Smart Attendance Notification System using SMTP with Face Recognition

B. PruthviRaj Goud, S. Sravan Reddy, K. Praveen Kumar

Abstract: ***Till today attendance marking is manual event for many educational bodies. It is a mandatory, common and important activity in day to day life of a faculty member. Manual attendances maintaining is bit difficult process, time consuming effort while doing analysis or report generations on it. Few automated systems are developed to overcome those complexities. Still there are so many drawbacks like cost effective, fake generation, accuracy. To overcome these initiations, there is a need of innovative a smart and automated attendance system. This paper exactly focused on producing a secure attendance marking system which is based upon one of the human gesture as Face. There are two stages to implement the approach. One is face detection using Haar classifier. Second one is face recognition using LHBP classifiers which is generated from trained faces.The proposed system is going to record the attendance of the people who are present in a classroom environment autonomously and this is an easiest way to produce the analysis and proof oriented approach makes as reliable applications.***

Keyword: Haar-classifiers, LHBP classifiers and smart attendance, reliable

I. INTRODUCTION

Successful Professional bodies are giving the highest priority for the student presence while teaching technical and non technical courses. The regular student appearance will be calculated as attendance which helps us to do the analysis based on his/her regularity and monitoring and tracking of student is very easy. The appearance of a student will be considered and maintained on the records manually. Educational bodies are having must and should rule while maintaining the attendance for a student. They are having a well-known definition for an importance of attendance. So educational Organizations are stick to the point, started engaging students and their regularity. Low attendance cases are considered as serious issue for student while finishing courses. It may produce, lot of challenges to student to follow the course and evaluating a student is bit complex to faculty member. Based on the tag line, attendance is monitoring by faculty member. In traditional system, we are normally used records for track the regularity of a student. Attendance will be represented on the records in manual way. Every day we used to call the student and track their attendance hour by hour. It will produce more complexities to faculty member while tracking attendance. It is very if it is for small group of institution and it is different case in large groups. A manual entry leads to produce the time-consuming approach, cost effective, human mistakes, faking is easy and less accuracy. Some web tracking systems are also generated. Even though they need manual entries are required. We are proposing a new and smart attendance system which is ready to enter the Daily attendance and tracking and report generations for checking the performance of students.

Proposed automated system is working based on one of the human biometric. Thumb recognition is the older versions technique which is already in use and producing lot of complexities in real world. We can easily throw the entire system into a trap with the help of humanoid hand. Need to use very natural and unique one to recognize a person i.e. can be happen with face. Face recognition is the one of the latest trend in many aspects and domains like Mobiles, Security. Based on the human face attendance will be marked in day to day life. Using camera captured image will be recognized and stored in database along with date and time. So we can evaluate, generate the report which is in proof oriented approach which gives some relaxation to professional bodies. It provides the advantages as easy tracking, no manual entries, no time wastage, and performance calculation is bit easy.

Organizing the papers: This paper construction will be follows with **Section II** Literature Survey covers the methodology of face recognition system which are available in real world**. Section -III** covers the proposed methodology of attendance system using face recognition and steps. **Section-IV** is evaluation of the proposed work. Section V in terms of conclusion.

II. LITERATURE SURVEY

Advancement of computer visionary has made-up with a possibility to invoke new video processing applications in field of Gesture reorganization based on face[1]. It has wide range of areas in human recognition which are going to provide the high-end Security, to develop the human computer interaction including the behavior analysis,

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teleconferencing and video surveillance. Face recognition has become most popular biometric eccentricity in recent decades due to its importance in security control applications. The primary step in practical face analysis, it is starting with real-time face retrieval from an image as a face segment or a template. The second step starts to find the matching faces which are available in database.

The real time or multiple face recognition system is tightly synchronized with the face segmentation technique. It seems to be, without segmentation we are unable to recognition an object. Mostly it is not going to be possible. In order to achieve, the recognition of an object from the database, just go through with the following steps:

1) The images in the test set are compared to all images in the reference set by matching their respective interest points.

2) The object shown on the reference image with the highest number of matches with respect to the test image is chosen as the recognized object.

Major proposal is focusing on the image matching to recognize the image from database. The matching is follows as below steps: [2]

1) Extract feature points from the face segment, as well as from the images which are available in the database by using SIFT, SURF algorithms.

2) Compare the image matches by calculating the distance between their descriptor vectors using Euclidian, Flann distance factors. Based on the matching descriptors, we can able to identify the image from database.

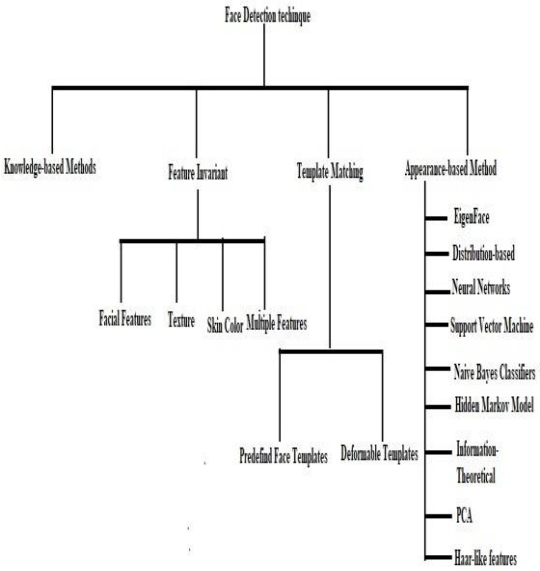

Fig 2.1 detection techniques of face

The geometric constraints reduce the impact of false positive matches. Major applications are using feature as key role to get robust results. While developing the applications as like image matching, Registration and Recognitions systems are using the local features. Because they are using robust to estimate the features. A real time system is proposed for multiple human face detection from an input image using Haar like features and recognition based on feature extraction using an efficient algorithm like PCA, SIFT (64-128 dimensional) and SURF which are available in database. To classify these features, we are using SVM classification in our regular development time. IN the beginning of the 1970's, face recognition was treated as a 2D pattern recognition problem [2]. The distances between important points where used to recognize known faces, e.g. measuring the distance between the eyes or other important points or measuring different angles of facial components. But it is necessary that the face recognition systems to be fully automatic. Face recognition is still throwing the challenges to researchers and it is an interesting problem to resolve the issues with different backgrounds: human emotions and psychology, pattern matching and recognition, neural networks, computer vision, and computer graphics. The following methods are used to face recognition.

I) Face Detection Using Haar- Classifiers [4]:

This is historical view of Face recognition and its algorithms. There are so many algorithms which implements on different selections or features from an image. PCA kind of algorithms will works with low level coefficient efficient values which is not yet all efficient to measure. Instead of classification and clustering will able to produce more effectiveness to application development. To represent the face features, haar classifiers are showing extensive results towards to reach the problem solving in the area of face and its related applications and approaches.

Haar classifiers are able to produce the features from composed rectangle area i.e called as integral images. Its weight and size of each feature are treated as constant values for feature selection and training the algorithms. Mostly, the haar classifiers features are uses integral images which take the help of summation of features to compare with threshold values to make it as haar feature classifiers. Each stage does not have a set number of Haar features. Depending on the parameters of the training data individual stages can have a varying number of Haar features. Based on the classifiers or trained features, faces are going to be detected based on the cascades. If the image is passed on all the stages or the features are exactly matched then the particular face is detected for recognition.

- **Face Recognition Techniques:**

After getting multiple Face Segments, we are able to find out the best match from the database. This recognition will include many different approaches.

2.1) PCA [5]: PCA- Principal Component Analysis uses the co-efficient values are uses to produce the features. Even though its elaborating on low level intensive values which are called as eigenfaces which are with same size which consist with normalized edges up the eyes and mouth of the subjects to the images. it is also helps to reduce the dimensional structure of facial patterns with the help of image compression techniques. This reduction drops the unused information and decomposes the face structure into orthogonal components known as eigenfaces. Each face image is represented as weighted sum feature vector of eigenfaces [8] which are stored in 1-D array. A probe image is compared against the gallery image by measuring the distance between their respective feature vectors then matching result has been disclosed.

2.2) SIFT:[5] Scale Invariant Feature Transform (SIFT) is an algorithm represented in machine vision to extract specific features of images for applications such as matching various view of an object or scene (for binocular vision) and identifying objects [6]. The obtained features are invariant to scale and rotation, and partially invariant to change in lighting. Such features are extracted in four steps.

1) by using Differentiation of Gaussian filters like 3*3, 9*9,27*27, each and every interest point is able to find out in feature invariants to its scale and Orientation.2) a model is used to determine the appropriate points based on different sustainability criteria.

3) Based on the local gradient of the image at target points, one orientation is assigned to each feature point.

4) the information contained in the gradient function around the feature points is encoded to be used as the point's characteristic for future works such as feature matching.[SIFT].

2.3) SURF:[6] Speed-up robust features (SURF) is a scale and rotation invariant feature. It contains interest point detector and descriptor based on the threshold values. The detector locates the interest points in the image, and the descriptor describes the features of the interest points and constructs the feature vectors of the interest points. Different from SIFT using DOG to detect interest points, SURF. The integral image is defined as the summation of the pixel values of the original image. The value at any location (x, y) of the integral image is the sum of the image's pixels above and to the left of location (x, y). Figure 1 illustrates the integral image generation. The simple rectangular features of an image are calculated using an intermediate representation of an image, called the integral image. The integral image is an array containing of sums of the pixels' intensity values located directly to the left of a pixel and directly above the pixel at location

$$H(x,\sigma) = \begin{bmatrix} L_{xx}(x,\sigma) & L_{xy}(x,\sigma) \\ L_{xy}(x,\sigma) & L_{yy}(x,\sigma) \end{bmatrix}$$

$L_{xx}(x,\sigma), L_{xy}(x,\sigma), L_{xy}(x,\sigma) and L_{yy}(x,\sigma)$ are the convolutions of the Gaussian second order partial derivatives with the image I in point x respectively, the interesting points can be shown as blobs of the sign. Comparatively PCA, SIFT, SURF and HAAR classifiers. Haar classifiers are working with classification technique which gives best part for the applications.

III. METHODOLOGY

As we now human gestures is the best part and high-end security will be achieved. One of the best is gesture is face. Face recognition is famous part. In our existing systems are giving best parts. Even looking into the advancement in security. Waiting To resolve the proposed system, we need to work with two different stages 1) face detection [2] 2) face recognition [5].

1) Train Data:

Before resolving the face recognition, we need to train the data to accept the input. Here camera is used to train the data and as well is to scan the faces. Training the data from a captured image. Haar features are going to be extracted from the image and save those images into a particular folder/ database in 5 different leveled images.

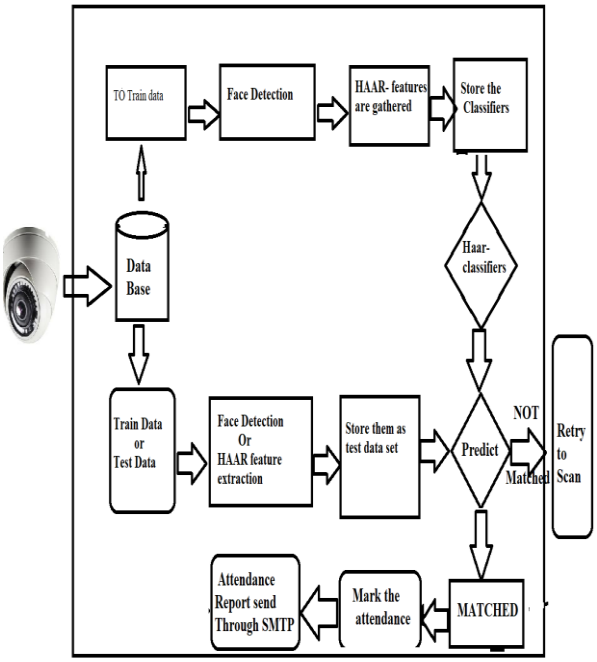

Fig 3.1 Smart attendance notification system architecture.

As shown in fig 3.1 work flow is showing an absolute solution for it.

3) **Face detection:[2]** before training or set up a classifier, we need an object and it has to identify by camera. To accept whether it is face or not we need to work with haar classifiers. We collected face location classifiers. They differ among each other by the number of stages and the minimal size of the faces that can be detected. They were designed to detect faces in different positions. Collect all the features, are represented in haar_casecade.xml file in OpenCV. Which help us to identify an object i.e. face.

4) **Face Recognition:** OpenCV enables the creation of XML files to store features extracted from datasets using the Face Recognizer class. The stored images are imported, converted to grayscale and saved with IDs in two lists with same indexes. Face Recognizer objects are created using face recognizer class. Here, LHBP classifier will be generated for each image. Histograms are used in larger cells to find the frequency of occurrences of values making process faster. By analyzing the results in the cell, edges can be detected as the values change. By computing the values of all cells and concatenating the histograms, feature vectors can be obtained. Images can be classified by processing with an ID attached. Input images are classified using the same process and compared with the dataset and distance is obtained. By setting up a threshold, it can be identified if it is a known or unknown face. Eigen face and Fisher face compute the dominant features of the whole training set while LBPH analyze them individually. Majorly LHBP focus on, the radius from the center pixel to build the local binary pattern. The Number of sample points to build the pattern. Having a considerable number will slow down the computer. The Number of Cells to be created in X axis. The

number of cells to be created in Y axis. A threshold value similar to Eigenface and Fisher face. If the threshold is passed the object will return-1.

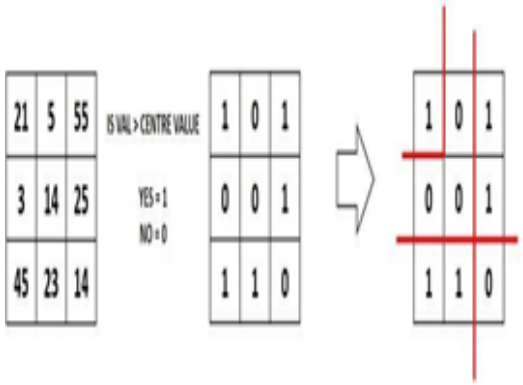

Fig 3.4 Features of Local Binary Histograms

Recognizer objects are created and images are imported, resized, converted into NumPy arrays and stored in a vector. The ID of the image is gathered from splitting the file name, and stored in another vector. By using all three of the objects are trained.

4) SMTP [6]:

With the help of face detection and face recognition system, we are able to identify a person and mark the attendance for the day. It can be stored in a database. Monthly reports are able to generate. As a feature we were attached enhanced feature to this existing system to make it very efficient and useful to end user. This is very easy process to identify a person and mark the attendance comparing with other existing systems. Database constraints are applied as every faculty can able to login into their prospective class room machine. Camera has to capture the images and it is ready to mark the attendance. Here attendance is marked but the student doesn't have confirmation about it even though machine said ok. To overcome this, confirmation mail can be sent to your particular mail id whatever you are given at the time of registration. Student can track every mail and they can confirm with the particular faculties. We were used SMTP to send the confirmations mail. SMTP is protocol which shares the message to email server.

IV. RESULT ANALYSIS

Here we are represented a high-end front end using python. Those, who wants work with it. First registrations are mandatory for student and faculty. Click on registration to enroll yourself. We are included OTP verifications which are required to verify email ids. Being on faculty registrations, staff-id is required and it is must and should. Integrity constraints are applied on Database objects to avoid the redundancy and which help us to maintain the consistency in the database. Faculty and student are mapped with referential integrity. Specific faculty will be logged into application or device to take the attendance. Each student has to appear in front of camera. Our proposed system will do the remaining context to reach the approach.

1) Login Page:

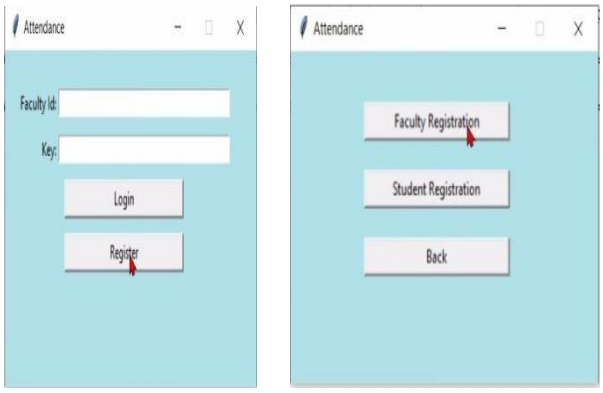

Fig 4.1 Faculty Registration Forms

2) Student Registration Page:

Student has to mention his student id. It is must and should, While generating admission into it. It is very helpful while report generation and all stuff. See the things in below image

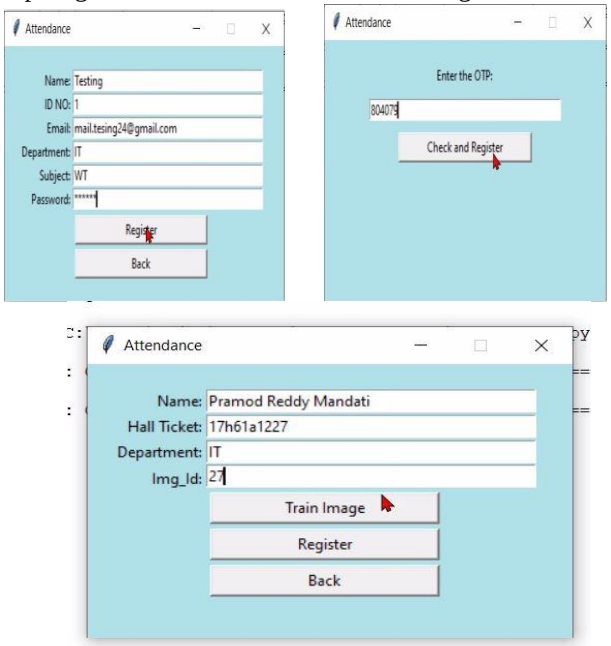

Fig 4.2 Student Registration Form

3) Face Detection and trained data:

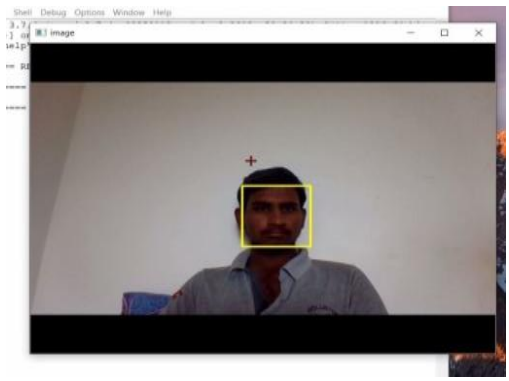

Fig 4.3 face detection using haar Classifiers

Face has been detected using camera can stored and attached with an student id. After detection, we need to train the data using local binary

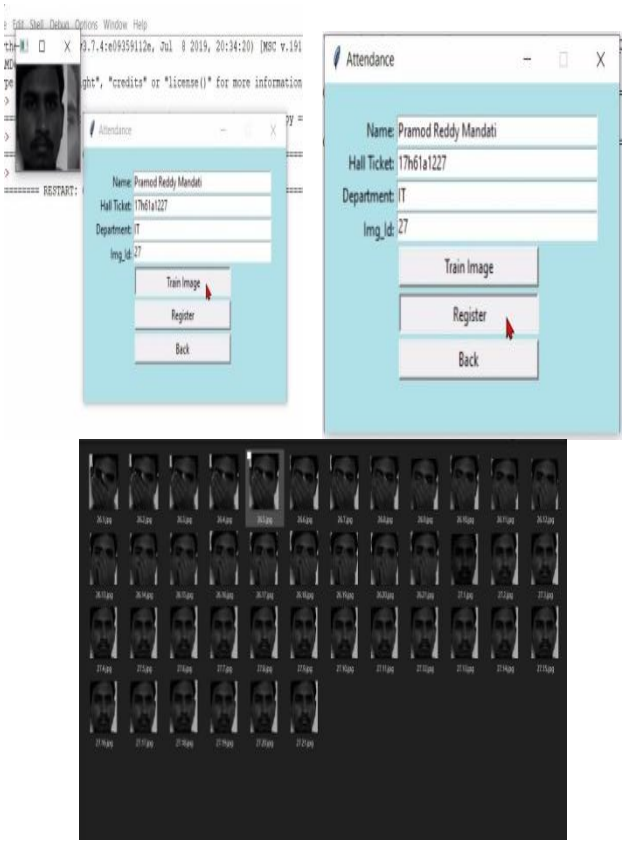

Fig 4.4 train the dataset

5) Taking Attendance:

We were provided four buttons which consist with Take Attendance it will start the attendance capturing, after considering the presenters, remaining students will be treated as Absent so click on absent remaining.

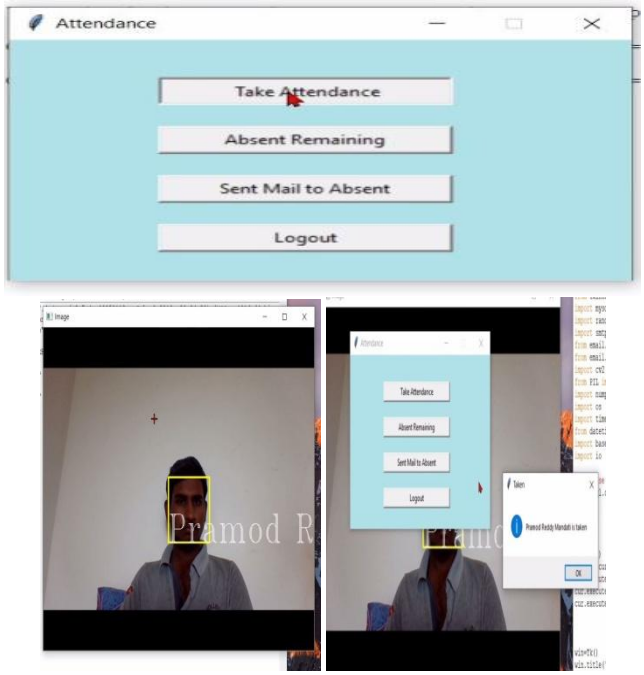

Fig 4.5 Take the attendance

6) Send an EMAIL:

Click on send Mail to Absent Students. And we can also watch the count of no of students are presented and absented for the particular cross. We are also given ability to check whether how many absentees or how many presenters are there?

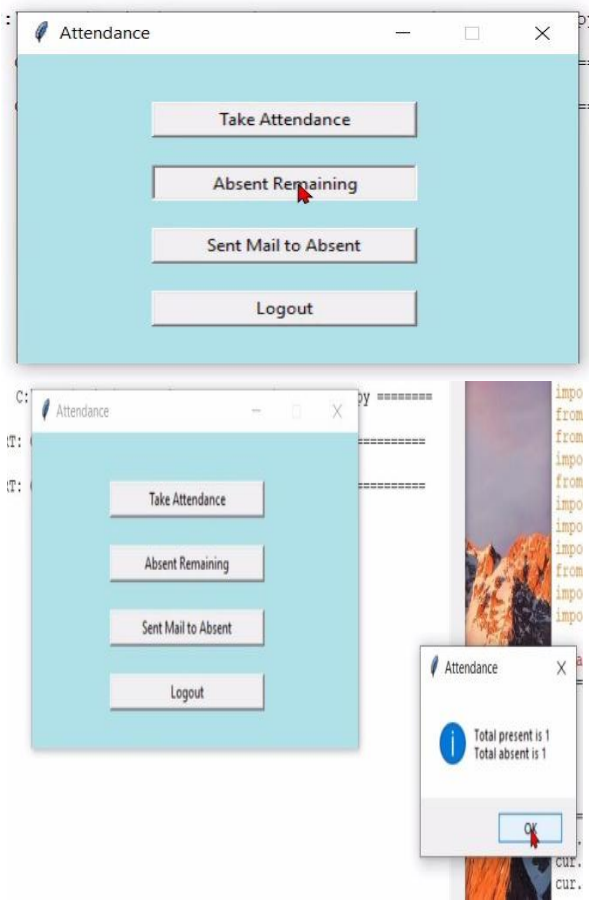

Fig 4.6 generates the attendance report.

7) Report generation:

It will produce report and as well as it will send the attendance report to particular student mail id Weather absent or present.

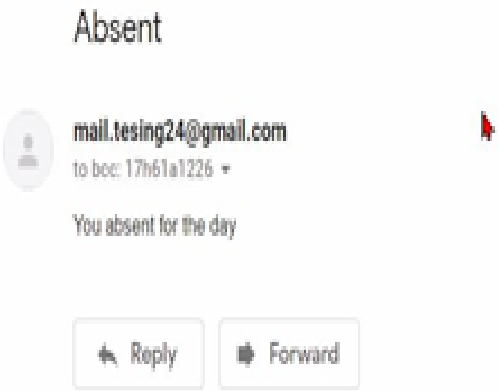

Fig 4.7 absent report

V. CONCLUSION

In this paper, smart attendance system is exposing the advantages as flexibility and reliable nature to applications which make user friendly. This approach working out with haar classifiers to detect the faces and SVM to train the image set which is well in advance technology for class room. Even though it is best thing to real time approach. Few constraint-based approaches

will degrade the application performance while collecting the attendance for every faculty member. They have to login into system and attendance has to be collect which is time consumed approach. Instead of collecting individual attendance, we are going to work with video where automatic attendance is collected using cameras. This is well in advance. as well, looking forward to enhance the performance, satisfying the constraints and report generation

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