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Face Recognition based Attendance Monitoring System

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Abstract : Education is one of the most important skills that everyone needs in this country. In this context, technology is being modified especially by information technology as it expands its width and length.In this digital era, facial recognition plays an important role in almost every field. Facial recognition is one of the most widely used biometric technologies.Real face detection is not only part of automatic face recognition, it is also an independent research topic,So there are many ways to perform face detection. The current school attendance system will take a long time and will work continuously. This system is designed to create attendance with the concept of face recognition. The system consists of 4 steps: database creation, face recognition, face detection and attendance update.The database is made up of pictures of students in the classroom. Face detection is done using the Haar-Cascade classifier. Faces are detected and recognized from the live video feed of the classroom. Attendance will be sent to the relevant faculty at the end of the class.

Keywords:Face Recognition, Face Detection,Haar-Cascade classifier.

INTRODUCTION

Face recognition is an important part of image processing because it has applications in many fields. One such application of facial recognition is to identify individuals in an organization for attendance purposes. Monitoring and control of attendance records plays a crucial part in analyzing the overall performance of a particular organization. The reason for developing attendance management is to computerize the attendance process. Auto-enrollment controls daily activity and review work, reducing manual impact.General techniques and methods for detecting and recognizing faces cannot overcome measurement, configuration, illumination, transformation, rotation, and occlusion problems.

The intended system is to resolve the shortcomings of already developed systems and provide functions for instance face tracking, feature extraction, feature detection and sending notifications about their attendance report.The system combines strategies for instance picture contrast, image normalization, color parameters and cascading classifiers for the purpose of tracking.The intended system is tested for various use cases.To evaluate the accuracy of the system, a certain factor, such as class attendance, is considered.The index is the proportion of faces that were recognized out of the faces tested by that particular person.The system is tested in a variety of lighting situations, with diverse facial expressions, partial faces (in classes with a high student population), and with or without a beard and glasses.

This paper introduces a new automatic attendance record keeping system, without the intervention with the regular teaching process.The system eliminates traditional student teaching methods, such as addressing students by name or checking their ID cards, which both disrupt the teaching process and put stress on students during exams.In this we have planned a system that identifying student's face in the class video and marks people in the class video. This new process will take less time than the traditional process.

NEED OF THE STUDY

An attendance system has become a vital element of any business since it enables management to monitor employee attendance and ensures that workers are adhering to the established schedule. A sign-in page or punching a timecard are common components of traditional attendance systems, however they can be vulnerable to fraud. Support vector machine (SVM)-based enhanced attendance systems can have a number of advantages.

First of all, an SVM-based system for attendance has the potential to be more precise than conventional ones. SVM is an automatic learning approach that can predict attendance trends by learning from prior attendance data. This can aid in lowering attendance system errors and ensuring that workers are fairly credited for their time.

A SVM-based attendance system may also be more effective than other systems. The human data entry and processing required by conventional attendance systems can be tedious and error-prone. These procedures can be automated by an SVM-based system, which will help management save time and effort.

Third, an SVM-based system for attendance might be safer. Traditional attendance systems are susceptible to fraud when students clock in early or late or sign in for one another. SVM-based systems can identify abnormalities and flag them for examination, assisting in the detection of fraud and ensuring that corporate policies are followed.
Therefore, an SVM-based system for attendance can offer useful information on employee attendance trends. Management can spot patterns and trends in student attendance using historical attendance data, which can assist spot possible problems or areas for improvement.

LITERATURE SURVEY.

The authors of [1] describe an interactive technology model. The concept focuses on how pupils can be captured and counted as they enter and exit the room using facial recognition in conjunction with the use of radio frequency identification (RFID). The system keeps accurate records of every student who is enrolled. Additionally, the system keeps track of each student's attendance data for each class they are registered for and updates the data as necessary.

Visar Shehu and Agni Dika, [2], developed a method for joining signatures that combines computer vision and facial recognition algorithms into the engagement management process. The system is used to use a non-disturbing camera installed in the classroom that examines the classroom, detects the faces. After that step, the student picture is compared to the database , and after the authentication is complete, the student attendance list is created and stored in the database. This article covers topics such as real-time face detection in multi-object environments, algorithms for face recognition, and correlation and expression of practical uses.

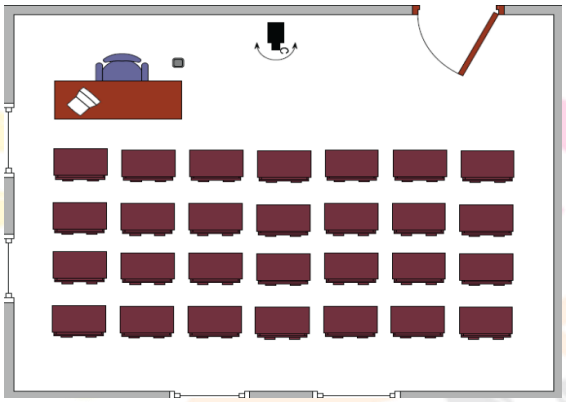

Fig. 1. Overview of Class Room

Pan Xiang explained the working procedure of the system in [3] as follows: When someone wants to enter the access control system, they use the RFID card to swipe the contactless card. The system analyzes the information on the card and also drives the camera to capture pictures of people. Then facial detection can be achieved quickly.Personal information on the card is compared to the information on file,corresponding face information will be received.

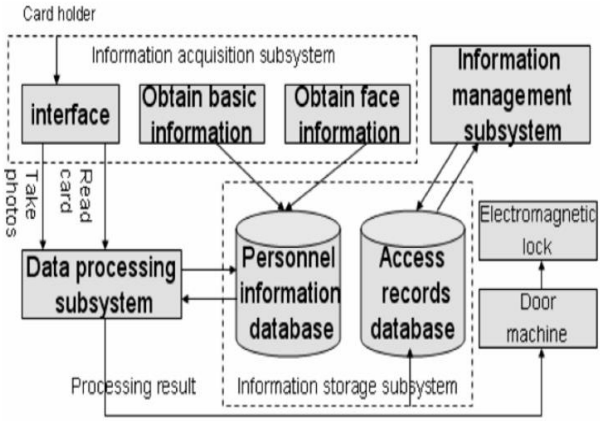

Fig. 2. Framework of access control system

The ear technique is also introduced in [4], where images of the ear are computerized. Edge detection is performed on this image. Other features are defined from this detected edge, separated by the reference line. Extraction is stored in the file as vectors, each vector related to a unique picture saved in the file. Eigenvectors of experimental results are compared with eigenvectors in the vector database used to generate and manage some information using a database to collect individuals and eigenvectors, , A MATLAB connections and 44BC for comparison and decision making. The driver relies on for calculations.This match was compared to decisions made by the individual.

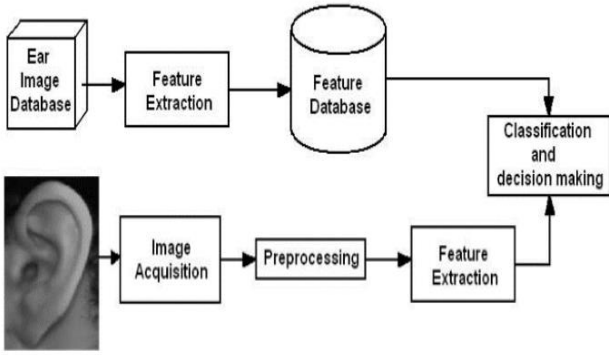

Fig. 3. Framework of Ear biometric attendance system

[5] intended a fast face detection system comprising three modules. Rapid facial detection method with rapidity and a high rate of detection to improve AdaBoost algorithm , SOC hardware to break frame BEF.

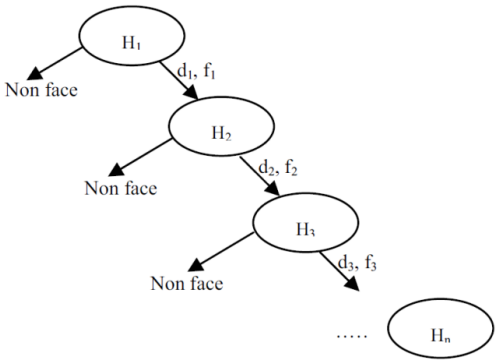

Fig. 4. Overview of cascading system

[6] intended a method for face and head detection for instant tracking using four-way distribution (FDF) and linear discriminant analysis. Four way distribution is one among the 's strong features that sets the models apart. The Four way distribution symbolizes the four-way edge characteristics of the raw image.The intended procedure attained a proficiency of about 10 frames per second for tracking ,therefore a lot of improvement is needed.

[7] describes a real-time system designed for multisensing. Because most systems software is based on algorithms. This request is based on hardware designed to improve runtime. The various levels of the hardware architecture include skin tone detection, topology analysis, Quick link-content registration algorithm, Quick link tags implementation of algorithm, Di Oral feature extraction, Horizontal sensing.

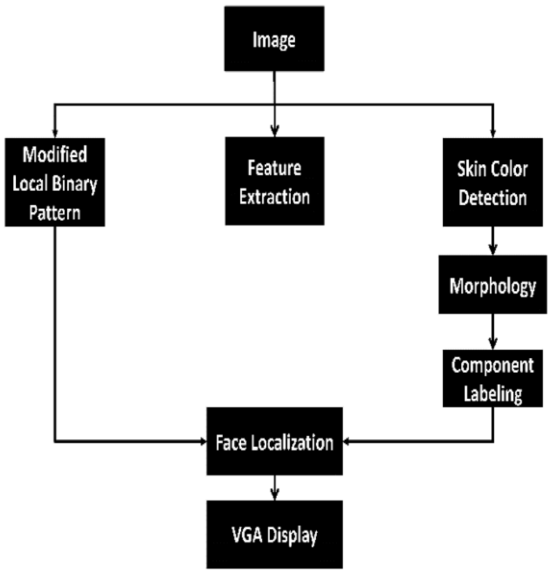

Fig. 5. Algorithm Flow

[8] For most video sequences, the face detection problem is handled in two prominent techniques. The initial step is to track the faces in each image frame. A next stage entails identifying the face in the first frames and tracking it throughout the sequence. The following document outlines the development of facial recognition for video sequences as a first approach. To reduce the effect of light changes caused by the camera's autofocus, we recommend that the recognize skin tones more appropriately in the skin tone model.Unnecessary skin region is removed from the face geometry of the person's face. Avoid the possibility by replacing it with an elliptical skin area. Then we get a maximum of , which is considered a face candidate. We propose a modified LBP that takes

into account not only the base texture but also the native . The histogram of the variable LBP coefficients is , which is considered a representative face.For classification steps, a combination of pattern matching and pattern matching is used. Local Binary Pattern histogram matching and extended Hidden Markov Models combine into an expression with levels to determine whether a face candidate is a face.

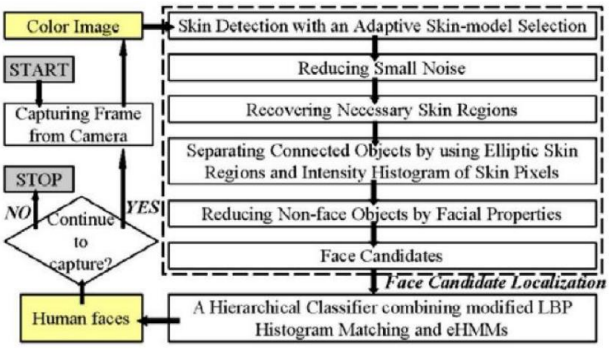

Fig. 6. Face Detection System

Machine learning-based face recognition-based attendance systems were proposed by Radhika C. Damale and Prof. Bageshree V. Pathak[11].Three different techniques, including SVM, MLP, and CNN, were applied in this.For the SVM and MLP inspired approaches, DNN was utilized for face detection. The features were obtained using the PCA and LDA extraction of features algorithms.

METHODOLOGY

All of the class members must apply by providing the necessary information, and their photos will then be taken and included to the dataset.Face will be recognised from the classroom's live video stream during each facial session. The photographs contained in the data file will be compared to the faces that were detected. If a match is made, the attendance for that particular kid will be recorded. A list of absences will be forwarded to the pertinent faculty at the conclusion of each session.

The system architecture of the proposed system is given below,Typically, there are four parts to this process,

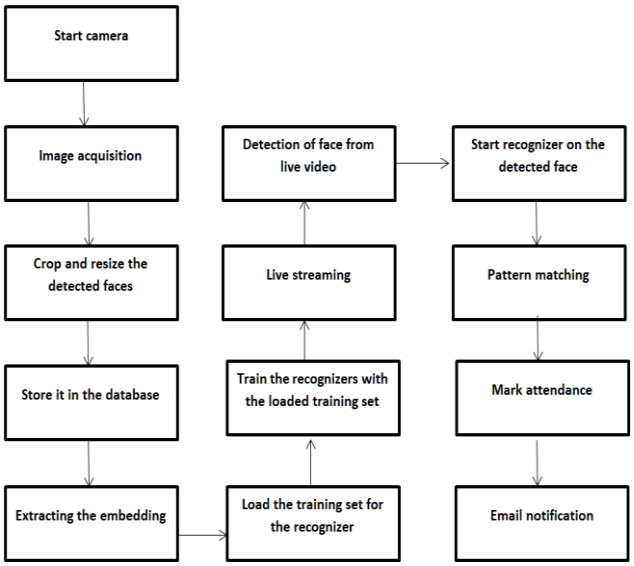

Fig 7.Methodology of face recognition based attendance monitoring system

1. Dataset Creation

With the help of a laptop camera, pictures of students are taken. Angles and movements will be used to capture many photographs of a single learner. They have already been processed. The cropped photos are then resized to any pixel point. These pictures will then be kept in RGB format. And after that, these pictures will be saved in a folder with the names of the respective students.

2.Face detection

Face detection here is done using Haar-Cascade Classifier with OpenCV. The Haar Cascade algorithm must be trained to detect human faces before it can be used for face detection. This is called feature extraction.The training data is stored in a pickle file. The haar features shown in Fig.2. will be used for feature extraction.

Here, face detection is carried out using OpenCV and the Haar-Cascade Classifier. Before being applied to face detection, the algorithm known as Haar Cascade needs to be taught to recognise individuals. The term for this is feature extraction.Pickle files are used to store the data used for training. To extract features, the haar features in Fig 2 will be employed. The OpenCV detectMultiScale module is utilized here.To draw a rectangular shape over each person in a photo, this is required. There are three criteria to take into account: scaleNeighbourhood, min Factor, minSize. To specify how the image should be scaled at every scale, use scaleFactor.The rectangle's minimum number of neighbors is determined by the minNeighbors parameter. Greater values

typically detect less faces but better quality images. Minimum object size is specified by minSize.It is always (30, 30) [8]. The parameters scaleFactor and minNeighbors, with values of 1.3 or 5, are employed in this system.

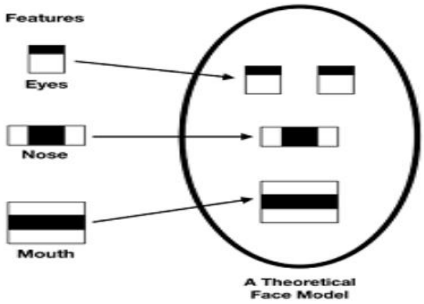

Fig 8.Haar Features

3.Face recognition

Face recognition could be broken down into three steps: gathering training data, face recognition training, and prediction. The photos included in the dataset will serve as the training data in this case. Then facial recognition software is applied to these pictures. The Support Vector Machine (SVM) technique is employed in this system for face recognition. The selection surfaces separating both classes is produced by an SVM algorithm. To construct a similarity measure that compares two facial images for recognition of faces, we reinterpret the decision surface. We can create face-recognition algorithms thanks to this.

4. Attendance Updation

Faces that are recognised during the process of face recognition will be registered as being present in the Spreadsheet sheet and the database, while the remaining faces will be tagged as absentee. A list of the absentees will be provided to the addresses of the relevant faculties. And the email will be forwarded to those who aren't there.

RESULTS AND DISCUSSION

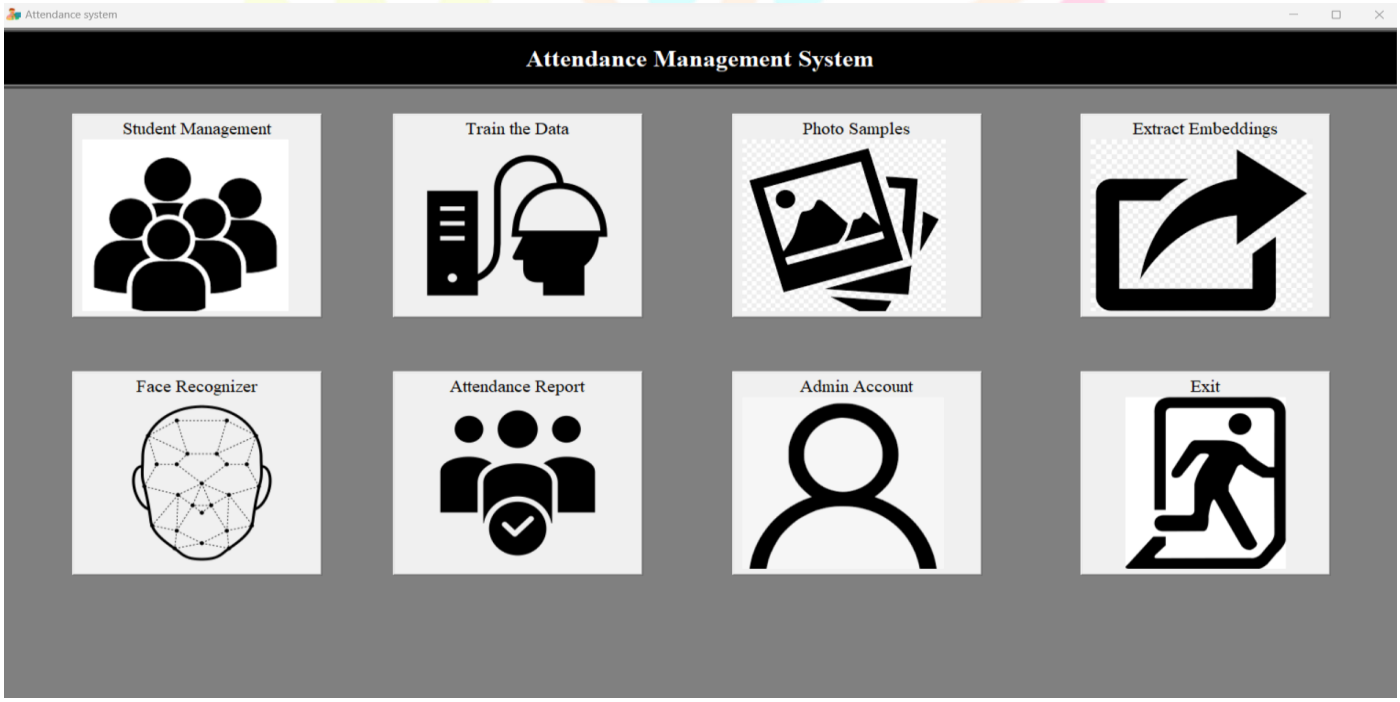

Fig 9. Main User Interface

For the admin, the main interface for users consists of of different classes. The administrator gathers the data and photographs from the students before using the different classes available in the interface to train the model.Then, using the classes available in the interface, facial recognition and automated attendance marking are also performed.

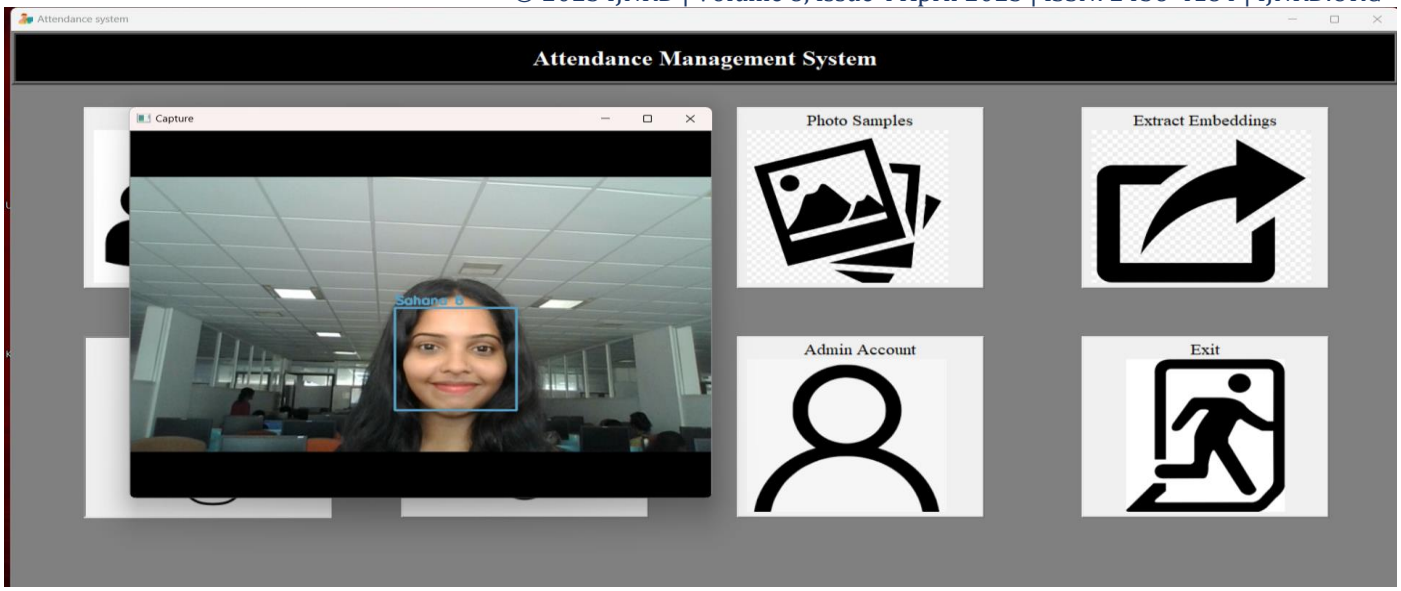

Fig 10.Face Recognition

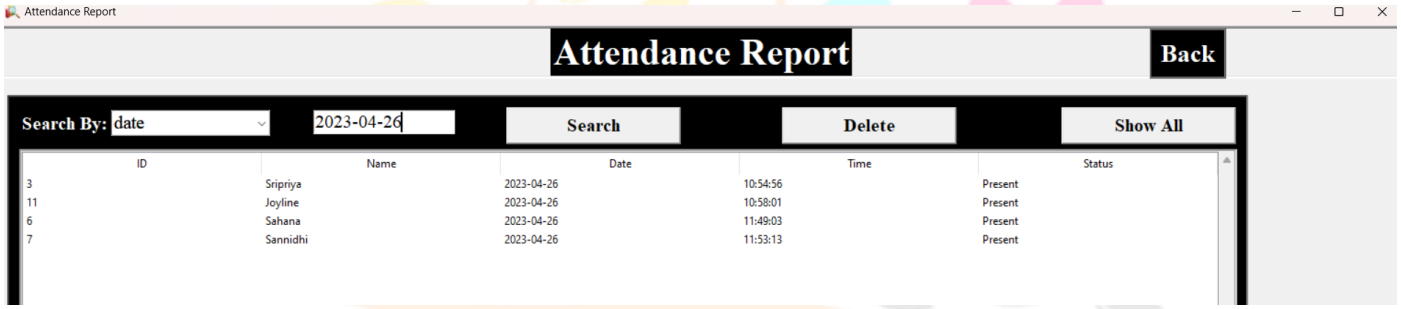

Fig 11. Attendance Report

CONCLUSION

In this essay, we've spoken about a system that was created with the goals of managing and easing the existing difficulty with maintaining student attendance and delivering email notifications as a reminder to the absentees. The system is a face recognition-based attendance monitoring system.Visual Studio Code, the Xampp Control Panel, and the Anaconda Command Prompt were used to create this system.

As a result of every student passing this process without difficulty, it has been noticed that the procedure of determining student absenteeism and tallying the total number of absent pupils utilizing the system has been less impacted.Pupils received delay notifications since the system might send emails to warn of high levels of absenteeism.Significant time could be saved by using this system.

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