Instinctive Face Identification Structure for Attendance

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Abstract

Maintaining the attendance record with day to day activities is a challenging task. The conventional method of calling each student's name is time-consuming, and there is always a chance of proxy attendance. The following system is based on face recognition to maintain the attendance record of students. The daily attendance of students is recorded subject-wise, which is stored already by the administrator. As the corresponding subject arrives, the system automatically starts taking snaps and applying face detection and recognition technique to the given image. They recognise students are marked as present and their attendance update with corresponding time and subject id. After comparing them with the reference image stored in a database, we have used modified LBPH (Linear Binary Pattern histogram) to detect the faces in images. The attendance sheet will keep in the CSV. After that sheet matches the timetable, and a message will be sent to the faculty.

Keywords: - *Modified LBPH(Linear binary pattern histogram), Image processing, Face recognition, CSV file, Database.*

INTRODUCTION

Every organisation requires a robust and stable system to record the attendance of their students. Every organisation has its own method to do so. Some take attendance manually with a sheet of paper by calling their names during lecture hours. Some have adopted biometrics systems such as fingerprint, iris or voice recognition and RFID card reader. The conventional method of calling the name of students manually is a time-consuming event. In the RFID card system, each student is assigned a card with their corresponding identity, but there is a chance of card loss, or an unauthorised person may misuse the card for fake attendance. In the wake of COVID-19, biometrics systems such as a fingerprint are at high risk of getting infected. At the same time, the other biometric systems like iris and voice recognition have flaws and are not 100% accurate. The use of face recognition for attendance marking is a smart way of an attendance management system. Face recognition is a more accurate and faster technique among other techniques and reduces proxy attendance. Face recognition provides passive identification that is a person who is to be identified does not need to take any action for their

identity. Face recognition involves two steps, the first step consists of detecting faces, and the second step consists of identifying those detected face images with the existing database. Our system uses a face recognition approach to reduce the current system's flaws with the help of a modified LBPH (Linear binary pattern histogram) algorithm and making more accurate time. The image is captured by the camera and sent to the system. Then input images will compare with the set of references images of each student and then identify the faces with the help of a modified LBPH (Linear binary pattern histogram) algorithm and mark their attendance. After that attendance sheet will be generated, and these sheets through message will be sent to the faculty.

LITERATURE REVIEW

One of the major areas for most researchers to work on is image processing. The most Popular sub-part of image processing is face recognition and face detection. There are many algorithms present that detect and recognises human beings faces. Like LBPH, Eigenface, Neural network, Fisherface, Elastic Bunch Graph Matching.

The Eigenface is one of the most used algorithms for face recognition. This method is used for dimensionality reduction. Principal Component Analysis(PCA) is used for face recognition and face detection. Eigenfaces are the principal components that divide the face into eigenvectors. These eigenvectors can be obtained from the covariance matrix. Eigenvectors are used to find the variation between multiple faces. The face can be approximated by using eigenvectors having the largest eigenvalues. The accuracy of eigenfaces are depended on many several things, it uses the pixel value for comparison of the projection, the accuracy would decrease with light intensity. The disadvantage of this algorithm is that finding the eigenvectors and eigenvalues are very time consuming on PPC.

The LBPH method is a widely used algorithm for extracting useful features from preprocessed face images to perform face recognition. It is a pixel-based Texture extraction method. And it is one of the best performing texture descriptors.

Another method is Neural Network, used in many applications like autonomous robot driving, character recognition, object recognition, pattern recognition problems. Neural networks are nonlinear, so it's a widely used algorithm for face recognition so that the extraction steps may be more efficient than the PCA. PCA + CNN method is superior to the eigenfaces technique even when there is only one training image per person.

The main goal of this paper is to develop an automated attendance management system using face recognition, it will solve the problems which are being faced in other systems which are running in today's modern-day world. The main approach to be followed is to identify the student's current image to the images stored in a database. The model specifies by [1], which is linked with the database. The first step of the process is fetching all the students' data from the database, then resizing it and creating a face vector. This vector is used for Eigenface, and other tasks are training the data for Eigenface and saving it into an XML file.

In another solution of a similar system [2][6][12], the first step in this system is the creation of a database of faces, and a camera is used for the detection of faces. Data of trained faces are stored and detected faces are compared to the student's id

and recognised. This system is heavily dependant on the condition of the camera. Each image of training data is converted into a grayscale. The face image is detected using Haar Cascade frontal face module using the LBPH algorithm. And the faces in the image are predicted after they are shown in a green box with their associated names. In [15] camera is set at the entrance. When the person enters in classroom image will capture. As not more than two persons can enter the classroom at a time algorithm has less work.

Research conducted by [3] uses Convolutional Neural Network, Principle Component Analysis. They use Viola and Jones algorithm for face bounding box detection, and for face recognition, they use PCA. Each picture in the training dataset is represented as Eigenface. In [11], they use CNN to detect the faces after detecting and processing the beginning. It's compared to the database faces and updates the students' attendance and corrected names of students go into an excel sheet.

Research conducted by [4] used Complete Kernel Fisher Discriminant (CKFD) method in that training set image first converted into grayscale then crop that image to 50 x 50 pixel and store into database. Image capture by webcam is converted into grayscale and crop to 50 x 50 pixel, then compute Eigenvectors from scatter Matrices, for recognising the face compute Eigenvectors from stored data and then sorted them by Eigenvectors then applied distance measure on current data and existing data from that result has been decided.

In another solution [20], they use the viola-Jones algorithm and Alignment-free partial face recognition algorithm. The viola-Jones algorithm does face detection. The photo of students taken from a camera placed at the top centre of the blackboard at fixed intervals. The image is converted to grayscale before performing face detection. Once detected, the face is sent to an Alignment-free partial face recognition algorithm for recognition after recognition step data is updated into an excel sheet.

COMPARISON OF EXISTING SOLUTION

We are comparing existing solution on the base on following parameters Accuracy rate, ageing problem, Real Time, Detection and Recognition of Different poses, multiple face Detection and Recognition. Solution [1,6,10,14,16,17,15] have low accuracy rate, only [16,17,20] are solving the aging problem, [1,5,8,12,17,18,19] are not Real time system,[1,5,6,7,10,13,14,15,17,20] are not Detecting and recognizing the Different poses ,[5,18] are not detecting multiple faces.

We also found that Fisherface and Eigenface are based on a statistical approach. By finding space based on the common feature of training set images. Both are a global approach of recognition that takes the whole image as a two-D array of a pixel. Fisher's face is a modified version of Eigenface. The diversity between them is the projection method. Fisherface uses FLD while Eigenface uses PCA.FLD works better for the classification of different faces & PCA works better for dimension reduction.

LOOPHOLES IN EXISTING SOLUTION

[1,8,10,11,12] is sensitive for lightening conditions and the [20] position of the head or different pose of person, in [2] Images dividing is problematic when pose variation is large, the classification result should be better, but the computation complexity will increase. In [3] CNN don't encode the position and orientation of an object, high computational cost, need a lot of training sets, in

[5] queue of student slow down the process, in [7] unintentional change in person is not detected. Less accuracy rate, [13] fails to recognise students from some distance,[18] generates an error while scanning multiple faces.

PROPOSED METHODOLOGY

In general, the attendance is taken offline on paper or by using fingerprint or by using ID. But our system is automatic, more effective and no effort needed. A camera can be used to capture the image and then recognise that image. Some steps are taken for accomplishing Automatic Attendance System are:

- Database
- Camera
- Face Detection
- Face Recognition
- Send message

A. Database:

In the system, student data should be registered in the database. General information like enrollment No., Name, Class with section, and image. Trained faces of students can be used for comparing faces. The database also contains the respective faculty mobile number as per time table. A mobile number system can send enrollment no. of students whose faces are matched with respective database faces.

B. Camera:

A camera is a must in this system. It is used for capturing images of all students. Images quality is also dependent on the camera. The camera should be set up in such a way that all students are visible.

C. Face Detection:

Face detection's main function is to determine whether the faces appear in a given image and the location of these faces. In other words, face detection is used to detect landmarks on a human's face. Face detection is essential for face recognition after the image is taken through the camera and given to the system. A face detection algorithm is used to identify human faces in an image. The main objective is to find faces in an image and extract them for the face recognition algorithm.

D. Face Recognition:

After face detection, the faces are compared with respective database faces. Face recognition is used to identify an individual with their face. If the faces are matched with database trained faces, the system will collect enrollment no. from the database and save it into a CSV file. Face recognition is done using LBPH (Linear Binary Pattern Histogram) algorithm.

E. Send Message:

After faces are recognised, the system will collect the enrollment no. through database whose faces are matched and saves enrolment no. into CSV file. Then collect data from the CSV file and send it to the respective faculty.

F. Algorithm:

Step-1: Registration of students details in a students database

Step-2: Image is captured by the camera

Step-3: Image processing and detect faces

Step-4: A bunch of detected faces are then compared with trained faces which are stored in a database

Step-5: If faces are recognised, the system collects Roll no and saves them into a CSV file. Else: go back to Step 1

Step-6: Roll no., saved in the CSV file, then converted into a message.

Step-7: Last but not least, the message is sent to the respective faculty as per time table

WORKFLOW DIAGRAM

It represents the general flow with data (Fig. 1). This system is based on automatic attendance system modules used like camera, database, face detection, face recognition etc.

ACTIVITY DIAGRAM

It represents a flowchart to show the flow from one activity to another (Fig. 2). As this system is based on automatic attendance, system activities are used like capture images, process images, detect faces etc.

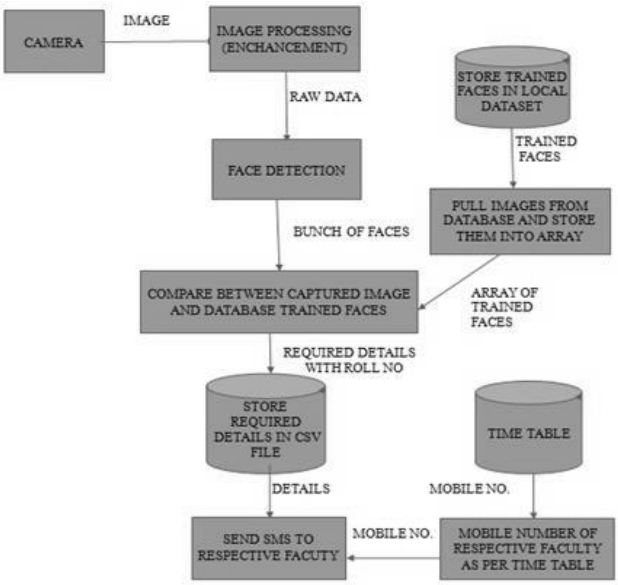

Fig.1 Workflow Diagram

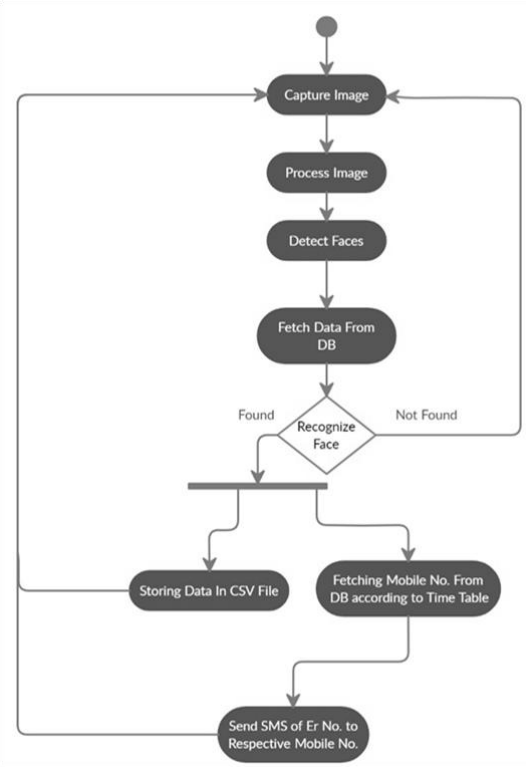

Fig. 2 Activity diagram

CONCLUSIONS

Instinctive face identification structure for attendance put forward using this algorithm to carry student's face recognition and confirmation. This system can avert fake attendance and improve the time-consuming issue.

By Overall discussion, we can conclude that Some factors like weather conditions can affect system decisions. The recognition rate is lower during cloudy weather because faces are not clearly visible to the system. We consider that the accuracy level of a grayscale image is much higher than a colour image, but in this structure, we often use colour frames. The recognition system has enough precision for the identification process.

Most schools and colleges often use paper registers for attendance. Therefore, This system will decrease paper usage in schools and colleges, which is good for the environment. Few factors affecting accuracy is detection and recognition of unintentional changes in a person and identifying different poses. In future work, we will mainly focus on the system's accuracy and improve our system to recognise changes in a person and various person poses.

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