then the features are extracted from the image[7]. Each feature is a single value, which is obtained by subtracting sum of pixels in white rectangle from sum of pixels in black rectangle as shown in Fig. 7.

### B. *Implementation of Histogram*

By using LBP operator, each image is considered as a composition of micro-patterns [8]. Then the histogram of LBP is computed over the face, which encodes only the occurrences of micro-patterns. The shape information is collected by dividing face image into m small non-overlapping regions such as $R_0$, $R_1$,…., $R_m$ [9]. Then this shape information is used to extract LBP histogram which is shown in Fig. 8.

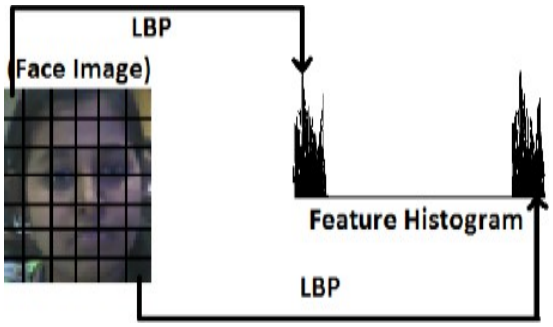


Fig. 8: Extracting sub-region

The LBP histogram which is extracted with spatial advanced features defined in (1):

$$Hij = \sum I(f1(x,y) = i)I((x,y) \in Rj) \quad (1)$$

### C. *Process involved in histogram*

The histogram works by taking a 3 x 3 window and moves across the image. For each move, the center pixel is compared with all its neighboring pixels. If the neighboring pixel intensity value is less than or equal to the center pixel then it is represented as 1, otherwise it is represented as 0.

In clockwise direction the entire 3 x 3 window reads the 0's and 1's value [10,11]. As the result of it, a binary pattern 11100001 has appeared as in Fig. 10. By using decimal to binary convertor the list of local binary patterns is converted into decimal numbers. The Fig. 9 shows the histogram matrix of face. Here the binary value 11100001 obtained as the result of histogram is converted into decimal value 225.

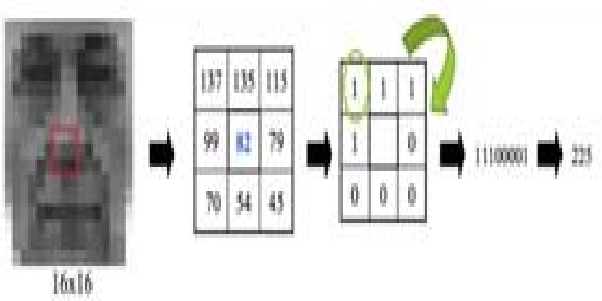


Fig. 9: Histogram Matrix

The Fig. 10 shows the histogram frequency chart obtained from the values of the histogram.

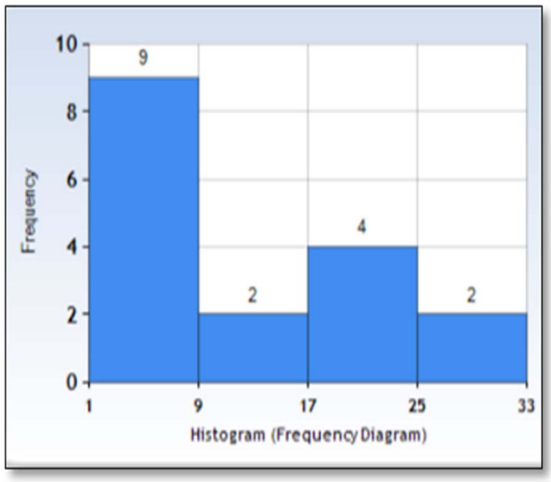


Fig. 10: Histogram Chart

### D. *Updating in database*

The last phase is the updating the attendance in the database. Once the image is been recognized then the mapping takes place where the names are mapped for the particular image. Then the names are marked with either present or absent. The Fig. 11 show how the attendances are updated in database.

| Student_id | Student_Name | Dept_name | Batch | Section | Date | Time |
|---|---|---|---|---|---|---|
| 312 | Alex | CSE | 2018 | A | 2/9/2018 | 8:30:03 AM |
| 391 | John | CSE | 2018 | B | 2/9/2018 | 9:30:03 AM |
| 420 | Mary | CSE | 2018 | B | 2/9/2018 | 10:30:03 AM |
| 365 | Angeline | CSE | 2018 | A | 3/9/2018 | 11:30:03 AM |

Fig. 11: Updating Database

## V CONCLUSION

An automated attendance marking and management system is a necessary tool for many Organization such as schools, colleges, office, etc. Most of the existing systems are much time consuming and require manual work. This proposed system had overcome the drawback of all the existing systems. By making use of face recognition techniques and machine learning, person's face are detected and attendance are marked. Each and every entry is updated in the database in order to use in future.

Since this system follows a modular approach, any advancement can be integrated into the system. Any changes based on the environment can also be incorporated into the system. This system makes use of the new trending technologies to effectively perform the day to day activities.

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