

Attendance Management System using Face-Recognition

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Abstract: Nowadays Educational institutions are concerned about regularity of student attendance. Even in a pandemic situation attendance is still a major issue in schools and colleges. Mainly there are two conventional methods of marking attendance which are calling out the roll call or by taking student signs on paper. They both were more time consuming and difficult. Hence, there is a requirement of a computer-based student attendance management system which will assist the faculty for maintaining attendance record automatically. In this project we have implemented the automated attendance system using 'TKINTER' and 'PYTHON'. We have projected our ideas to implement an "Automated Attendance System Based on Face Recognition". The application includes face identification, which saves time as well as being purely software based; it can be flagged as eco-friendly as it reduces the use of paper. This system also eliminates the chances of fake attendance because of the face being used as a biometric for authentication. Hence, this system can be implemented in a field where attendance plays an important role. The proposed system is designed in TKINTER platform supported with a script of PYTHON as well as SQL database. The algorithm used in the system is based on image comparison based on the encoded values of the face from the image from the database with the image recorded by the system in run time. The system has output in the form of an excel sheet.

Keywords:Attendance system, Python, Machine Learning, Tkinter, MySQL.

I. Introduction

The Attendance System using Face – Recognition is a replacement method for the traditional way of marking attendance. The proposed system is python, a tkinter based system supported with a MySQL database. This system can be implemented on a single faculty system of a particular institute. This system is proposed to be based on biometrics, i.e., Face Authentication. Since there is the presence of biometrics, this system eliminates the chances of fake attendance which is a problem with the traditional methods of attendance.

The Attendance management is the significant process that was carried out in every institute to monitor the performance of the student. Every institute does this in its own way. Some of their institutes use the old paper or file-based system and some have adopted strategies of automated attendance systems using some biometric techniques. A facial recognition system is a computerized software which is suited for determining or validating a person by performing comparisons on patterns based on their facial appearances. In this system OpenCV & Face Recognition libraries were used which are one of the popular libraries for face detection by using these libraries system first capturing the student photos and storing them into the database which were further used for the training purpose after that at the time of attendance when system camera get on system will detect the faces that were present in the frame the faces were detected by using HOG i.e. (Histogram of Oriented Gradients) which were carried out in the system. After that if the image that was present in the frame is tilted then the Face Landmark Estimation algorithm will be carried out and the face will be transformed to be as close as possible to perfectly centered. After that the system will encode all the images that were present in the database as well as the faces which were detected in the frame. For performing encoding Deep Convolutional Neural Network algorithm will be carried out & for each face 128 measurements were generated then the measurements of the face that were detected in frame it gets compared with the measurements of the faces that were present in the image which is earlier stored in the database. So, at last by using a simple linear SVM algorithm the system will find the person in the database of known people (i.e., capture at the starting of the project) who has closest measurements to the image that were detected by the camera. After finding the perfect match, the system will generate the name and date & time & present mark and store the entry in a CSV file. Which were further uploaded on the database and user can open it with Microsoft Excel

II. Literature Survey

Using real time computer vision algorithms in automatic attendance management systems This paper introduces a new approach in automatic attendance management systems, extended with computer vision algorithms. The

Proposed system uses real time face detection algorithms integrated on an existing Learning Management System (LMS), which automatically detects and registers students attending a lecture. The system represents a supplemental tool for instructors, combining algorithms used in machine learning with adaptive methods used to track facial changes during a longer period. [1]

Face Recognition-based Lecture Attendance System proposed a system that takes the attendance of students for classroom lectures. The system takes attendance 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. In this paper, we propose a method for estimating the attendance precisely using all the results of face recognition obtained by continuous observation.[2]

Automatic Control of students' attendance in Classrooms Using RFID Radio frequency identification (RFID) is one of the automatic identification technologies more in vogue nowadays. There is a wide research and development in this area trying to take maximum advantage of this technology, and in coming years many new applications and research areas will continue to appear.[3]

Face Recognition based Attendance Management System using Machine Learning The most arduous task in any organization is attendance marking. In this paper we proposed an automated attendance management system which tackles the predicament of recognition of faces in biometric systems subject to different real time scenarios such as illumination, rotation and scaling.[4]

III. Methodology

The Attendance management is the significant process that was carried out in every institute to monitor the performance of the student. Every institute does this in its own way. Some of their institutes use the old paper or file-based system and some have adopted strategies of automated attendance systems using some biometric techniques.

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So, at last by using a simple linear SVM algorithm the system will find the person in the database of known people (i.e., capture at the starting of the project) who has closest measurements to the image that were detected by the camera. After finding the perfect match, the system will generate the name and date & time & present mark and store the entry in a CSV file. Which were further uploaded on the database and users can open it with Microsoft Excel.

IV. Proposed System

Image acquisition:

Image is acquired using a high-definition camera which is placed in the classroom or lab. This image is given as an input to the system. All title and author details must be in single-column format and must be centered.

Dataset Creation:

The student's dataset is created before the recognition process. Dataset was created only to train this system. We are going to create a dataset of the whole class which involves their name, roll number department and images of the student in different variations. Whenever we register a student's data and image in our system to create a dataset, deep learning applies to each face to compute 128-d facial features and store them in the student face data file to recall that face in the recognition process. This

process is applying to each image taken during registration.

Face Detection and Extraction:

Face detection is important as the image taken through the camera given to the system, face detection algorithm applies to identify the human faces in that image, the number of image processing algorithms are introduced to detect faces in an image and also the location of those detected faces. We have used the HOG method to detect human faces in a given image.

Face Positioning:

There are 68 specific points in a human face. In other words, we can say 68 face landmarks. The main function of this step is to detect landmarks of faces and to position the image. A python script is used to automatically detect the face landmarks and to position the face as much as possible without distorting the image.

Face Encoding:

Once the faces are detected in the given image, the next step is to extract the unique identifying facial feature for each image. Basically, whenever we get localization of the face, the 128 key facial points are extracted for each image given input which are highly accurate and these 128-d facial points are stored in a data file for face recognition.

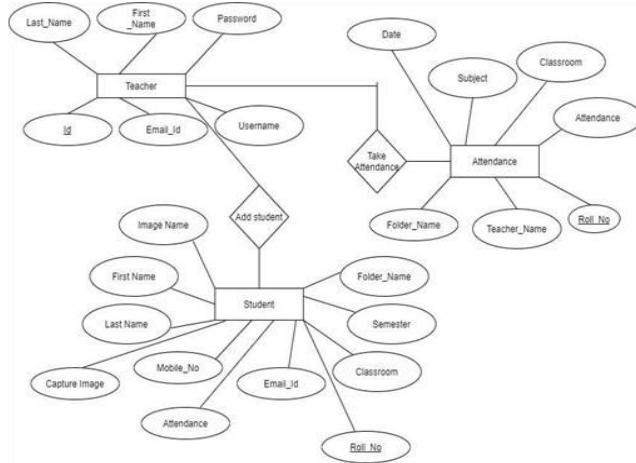
Face matching:

This is the last step of the face recognition process. We have used one of the best learning techniques that is deep metric learning which is highly accurate and capable of outputting real value feature vectors. The proposed system ratifies the faces, constructing the 128-d embedding (ratification) for each. Internally, the compare face's function is used to compute the Euclidean distance between face in image and all faces in the dataset. If the current image is matched with the 60% threshold with the existing dataset, it will move to attendance marking.

Attendance Marking:

Once the face is identified with the image stored in SQL database, python generates roll numbers of present students

and returns that, when data is returned, the system generates an attendance table which includes the name, roll number, date, day and time with corresponding subject id. And then passes the data to python to store the table into an CSV file automatically. Letter staff can open that file into the excel sheet to edit the sheet and make changes in it.



ER-Diagram of the attendance Management system using face recognition

Fig. 1ER-DIAGRAM
Figure 1 shows the Entity-Relationship diagram of the proposed system.

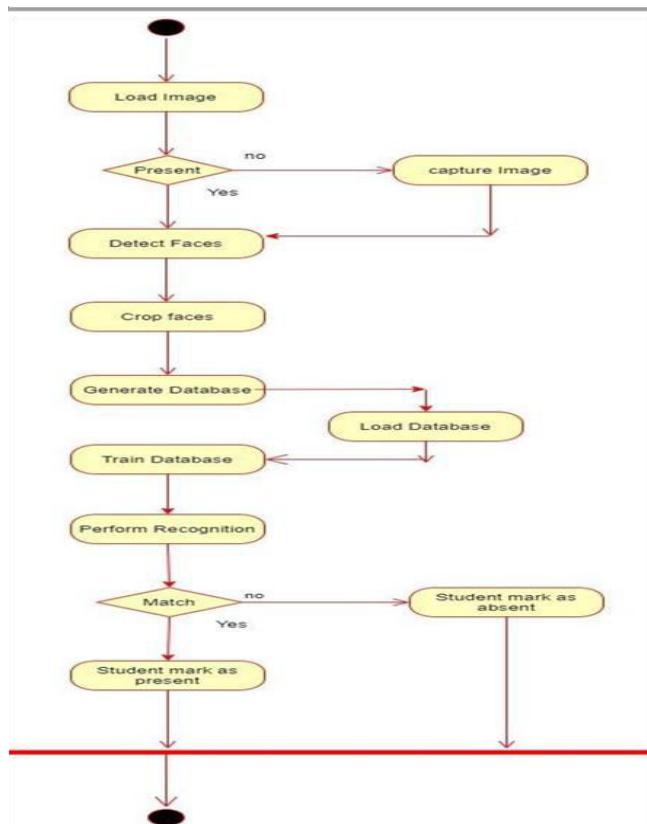


Fig 2. ACTIVITY DIAGRAM

Figure 2 shows activity diagram of the proposed system

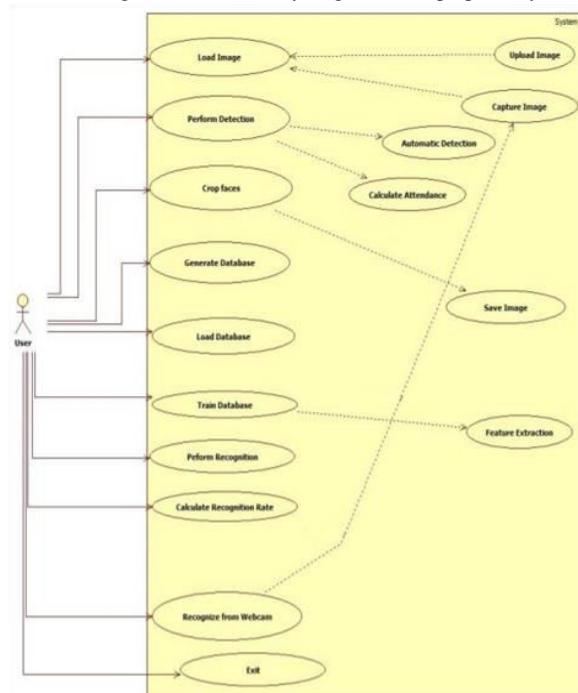


Fig 3. USE-CASE DIAGRAM

*Figure 3 shows the User Interaction diagram of the proposed system.

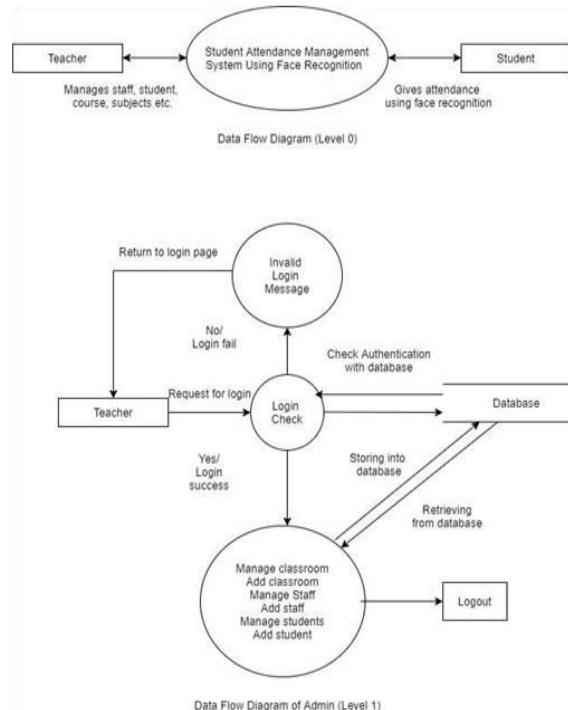
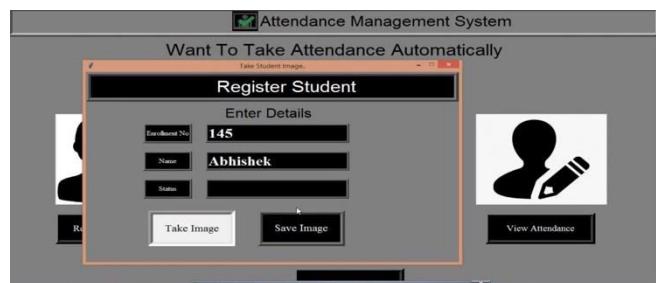
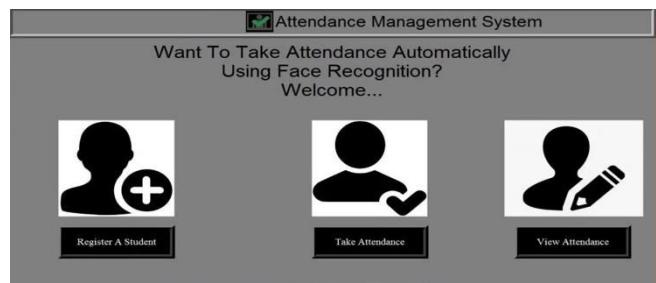


Fig 4. DATA FLOW DIAGRAM (LVL 0 & LVL 1)

Figure 4 shows the Data flow diagram on lvl 0 and lvl 1



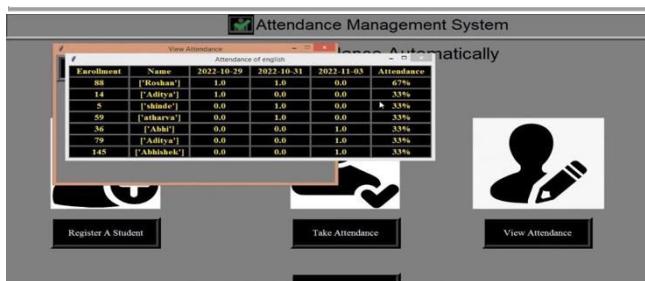


Fig 5, 6, 7 OUTPUTS

Figure 5,6,7 show the screenshots of the output screen of the system.

V. Advantages of The System

The proposed system has a much simpler and efficient algorithm. The system is simpler because it uses an easy and user-friendly Framework. It has a more efficient algorithm along with much less complex database configurations. The system is more efficient because of being platform independent.

VI. Conclusion

In order to obtain the attendance of individuals and to record the entry and exit, the proposed system can be used. The system can widely be used in institutions/organizations. The proposed system takes attendance of each student by continuous observation at the entry and exit points. The result of our preliminary experiment shows improved performance in the estimation of the attendance compared to the traditional attendance marking systems.

VII. References

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