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Computer Vision based Attendance Management System

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Abstract: **Recording attendance on a daily basis is a common and important activity in schools and colleges for knowing whether the student is present or absent. Taking Attendance manually and maintaining is difficult process, especially for large group of students. We are developing a system to overcome the drawbacks like cost, fake attendance, accuracy, etc . In this project, we propose a system that takes the attendance of students in classroom automatically using face recognition. However, it is difficult to estimate the attendance precisely using each result of face recognition independently because the face detection rate is not sufficiently high. We propose a method for estimating the attendance precisely using all the results of face recognition obtained by continuous observation, improves the performance. The enrolment of the students is a onetime process and their face will be stored in the database. Students can have their own roll number as student id and name which will be unique for each student. The presence of each student will be updated in a database for every hour in a day. This system will overcome the problems of manual attendance management system.**

Keywords- Face recognition; Face detection; Face database; Attendance system

I.INTRODUCTION

Face recognition is among the most productive image processing applications and has a pivotal role in the technical field. Recognition of the human face is an active issue for authentication purposes specifically in the context of attendance of students. Attendance system using face recognition is a procedure of recognizing students by using face biostatistics based on the high definition monitoring and other computer technologies.

The development of this system is aimed to accomplish digitization of the traditional system of taking attendance by calling names and maintaining pen-paper records. Present strategies for taking attendance are tedious and time-consuming. The purpose of this system is to build a attendance system which is based on face recognition techniques. In this system face of an individual will be considered for marking attendance.

Nowadays, face recognition is gaining more popularity and has been widely used. In this paper, we have proposed a system which detects the faces of students from live streaming video of the classroom and attendance will be marked if the detected face is found in the face database. This system with face recognition technology will consume less time than compared to traditional methods of marking attendance

Records of attendance will be simply manipulated by manual recording. the normal method of constructing attending and the current biometric systems has high risk of proxies.

This paper is so planned to tackle of these issues. As part of the planned system, Haar classifiers, KNNs, CNNs, SVMs, and HOG(Histogram of oriented gradients) algorithm are used. The face recognition attending reports are generated and keep in excel format.

II. LITERATURE SURVEY

In the paper [1] The authors planned a paradigm for a processed group action system. The thought focuses on however face recognition combined with frequency Identification (RFID) identifies and counts permissible pupils as they enter and exit the room. each registered student's record is unbroken within the system. additionally, the system keeps track of each student listed during a specific course within the group action record and delivers needed information as required.

In study [2] The authors planned for system going to be able to mark the group action via face Id. it'll observe faces via digital camera and so acknowledge the faces. once recognition, it can mark the group action of the recognized student and update the group action record.

In paper [3], authors planned a methodology for student attending system in school classroom face recognition technique by combining distinct rippling reworks (DWT) and distinct circular function Transform (DCT). These algorithms were used to extract the options of student's face followed by applying Radial Basis perform (RBF) for classifying the facial objects.

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In research [4,] the authors suggested a paradigm for an automated attendance system. The concept focuses on how face recognition combined with Radio Frequency Identification (RFID) identifies and counts permitted pupils as they enter and exit the classroom. Every registered student's legitimate record is kept in the system. In addition, the system keeps track of every student enrolled in a particular course in the attendance record and delivers required information as needed.

In research [7]Jones algorithm is used to find images in frames. Initially an image was created from the frame simply assigns numbers to the generated pixels by summing up numbers. Continue to see things in frames. A feature like Haar is also produced as millions of features is produced Adaboost (development algorithm) is used improve performance. Extracted features are passed through a trained facial recognition algorithm which differentiates face from things.

This project entails developing an attendance system that uses facial recognition to track presence, time-student in, and time. It includes facial detection, alignment, and identification, as well as the creation of a application to support the system's many use cases, such as new student registration, photo addition to the training dataset, reading attendance records, and so on. This project aims to provide a cost-effective alternative to standard manual attendance methods. It may be utilised in places like schools, and colleges where security is a must .

II. PROPOSED SYSTEM

All the students of the class must register themselves by entering the required details and then their images will betaken and stored in a database. During each session, a face will be found in the live streaming video of the class. The recovered faces will be compared to the images in the database. Once a match is found, attendance will be marked to the appropriate student. At the end of each session, attendance percentage of each student will be calculated and displayed.

Face recognition is one of the methods of automatic attendance which is accurate and time saving. In this project we have four steps:

- Detection of face In Image,
- Normalization of facial landmarks,
- Extraction of facial features,
- recognition of face.
- Updating attendance

The faces detected will be compared with images present in the dataset. If match found, attendance will be marked for the respective student.

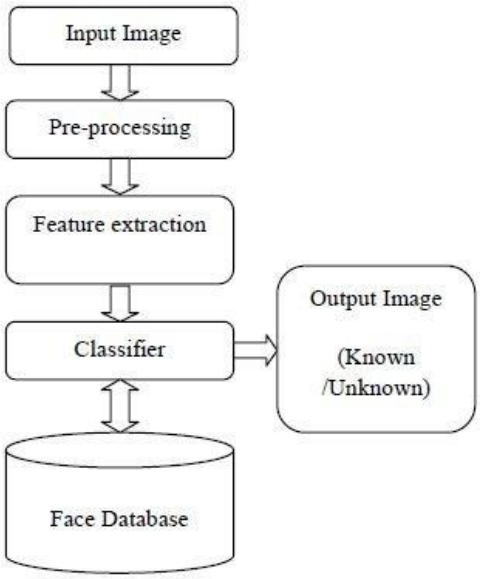

Fig 1 block diagram

III. SYSTEM ARCHITECTURE

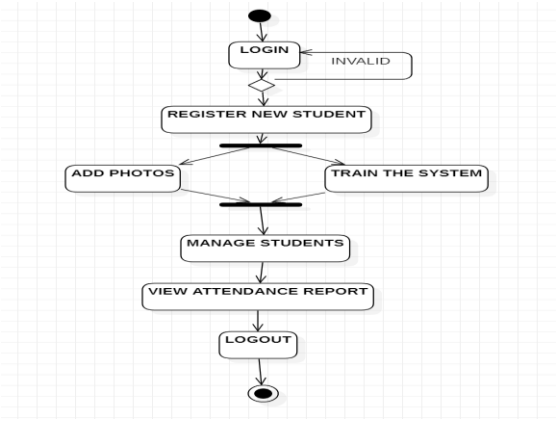

Fig 2system work flow architecture

Before beginning the construction of the facial recognition attendance management, it is important to know what platform the program will be created in and the process involved in it. In Fig1 the modules covered are detection of face image extraction of facial features, normalizing facial landmarks and training input images, updating attendance in database.

1.Detect Face in Image

This section is responsible for the strategy of capturing and converting live footage to digital data. These captured footage unit of measurement sent to the face detection formula. The face detection algorithm used in this module is the HOG (Histogram of Gradients)algorithm. The HOG algorithm locates the face on the captured footage and extracts the image for face recognition system. throughout segmentation, a section is searched provided that the section contains a face. This reduces the machine time required for searching the full image whereas effort the image, Environmental lighting conditions could vary. This causes non-skin objects to seem as skin objects., therefore

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the white balance has to be corrected before segmenting the image. looking on these conditions, the face are going to be segmental Candidates face are extracted from input image with modified bounding box from original bounding box. the height of the bounding box has been modified joined.28 times larger than the dimension as a results of chest and neck elements are eliminated. This price of modification has been determined through an experiment. These face pictures are sent to facial feature extraction to validate the candidates. once the filtered image is recognized, a labelling operation is applied. once the corner point of face is calculated, the face image is extracted.

2. Normalize Facial Landmarks

As shown in fig 2 Detecting facial landmarks involves two steps they are Locate the face in image, Detect facial structures, The geometric face model was constructed with the eye detection performed using the Haar Cascade Classifier, while the nose detection was used as a retrieval and eye detection method. Later, features of HOG (Histogram of Oriented Gradients) are extracted from a large number of facial images that will be used as part of the visual approach. The Haar feature component is used to extract and extract original data, and then HOG features are extracted from image data and PCA size reduction is processed, and the Support Vector Machines (SVM) algorithm is used for face detection.

Fig 3 Normalize facial landmarks

3. Extract facial features

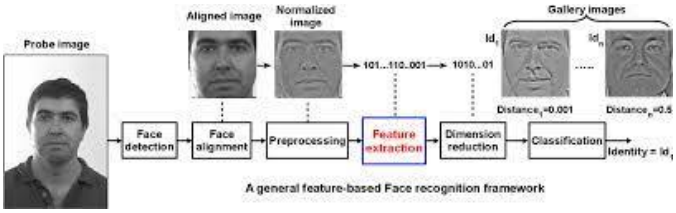

Fig4 facial feature extraction

In this module the Facial features are extracted from the image and processed in the backend which is later on used to compare the images.

Dlib library used for this module. Dlib is a machine learning library which was created to solve complicated real-world issues. This library has been created using the C++ programming language and it works with C,C++, Python, and Java.

Our face has many features which will be known, like our eyes, mouth, nose, etc. we tend to once after we use DLib algorithms to notice these options we really get a map of points that surround every feature. These HOG features are then labelled together for the user and the Support Vector Machine (SVM) model is trained to predict the registered faces in the system. The SVM algorithm generates a decision area that divides two classes. With facial recognition, we also interpret the decision area to generate a metaphor for the similarity between two facial images. This allows us to build face recognition algorithms.

4.Recognition of face

Digital image or a video frame from a video is captured. The image of the extracted face is used therefore to spot the individual. Face recognition involves pre-processing the image, vectorizing it, generating a info, then classifying the image, that's accomplished with a Neural network. Before classifying face pictures, pre-processing is needed. Pre-processing operations Equalize grayscale face histograms up to30 pixels, and at last vectorizing the matrix image. it's crucial to educate a network once structure is generated with relevancy a face info. Thus, a face info is made before any actual tests. An info is made with samples for each person. this could be the employment sample. Therefore, the scale matrix is that the employment matrix. because to the number of samples for each person, the employment matrix vector elements are split into four groups. but the first vector element belongs to the first sample. A pre-processed image is converted into a vectorized face image, that generates the employment matrix. once the employment matrix and target matrix are created, NN are going to be trained.

Fig 5Recognition of face

Execution

1. Registration of Student

So now the user have to register the students for the system to recognize and mark attendance to the respective subjects. The front-end of the application is developed using the tkinter library in python. To register first the teacher/staff has to click on the register new student option. And enter the student details such as student registration number, student name. Once the details are entered after clicking on take image the system will automatically start clicking images of the student. The system will click 30-50 images of the student. The greater number of images as

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input, the more accurate the output will be. After clicking the required amount of image the camera closes automatically, Once the camera closes the train image button is clicked which will start extracting the features of face and train the image, when the images are trained successfully a notification will be displayed saying images trained successfully. features are then labelled together for the user and the Support Vector Machine (SVM) model is trained to predict the registered faces in the system. After the notification is displayed the student is ready to mark his/her attendance.

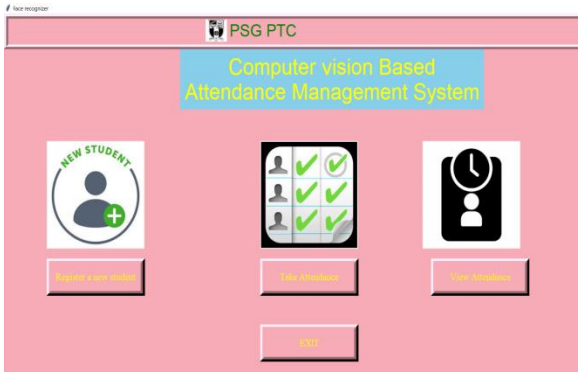

Fig 6 attendance system

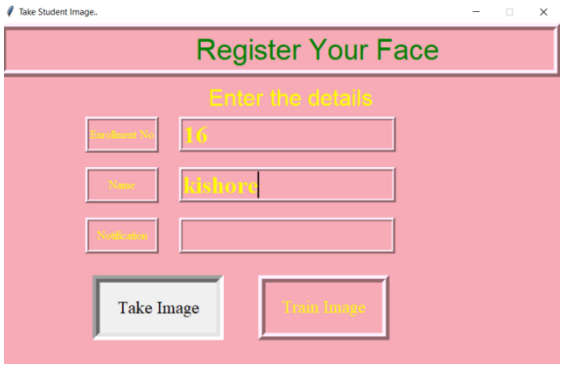

Fig 7 Registration of student

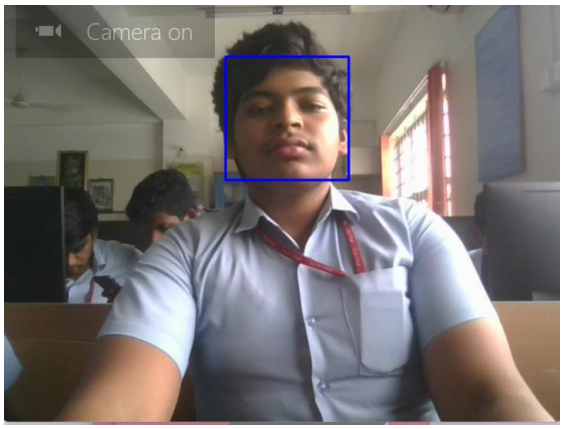

Fig 8 Registration of student

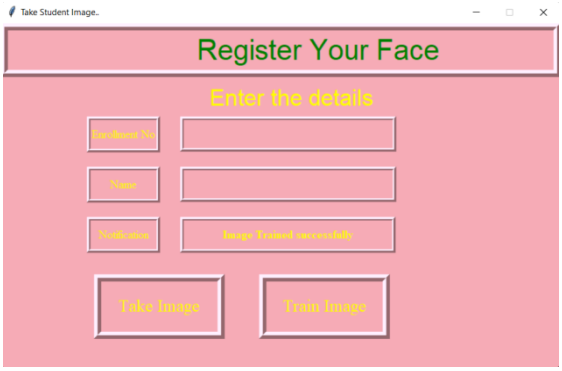

Fig 9 Registration of student

2.Attendance Updating

Video frames from the area is obtained by a camera place in among the area. The video information is initial divided into a frame of photos, from that 30 photos with clear faces and higher lighting unit are used as train image, and eventually the popularity results. Once the students enter the subject and click on mark attendance the camera pops up and face recognition method, the recognized faces are going to be marked as present the recognized faces will be marked as present in the database and later will generate an excel sheet report. Attendance of each student for each subject will be calculated and the attendance percentage will be displayed. Attendance is marked as 1 if the student is present and 0 is used to indicate the student is absent.

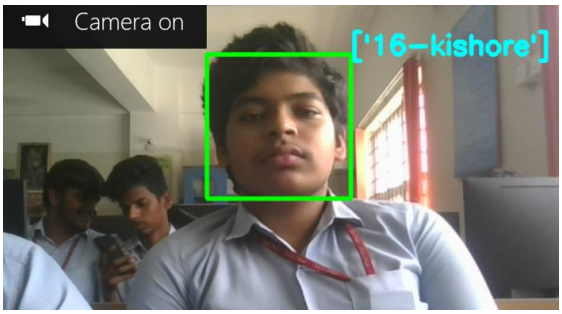

Fig 10 Updation of attendance

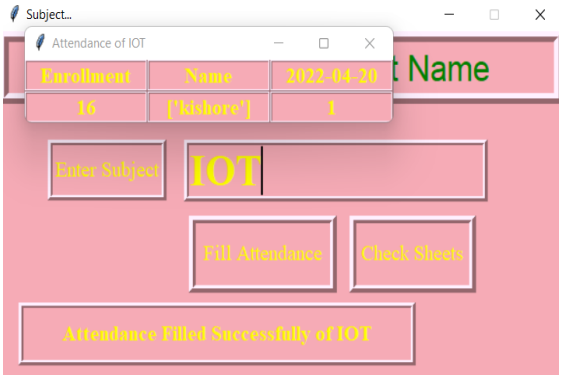

Fig 11Updation of attendance

3. View Attendance report

Once we finish updating the attendance, The attendance gets stored in an excel format with the date and

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in when the teacher clicks view attendance it will display the attendance record for the particular subject that the user has chosen for and also the attendance for each subject is calculated and attendance percentage for each student is displayed as shown in Fig7. Attendance percentage is calculated in the backend by adding the student attendance and dividing it by number of classes conducted

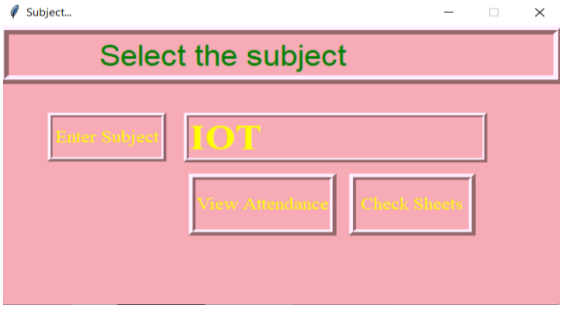

Fig 12Viewing attendance report

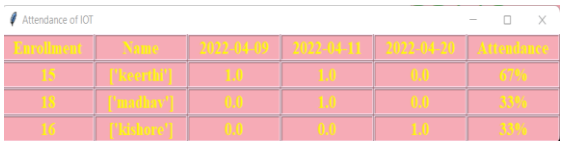

Fig 13 Viewing attendance report

CONCLUSION

Our goal is to form a system that reduces the errors that occur within the traditional(manual) system for taking group action. we wish to form the system helpful to an institute. traditionally, the recent manual ways of trailing group action within the classroom atmosphere are ineffective and inaccurate. This new technique correct and provides accurate output.

Automatic Classroom Attendance System provides high-precision real-time classroom evaluation with improved accuracy and speed. The faculties can also view the attendance of each subject and the attendance percentage will be calculated automatically for each student and a report will also be generated in an excel format.

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