SMART ATTENDANCE VIA IMAGE PROCESSING

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ABSTRACT:

Attendance is always an issue in every class. It is time consuming and often leads to conflicts between students and teachers when it is taken manually. Teachers can also do mistakes while uploading the attendance in the ERP. So, it is concluded that manual attendance is not a good option in colleges and universities. The process of attendance can be automated and can be enhanced .

The project Smart attendance project is automated process based on image processing .It basically scan the students in the class two times, once in the starting of the class hour and second time in the last 15min. It will scan the face of each and every student in the class and identify the faces and compare it with the stored data in its database . If the faces that the camera has scanned matches with the data, the student will be marked present in the class and if any face is missing then the particular student will be marked absent. This data is then sent to the respective teachers through a message.

The process of attendance can be modified and can be brought into practice . The smart attendance project is able to solve all the problems related to attendance.

**KEYWORDS:** ERP, Smart Attendance, Database

1. INTRODUCTION

Maintaining attendance in all institutes is very important to check students ' results. In this regard, each institute has its own method. Some use the old paper or file-based approach to attendance manually, and some have adopted automatic attendance methods using some biometric techniques. But students should wait a long time in these methods, or the methods in these processes takes very long time. There are many biometric systems available, but all the methods are the same as the key authentications. Each biometric system consists of the enrollment process in which a person's unique characteristics are stored in the database and then identification and verification processes are in place. Such procedures equate a person's biometric function with a previously stored template captured at the time of registration. Biometric models can be of several types such as Fingerprints, Head, Hand Geometry, Signature, Gait and Voice. The Smart Attendance Project uses the approach to face recognition for automatic student attendance in the classroom environment without the intervention of students. Face recognition consists of two steps, in first step faces are detected in the image and then these detected faces are compared with the database for verification. A variety of methods for face detection are proposed, i.e. Ada Boost algorithm, Float Boost algorithm, Support Vector Machines (SVM) S-Ada Boost algorithm, and Bayes classifier. With the quick face detection algorithm, the efficiency of the face recognition algorithm can be increased. ADA Boost is the most efficient in all of the above methods. This algorithm has been used by our system to detect faces in the classroom image. Face recognition techniques can be divided into two types Appearance based on texture features applied to the whole face or to certain specific regions. Built on geometric features such as mouth, nose, ears, brows of the head, cheeks and their relationships. Statistical methods including Linear Discriminant Analysis (LDA), Principal Component Analysis (PCA), Kernel Methods, and Neural Networks, Eigen-faces were used for facial templates development. Invariant lighting algorithm is used to minimize the effect of lighting inside the classroom.

2.1 EXISTING SYSTEMS

**Fingerprint Based recognition system**

In the Fingerprint based existing attendance system, a portable fingerprint device needs to be configured with the students fingerprint earlier. Later either during the lecture hours or before, the student needs to record the fingerprint on the configured device to ensure their attendance for the day. The problem with this approach is that during the lecture time it may distract the attention of the students.

**RFID(Radio Frequency Identification) Based recognition system**

In the RFID based existing system, the student needs to carry a Radio Frequency Identity Card with them and place the ID on the card reader to record their presence for the day. The system is capable of to connect to RS232 and record the attendance to the saved database. There are possibilities for the fraudulent access may occur. Some are students may make use of other students’ ID to ensure their presence when the particular student is absent, or they even try to misuse it sometimes.

**Iris Based Recognition System**

In the Iris based student attendance system, the student needs to stand in front of a camera, so that the camera will scan the Iris of the student. The scanned iris is matched with data of student stored in the database and the attendance on their presence needs be updated. This reduces the paper and pen workload of the faculty member of the institute. This also reduces the chances of proxies in the class and helps in maintaining the student records safe. It is a wireless biometric technique that solves the problem of spurious attendance and the trouble of laying the corresponding network.

**Face Based Recognition System**

The facial recognition technology can be used in recording the attendance through a high-resolution digital camera that detects and recognizes the faces of the students and the machine compares the recognized face with students’ face images stored in the database. Once the face of the student is matched with the stored image, then the attendance is marked in attendance database for further calculation. If the captured image doesn't match with the students' face present in the database then this image is stored as a new image onto the database. In this system, there are possibilities for the camera to not to capture the image properly or it may miss some of the students from capturing.

2.2 PROPOSED METHOD

In this system, we have integrated facial recognition algorithm with machine learning algorithm into the process of automatic attendance system. This system is implemented in basic and fundamental principle on the presence of a digital camera in the classroom. The digital camera would capture images in the time interval of 25 minutes in a lecture of 50 minutes. Now image would be provided to system and system would extract all the faces from the image. Now face would be compared with the existing trained model of faces and checks if face exists or not. If face exists on current database, then the system would save unique ID of a student in attendance database or discards in case student doesn’t exist in classroom database

3. METHODOLOGY

**3.1 Operation**

The system consists of a camera that captures the images of the student and sends it to the image enhancement module. After enhancement the image comes in the Face Detection and Recognition modules and then the attendance is marked on the database server. This is shown in the experimental setup in Figure(1). At the time of enrolment, templates of face images of individual employees are stored in the Face database. Here all the faces are detected from the input image and the algorithm compares them one by one with the face database.

If any face is recognized the attendance is marked on the server from where anyone can access and use it for different purposes.

A lot of time is saved in this way, and this is a highly secure system that no one can identify someone else's attendance. Attendance on the server is maintained so that for purposes such as administration, employees themselves can access it.

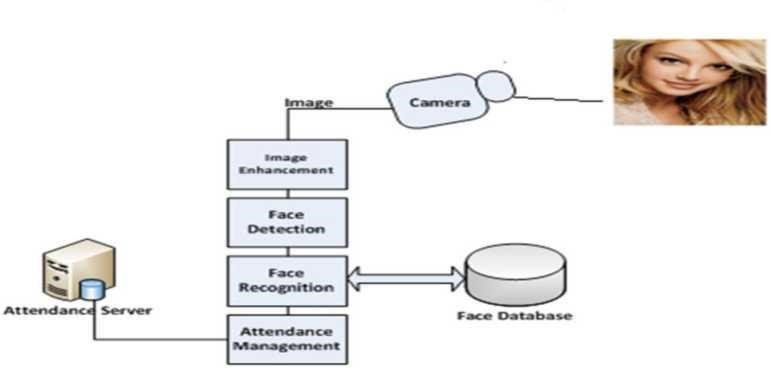


Fig-1

We use the skin classification technique to avoid false detection. Using this technique improves the detection process's efficiency and accuracy.

**3.2 SYSTEM ALGORITHM**

* Image acquisition
* Haar cascade classifier

1: Pick a pixel location from the image.

2: Now crop a sub-image with the selected pixel as the center from the source image with the same size as the convolution kernel.

3: Calculate an element-wise product between the values of the kernel and sub- image.

4: Add the result of the product.

5: Put the resultant value into the new image at the same place where you picked up the pixel

location.

* Face recognition

**3.3 COMPONANTS AND SOFTWARE MODULE**

**I. Standalone computer needs to be installed in the office room where the system is to be deployed :**

Standard equipment and software need to installed in the computer which should have efficient storage in it so that all of the pictures and templates of the students or employee can be stored.

The device should not run out of the storage space as there will be new entries of students or employee every year.

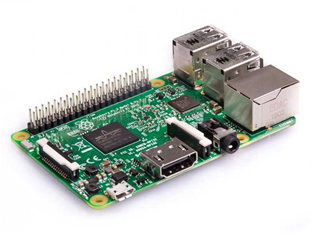
II. **Raspberry Pi 3 Model B :**

Fig-2

The Raspberry Pi just got juicer! Now with a Quad-Core 64bit CPU, WIFI & Bluetooth!

The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B.

Whilst maintaining the popular board format the Raspberry Pi 3 Model B brings you a more powerful processor, 10x faster than the first-generation Raspberry Pi.

Additionally, it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected designs.

Raspberry Pi 3 - Model B Technical Specification :

* Broadcom BCM2387 chipset
* 1.2GHz Quad-Core ARM Cortex-A53
* 802.11 bgn Wireless LAN and Bluetooth 4.1 (Bluetooth Classic and LE)
* 1GB RAM
* 64 Bit CPU
* 4 x USB ports
* 4 pole Stereo output and Composite video port
* Full size HDMI
* 10/100 Base T Ethernet socket br
* CSI camera port for connecting the Raspberry Pi camera
* DSI display port for connecting the Raspberry Pi touch screen display
* Micro SD port for loading your operating system and storing data
* Micro USB power source

III. **Raspberry Pi Camera Module :**

The Raspberry Pi Camera v2 is the new official camera board released by the Raspberry Pi Foundation.



Fig-3

The Raspberry Pi Camera Module v2 is a high quality 8 megapixel Sony IMX219 image sensor custom designed add-on board for Raspberry Pi, featuring a fixed focus lens.

The Raspberry Pi Zero now comes complete with a camera port! Using the new Raspberry Pi Zero camera adapter you can now use a Raspberry Pi camera to your Zero

It's capable of 3280 x 2464 pixel static images, and also supports 1080p30, 720p60 and640x480p90 video.

It attaches to Pi by way of one of the small sockets on the board upper surface and uses the dedicated CS interface, designed especially for interfacing to cameras

Raspberry Pi Camera Module Features :

* Fixed focus lens on-board
* 8 megapixel native resolution sensor-capable of 3280 x 2464 pixel static images
* Supports 1080p30, 720p60 and 640x480p90 video
* Size 25mm x 23mm x 9mm
* Weight just over 3g
* Connects to the Raspberry Pi board via a short ribbon cable (supplied)
* Camera v2 is supported in the latest version of Raspbian, Raspberry Pi's prefer operating system

IV. **OpenCV :**

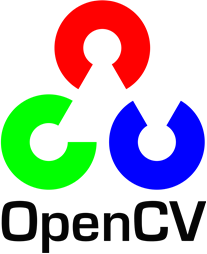


Fig-4

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD-licensed product, OpenCV makes it easy for businesses to utilize and modify the code.

The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, find similar images from an image database, remove red eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc. OpenCV has more than 47 thousand people of user community and estimated number of downloads exceeding 18 million. The library is used extensively in companies, research groups and by governmental bodies.

V. **Python 3 :**

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Fig-5

Python is a general-purpose interpreted, interactive, object-oriented, and high-level programming language. It was created by Guido van Rossum during 1985- 1990. Like Perl, Python source code is also available under the GNU General Public License (GPL). Python is named after a TV Show called Monty Python Flying Circus and not after Python-the snake.

Python 3.0 was released in 2008. Although this version is supposed to be backward incompatibles, later on many of its important features have been back ported to be compatible with version 2.7.This tutorial gives enough understanding on Python 3 version programming language. Please refer to for our Python 2 tutorial.

4. CONCLUSION

Automated Attendance System has been envisioned for the purpose of reducing the errors that occur in the traditional (manual) attendance taking system. The aim is to automate and make a system that is useful to the organization such as an institute. The efficient and accurate method of attendance in the office environment that can replace the old manual methods. This method is secure enough, reliable and available for use. No need for specialized hardware for installing the system in the office. It can be constructed using a camera and computer.

5. REFFERENCE

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