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SMART ATTENDANCE AND FEEDBACK MANAGEMENT SYSTEM

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Abstract: ***As in colleges attendance and feedback management is very crucial task. In existing system, attendance is marked manually in seminar hall. Once attendance sheet is circulated in seminar hall. Students signed on that sheet and according to that attendance is marked. After that in order to take the feedback again feedback forms are given or some times, link will be shared on whats app group and then students are giving the feedback. Staff has to manually analyze the feedbacks given by the students and according to that they are deciding how the seminar was? In this, as all the work is manual, it requires more time. In order to overcome the existing system demerits we propose a system which helps to mark the attendance of students easily. To mark the attendance students simply have to give the thumb impression in thumb scanner machine. Whenever seminar is completed then a link is send on Email. It includes the information in terms of feedback. When student fills the feedback form then analysis of overall session is done. So, if staff wants to see the overall reviews of the session he/she can simply look at the graph and they get the idea of that session. Staff also get the idea that how many PO, PSO, CO achieved by the seminar. In proposed system, there is no use of papers at all. As are main focus is to do all the work automatically and hence it saves the time. There is no chances of proxy attendance as each student must have to give biometric attendance on thumb machine. In some cases, student fingerprint is not recognized thumb machine, to overcome this issue we are implementing face recognition.***

Keywords: *- Web Application, IOT, Database*

I INTRODUCTION

In existing system there is no any effective mechanism to record the student attendance in seminar hall. The manual process is tedious, as paper is circulated among the students and attendance is marked. The drawback is sometimes student may not present for seminar still the attendance of that student is marked by his/her friends. To overcome the drawbacks of the existing system we propose this system. This project uses a biometric concept to facilitate the attendance system in educational institutes. Staff get the idea that how many PO, PSO, CO achieved by the seminar. It uses the most reliable way of uniquely identifying students through fingerprint reading. This project enables the easy way of maintaining seminar attendance with fewer efforts. Also the feedback of session is automated and its analysis is generated by the system.

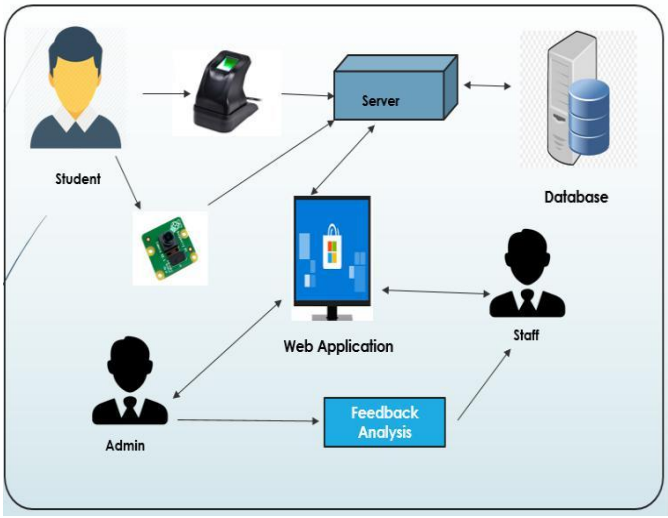


Figure 1. Architecture Diagram

II LITERATURE SURVEY

A number of existing works focus on the application of various methods and principles to effectively monitor the attendance of students. Design and development of smart student management system was proposed. This paper presents a design of an automatic attendance system for both students and professor with parents notification sent via GSM[1].A secure framework for implementing different educational service mobile applications like, mobile attendance, mobile curriculum, mobile marks register etc. The second part will leverage Near Field Communication technologies and gamification behavior approach to incorporate game mechanics into activity oriented learning systems [2].In this paper, the design and development of a portable classroom attendance system based on fingerprint biometric is presented. Among the salient aims of implementing a biometric feature into a portable attendance system is security and portability [3].Fingerprints are the oldest and most widely used form of biometric identification. Experiments using a mixture of both synthetic test images and real fingerprint images are then conducted to evaluate the performance of the implemented techniques. In combination with these techniques, preliminary results on the statistics of fingerprint images are then presented and discussed [4].For the alignment of two fingerprints certain landmark points are needed. These should be automatically extracted with low misidentification rate. Complex filters, applied to the orientation field in multiple resolution scales, are used to detect the symmetry and the type of symmetry. Experimental results are reported [5].Determination of individuality is one of the prime concerns in forensic investigation. The study of fingerprints is widely used in providing a clue regarding identity. The present study was undertaken to study the sex differences in fingerprint ridge density in the Indian population [6].

III METHODOLOGY

A.Fingerprint authentication is used for the student attendance system. It consists of two parts. One is enrollment and another one authentication. During enrollment, the fingerprint of the student is captured using fingerprint reader and the unique features are extracted and stored in the database as the template with the student ID. In the processing of authentication, the fingerprint of student is captured again and compared with the extracted features already existing in the database for determining match or mismatch. In this system, R307 fingerprint identification integrated reader is used to capture fingerprints as shown in Fig.2. Fingerprint module mainly has three types of fingerprint sensors like optical fingerprint sensor, ultrasonic fingerprint sensor and capacitive fingerprint sensor. The sensor type of R307 fingerprint reader is high-definition optical sensor. This reader can store 250 fingerprints. R307 Fingerprint Module consists of optical fingerprint sensor, high-speed DSP processor, high-performance fingerprint alignment algorithm, high-capacity FLASH chips and other hardware and software composition, stable performance, simple structure, with fingerprint entry, image processing, fingerprint matching, search and template storage and other functions.

B. Face recognition is used for the student attendance system. It consists of two parts. One is enrollment and another one authentication. During enrollment, the face of the student is captured using camera and the unique features are extracted and stored in the database as the template with the student ID. In the processing of authentication, the face of student is captured again and compared with the extracted features already existing in the database for determining match or mismatch. For face recognition raspberry pi3 model B camera is used. It is 8 megapixel camera used for capturing the image.

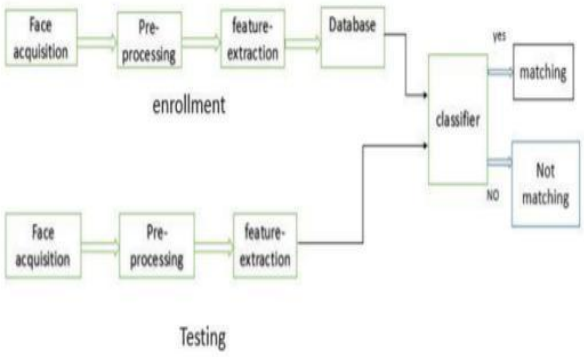
Figure 2. R307 Fingerprint Scanner Module

C. Representation of feedback is done in pie chart. The chart is divided into sectors, where each sector shows the relative size of each value. The sectors are named as excellent, very good, good, average, and poor.

IV. ALGORITHM AND MATHEMATICAL MODEL

Using LBPH algorithm for face recognition and Haar Cascade classifier for face detection. What is LBPH algorithm? The Local Binary Pattern Histogram (LBPH) algorithm is a simple solution on face recognition problem, which can recognize both front face and side face. However, the recognition rate of LBPH algorithm under the conditions of illumination diversification, expression variation and attitude deflection is decreased. To solve this problem, a modified LBPH algorithm based on pixel neighborhood gray median (MLBPH) is proposed. The gray value of the pixel is replaced by the median value of its neighborhood sampling value, and then the feature value is extracted by the sub blocks and the statistical histogram is established to form the

MLBPH feature dictionary, which is used to recognize the human face identity compared with test image. Experiments are carried on FERET standard face database and the creation of new face database, and the results show that MLBPH algorithm is superior to LBPH algorithm in recognition rate. The steps involved to achieve this are:



For image having dimentions N x M. We divide it into regions of same height and width resulting in m x m dimension for every region.

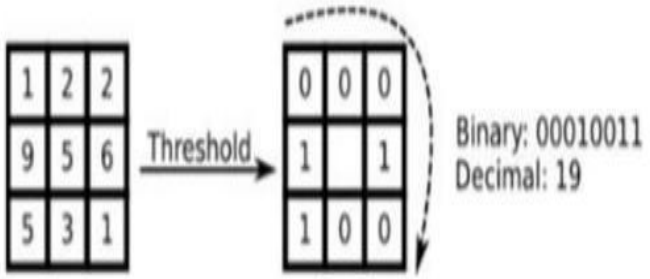
Local binary operator is used for every region. The LBP operator is defined in window of 3x3.

$$LBP(x_c, y_c) = \sum_{p=0}^{P-1} 2^p s(i_p - i_c)$$

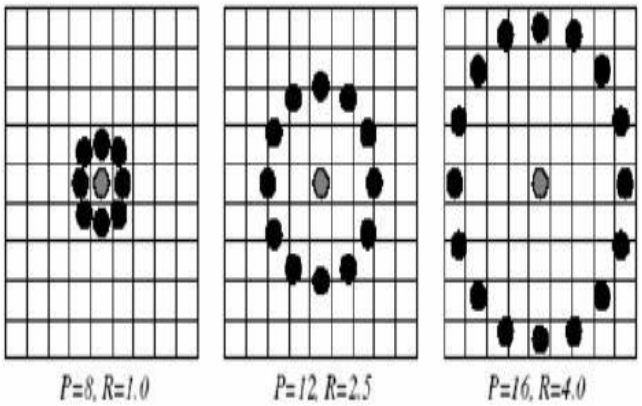
here '(Xc,Yc)' is central pixel with intensity 'Ic'. And 'In' being the intensity of the the neighbor pixel. Using median pixel value as threshold, it compares a pixel to its 8 closest pixels using this function.

$$s(x) = \begin{cases} 1, & x \geq 0 \\ 0, & x < 0 \end{cases}$$

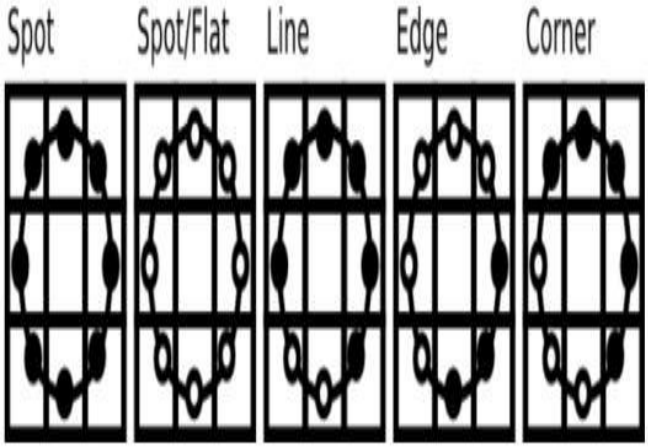
If the value of neighbor is greater than or equal to the central value it is set as 1 otherwise it is set as 0. Thus, we obtain a total of 8 binary values from the 8 neighbors. After combining these values we get a 8 bit binary number which is translated to decimal number for our convenience. This decimal number is called the pixel LBP value and its range is 0-255.



Later it was noted that a fixed neighborhood fails to encode details varying in scale .The algorithm was improved to use different number of radius and neighbors , now it was known as circular LBP.



The idea here is to align an arbitrary number of neighbors on a circle with a variable radius. This way the following neighborhoods are captured:



For a given point (Xc,Yc) the position of the neighbor (Xp,Yp), p belonging to P can be calculated by:

$$x_p = x_c + R\cos(\frac{2\pi p}{P})$$

$$y_p = y_c - R\sin(\frac{2\pi p}{P})$$

Here R is radius of the circle and P is the number of sample points. If a point's coordinate on the circle doesn't correspond to image coordinates, it gets interpolated generally by bilinear interpolation:

$$f(x,y) \approx \begin{bmatrix} 1-x & x \end{bmatrix} \begin{bmatrix} f(0,0) & f(0,1) \\ f(1,0) & f(1,1) \end{bmatrix} \begin{bmatrix} 1-y \\ y \end{bmatrix}$$

Now we compare the histograms of the test image and the images in the database and then we return the image with the closest histogram. (This can be done using many techniques like Euclidean distance, chi-square, absolute value etc.) The Euclidean distance is calculated by comparing the test image features with features stored in the datasets. The minimum distance between test and original image gives the matching rate.

As an output we get an ID of the image from the database if the test image is recognized. What is Haar cascades? A Haar Cascade is basically a classifier which is used to detect the object for which it has been trained for, from the source. Better results are obtained by using high quality images and increasing the amount of stages for which the classifier is trained.

CascadeClassifier::detectMultiScale Detects objects of different sizes in the input image. The detected objects are returned as a list of rectangles. Image Matrix of the type CV8U containing an image where objects are detected. Objects Vector of rectangles where each rectangle contains the detected object. How does Haar Cascade work? Haar Cascade is a machine learning object detection algorithm used to identify objects in an image or video and based on the concept of features proposed by Paul Viola and Michael Jones in their paper "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001.

It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images. Initially, the algorithm needs a lot of positive images (images of faces) and negative images (images without faces) to train the classifier. Then we need to extract features from it. For this, Haar features shown in the below image are used. They are just like our convolutional kernel. Each feature is a single value obtained by subtracting sum of pixels under the white rectangle from sum of pixels under the black rectangle. To select the best features out of 160000+ features, the concept is used called Adaboost which both selects the best features and trains the classifiers that use them. This algorithm constructs a strong classifier as a linear combination of weighted simple weak classifiers. The process is as follows. During the detection phase, a window of the target size is moved over the input image, and for each subsection of the image and Haar features are calculated. This difference is then compared to a learned threshold that separates non-objects from objects. Because each Haar feature is only a"weak classifier" (its detection quality is slightly better than random guessing) a large number of Haar features are necessary to describe an object with sufficient accuracy and are therefore organized into cascade classifiers to form a strong classifier.

The cascade classifier consists of a collection of stages, where each stage is an ensemble of weak learners. The weak learners are simple classifiers called decision stumps. Each stage is trained using a technique called boosting. Boosting provides the ability to train a highly accurate classifier by taking a weighted average of the decisions made by the weak learners. Each stage of the classifier labels the region defined by the current location of the sliding window as either positive or negative. Positive indicates that an object was found and negative indicates no objects were found. If the label is negative, the classification of this region is complete, and the detector slides the window to the next location. If the label is positive, the classifier passes the region to the next stage. The detector reports an object found at the current window location when the final stage classifies the region as positive. The stages are designed to reject negative samples as fast as possible. The assumption is that the vast majority of windows do not contain the object of interest. Conversely, true positives are rare and worth taking the time to verify.

V HARDWARE AND SOFTWARE

A. HARDWARE

- Fingerprint module SM-621[12] is an optical fingerprint module that has large capacity and high digital signal processing function. It has a low power ARM processer with Flash memory and has CMOS technology. The module can perform tasks like fingerprint enrolment, storing templates, matching fingerprints, and searching fingerprints.
- Raspberry pi camera The Raspberry Pi Camera v2 is a high quality 8 megapixel Sony IMX219 image sensor custom designed add-on board for Raspberry Pi, featuring a fixed focus lens. In terms of still images, the camera is capable of 3280 x 2464 pixel static images, and also supports 1080p30, 720p60 and 640x480p90 video.
- Stontronics black pi3 adapter
  Raspberry Pi STONTRONICS T5875DV Official 2.5A 5.1V Power Supply designed. Generic EERD5V2ADC01

DC USB Adapter Charger for Raspberry Pi 3 Model B/RPi2. Product description. Raspberry Pi 3 Official Case Black/Grey.

- RPI case with fan transparent
  Raspberry pi 2 pi 3 Model B ABS Blob case with mini FAN (Transparent. Rpi shop Raspberry pi 4 case Model B Acrylic case with fan.
- HDMI to VGA adapter converter cable
  Portable HDMI to VGA Adapter Connects a computer, laptop, tablet or other device with HDMI to a monitor or projector with a VGA port; A VGA cable (sold separately) is required to connect from the adapter to a monitor or projector.

B. SOFTWARE

For development of the system, NetBeans, MySQL server, phpMyAdmin and Android Studio are used. NetBeans is an integrated development environment (IDE) used in computer programming. NetBeans is written mostly in Java and its primary use for developing Java applications, but it may also be used to develop applications in other programming languages. Jsp is used to develop this system. MySQL is a relational database management system (RDBMS) based on SQL (Structured Query Language) and phpMyAdmin is a web-based interface to a MySQL server. With the help of phpMyAdmin we can perform various operations on database like create, alter, modify, delete etc.

VI CONCLUSION

The application offers reliability, time saving and easy control. To maintain the attendance system with Fingerprint and Face Recognition and that means using biometric like fingerprint or face module. As fingerprints and face are unique in nature. We can avoid cheating and maintain discipline in all environments. After attendance marking analysis of feedback is done. By that staff get the idea like how was the seminar.

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