A Smart Digital Attendance Monitoring System for Academic Institution Using Machine Learning Techniques

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Abstract

Face Recognition is the one of the foremost emerging and interesting technology. In this fast-evolving generation, attendance is usually a problem among school community and so as business community. One among the foremost efficient solution for this problem is that the Digital Attendance System. Now a days Computers plays a vital role in many fields. Likewise, in this field also, we will make an efficient use of it. Face detection and

recognition-based attendance system may be a process of identifying face of the scholars using image of a face on the idea of high - definition monitor video and uploading the attendance of every student automatically, rather than manual attendance uploading process. In our face recognition Research work, a smart system is going to be ready to capture a frame from a video and process it accurately and predict which of the scholar is present therein class. There are number of algorithms and programme to detect the face of an individual, but the concept to be implemented here is Neural Networks. We used Neural Networks because, it will be used for the extraction of the frames from the video and convert it into images in so the face of the scholar will be often identified and updated automatically within the database.

Keywords

Machine Learning, Smart Digital Attendance, Neural Networks.

Introduction

Lots of Technical oriented innovations are emerging in our day to day life. These technology makes the globe running efficiently both knowledge based and also economically. Deep Learning &Neural Network are one of the interesting domains. These domains permit the machine to coach itself using some datasets that are provided as input and we are rewarded with certain output during testing based on the applied algorithms by which they were trained. Everybody knows that attendance is one among the foremost considered things in today's world to understand the presence of every one in any quite organization especially in class environment and business environment. With the help of the advanced and latest Neural Network technology the machine automatically predicts the attendance performance of the scholars. Not only detects the attendance but also the collected data is maintained in a fair and efficient manner. Generally, the scholar's attendance can be maintained in two different forms namely,

- Manual maintenance of Attendance.
- Digital maintenance of Attendance.

The process involved in Manual Attendance System is, an educator especially in a class wants to call the scholars name and perform the manual attendance process. (Dhanasekaran. S, 2016). This system is taken into account as a time-consuming process as in schools or colleges sometimes teacher might miss someone or a student may say present for his/her absent friend or perhaps some students leave the class in-between for a few personal or for a few mandatory reasons and even in some cases the teacher may

benefit of manual attendance and mark absent for college kids who are disobeying them. So, in these cases manual attendance seems to possess both problems and also advantages. To unravel of these issues, we accompany a Digital Attendance System.

A Digital Attendance might be a way to automatically predict the scholar is inside the class or he/she is absent thereto particular class. (Dhanasekaran. S, 2016) This will be easily achieved with the assistance of a face recognition technology. In examination centres also it can be implemented to confirm the presence of the scholar. In future updates it's also possible to acknowledge whether the scholar is sleeping or awake when the staff is in the class busy with him/ her lectures. The scholar's attendance is often predicted by imaging the faces of the scholars through a high-quality camera. This will help the system a lot to analyse each photo frame extracted from the video captured by the camera and update the presence of the students.

Literature Survey

Attendance and Feedback System on the basis of Machine Learning: In (N. Sudhakar Reddy, 2018), two approaches are applied to the scholar attendance and feedback system's idea of machine learning. The system tracks student performance automatically, maintains student records like attendance and the feedbacks given by those students as per the guidelines for each staff with whom they are assigned with. Thus, the scholar's attendance is often made ensured that it is updated regularly by identifying the scholar's presence in those class hours. Once identified, marks for the scholar and their presence in those classes will be automatically updated.

Automated Attendance System: The (Akshara Jadhav, 2017) uses various face recognition and detection algorithms, which is employed to recognize the scholar's face when he / she enters the category and therefore the system can mark attendance by identifying him / her. The algo used here is Viola Jones, which is using SVM for detecting and classifying human faces and uses PCA algorithms for cascade classification and have selection. This technique saves time and helps in monitoring student's presence in comparison to traditional attendees.

Student Attendance System Based on Detection of Human Iris: This (Dhanasekaran. S, 2019) type system works as the scholar is identified by asking him/ her to face ahead of the camera to acknowledge the iris of the scholar and thereby identifying the presence of the scholar within the classroom. Some algorithms like conversion of grayscale and more are accustomed to detect iris of a human being. This helps avoid proxy and it effectively

work in case of universities for maintain student's presence in their class, but one among the foremost disadvantage is, it is time-consuming processes for a scholar or a lecturer to attend until previous member updates his/her attendance.

Face Detection based Lecture Attendance System: This (Shireesha Chintalapati, 2013) Work clears us that the detection of presence of the scholar by the system is achieved by continuous inspection. Continuous observation helps system assess and improve their performance. so as to upload attendance, pictures and facial images of scholars within the classroom are taken through a camera. With the recorded video, the system the existence/presence of student in the class for that particular hour.

Existing Systems

Recognition system on the Basis of Fingerprint: In (Dan Wang, 2017), the system is based on fingerprint scanner, a fingerprint tech with the capacity of portability must be ready with the scholar's fingerprint already imprinted on it. On the time or after the class, the scholar must imprint his finger on that fine configured tech to attendance of that particular period. The disadvantage in this approach is that it can distract students during the lecture. It is also possible that a student may cheat the lecturer by just coming to class and keeps his fingerprint and leave the class before the lecturer comes and again at the end, reappears after the staff left the class to re-keep his finger and gets attendance.

Recognition System on the Basis of Radio Frequency Identification: Through this type of system, the student must register with his / her Radio Frequency Identification Card and the ID in the card should be read by the reader for his / her attendance of the day. (Dhanasekaran. S, 2015) The system can connect to RS232 and register a presence in the saved database. There may be opportunities for fraud access. Some students may use other student IDs to confirm their attendance in the absence of a student, or students will definitely try to take advantage out of it.

Recognition System on the Basis of Iris: (Prajakta Lad, 2017). This system requires the scholar to face ahead of the camera, this gives the camera the permission to scan the scholar's eyes for his iris. This iris should match the info of the scholar's iris stored within the database and update the existence. By this manner we will prevent the standard method of using pen and Work for taking attendance. It will decrease the likelihood of assessments within the classroom and helps maintaining the database. This is definitely a wireless technology, which solves the matter of spontaneous existence and therefore the difficulty of getting an affiliate network. The disadvantage of using this is its too costly to

implement and also time consuming as each student should be ahead of the camera frequently to create his name in the attendance sheet.

Face Based Recognition System: (Vasudevan. V, 2018) Facial recognition technology is usually familiar with record attendance by means of a high-resolution camera, which detects and identifies student's faces and matches faces with student's face that is maintained by the database. Only if the scholar's facial image is connected with the face maintained in the database, the presence of the student will be considered for further calculations. If the facial image that is taken doesn't connect the faces of the scholars within the previously maintained database, then the image will be stored within the database as a fresh entry. In this process, there is a chance that the camera won't capture the image properly or some students might be turned around and missed the camera while it taking the image.

Proposed System

Main objective of this Research work is to take each scholar's facial image and record it in a system as a database for future use. We need to capture the student's face, confirm all the features of the student's face, even seating position and identify the student's posture. Once the images are captured, we will use it for training our model. Now, the system will take photos of class in some time interval and it will be sent to the trained model. The model will predict the faces and automatically updates the attendance of student. The teacher does not have to take attendance of the classroom manually as the attendance database is updated automatically without any manual intervention.

Proposed Methodology

The main processing method and rule of this system is that, the frames are extracted as images from the captured video. The taken image of the scholar is given the attendance, else the system enters absent in the database for that student. The following are the steps involved in our Research work.

- Capture Images: The Camera is placed in front of classroom capture images of class and make sure that the camera doesn't loss it's quality of the picture. (Use High quality camera) The photo of the whole student's community of the class is taken in time interval.
- Detection of Faces: The important and intelligent process where the image which is extracted from each class photo is given as an input (picture) to this smart system.

The system will detect face from the class image and will be sent to face crop function.

- Face Cropping: The Faces of every student are cropped from the Captured Images of the category. Faces of the students are enhanced and is ready for face recognition. To achieve this convolution neural network algorithm is used in this Research work.
- Recognition of Faces: Once the detection phase of this Research work is over, next starts the recognition phase, where the cleaned-up picture will be sent to our trained model. If present, it will return present status for that particular student.
- Final Processing: The last and final step of this Research work involves the easier method of updating the names of the scholar in their database. So that every staff in the community could easily understand and edit. This can be achieved by storing the obtained result in the form of Excel sheets. The Excel sheet should be edited only by the concerned staff on a weekly basis or monthly basis to record the scholar's presence.

CNN Working

A Convolutional Neural Network (CNN) is a kind of a multilayer perceptron. The Convolutional Neural Network has been developed to carry out the necessities faster when compared to other image processing techniques. Generally, the Convolutional Neural Network layer consists Three layers. They are an input layer, an output layer and a hidden layer that features multiple convolution layers like normalizing and pooling layers. The CNN removes the loss of data elements while processing an image and gives us highly efficient outputs that are almost accurate and hence can be used in any places like universities and working organizations, etc., for image recognition.

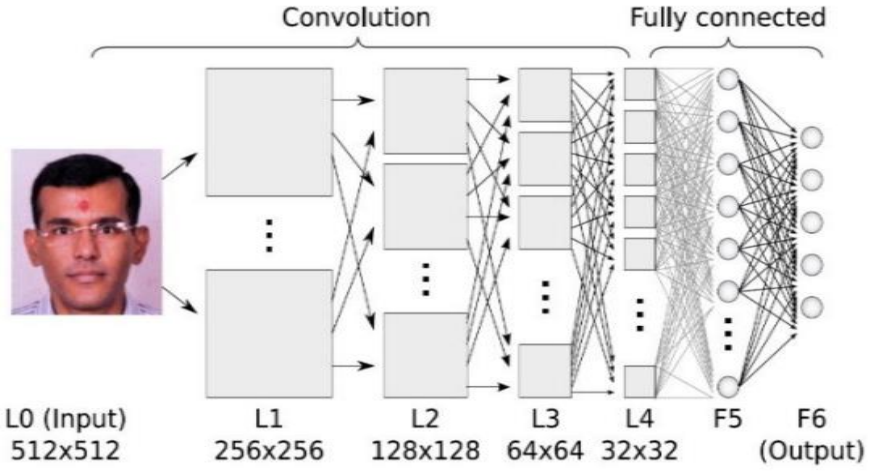

Fig. 1 Concept of Convolutional Neural Network

Results of Each Modules

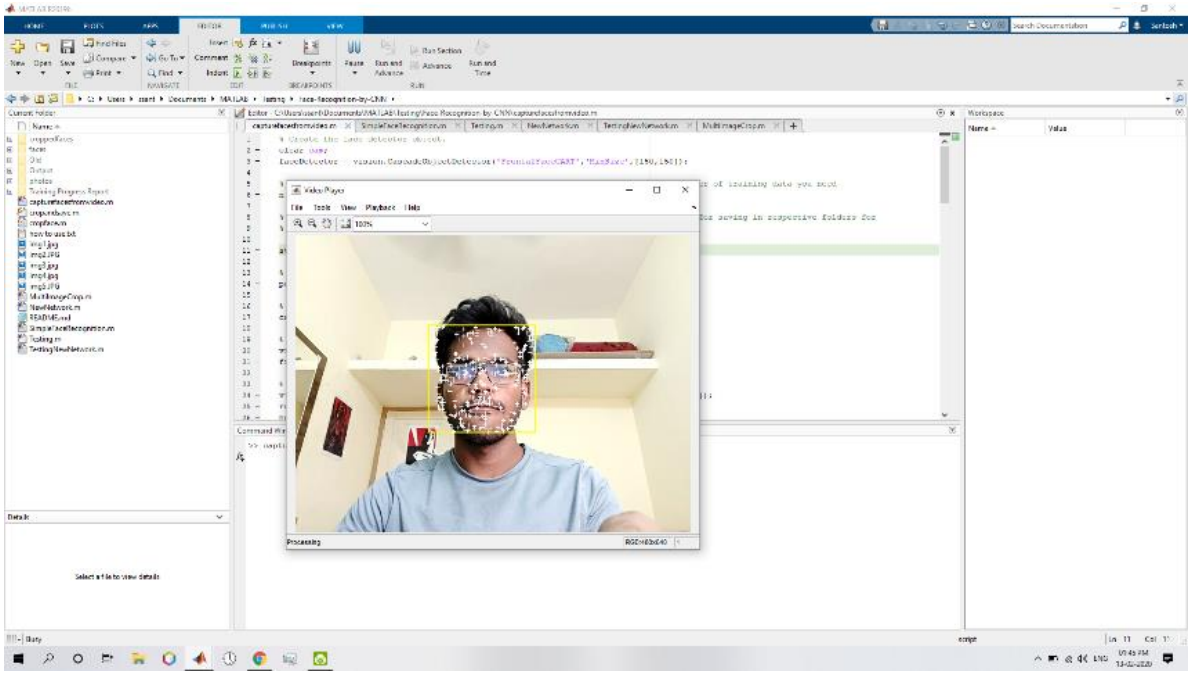

Fig. 2 Capturing Picture of Student to train the model

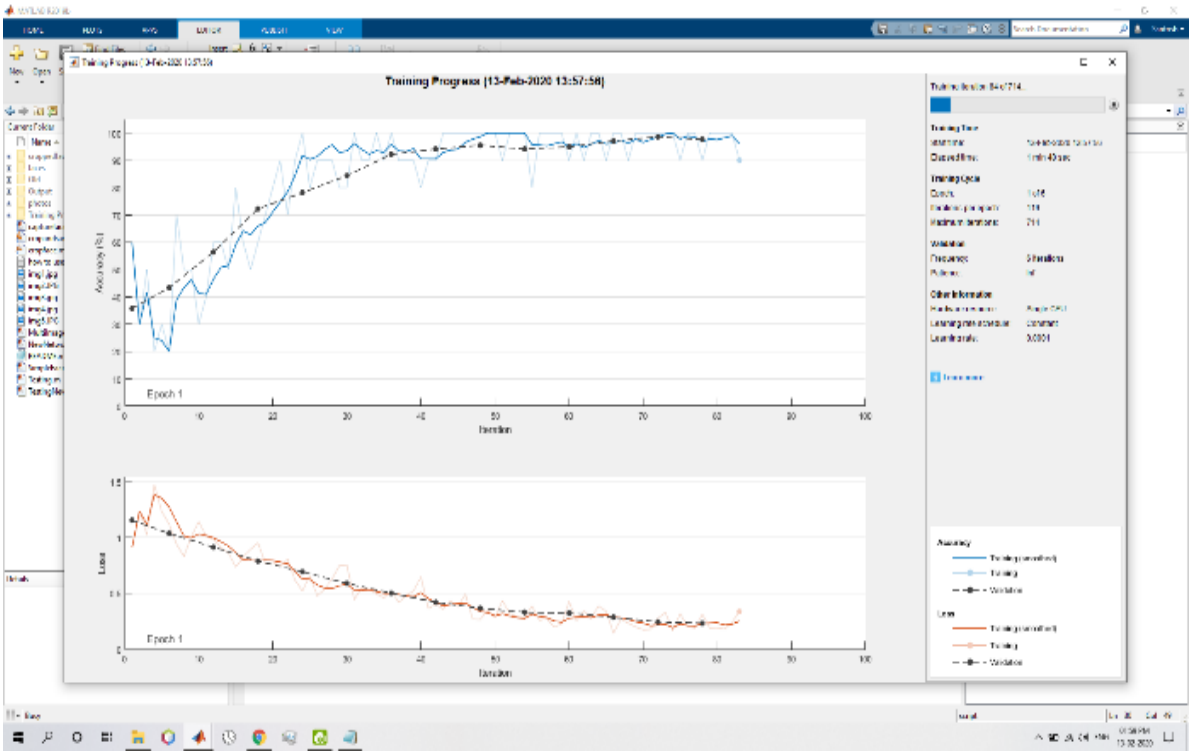

Fig. 3 Training the model

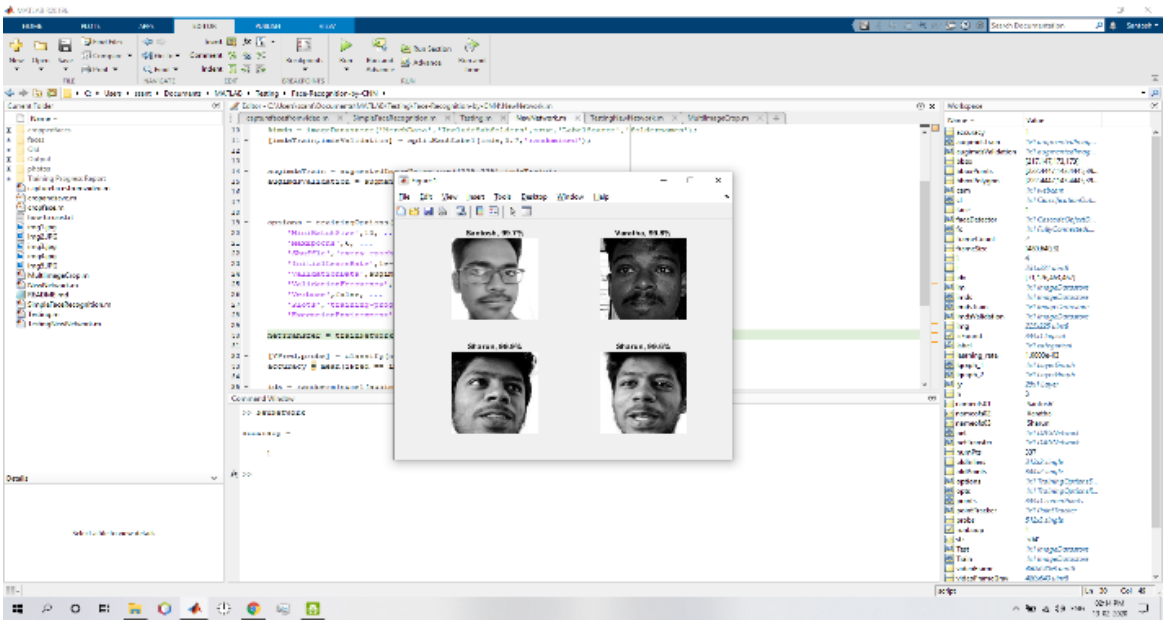

Fig. 4 Predicting the faces

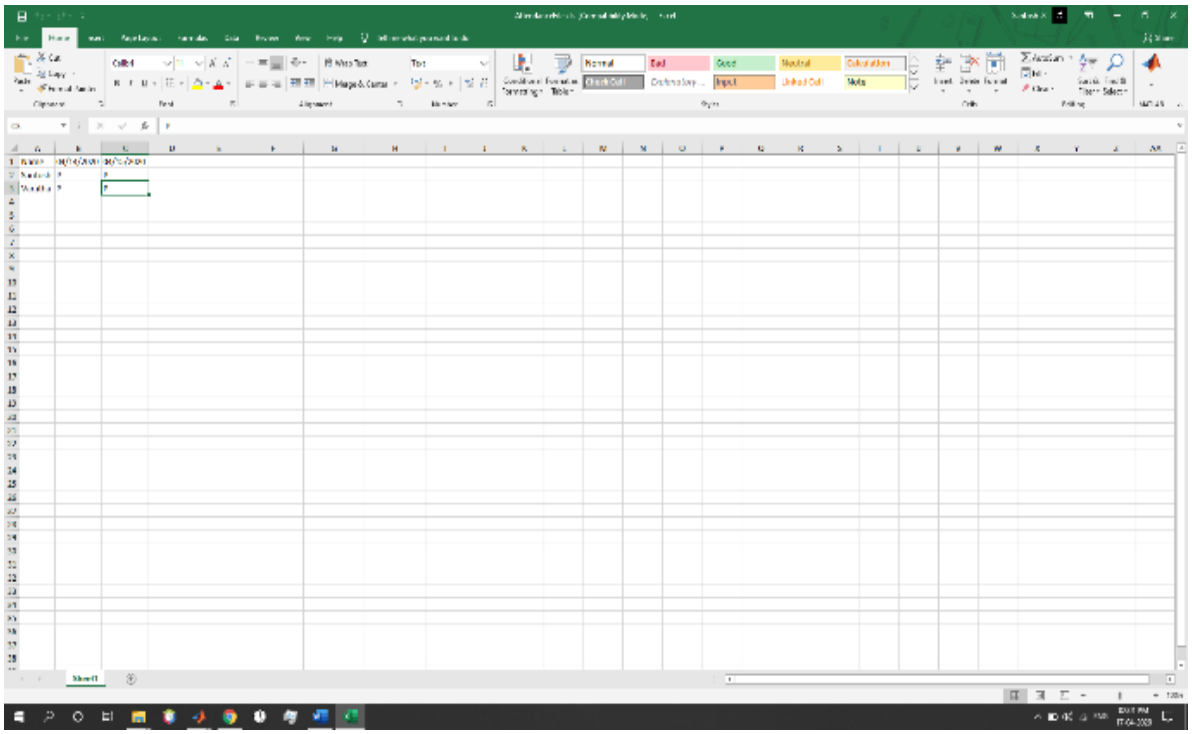

Fig. 5 Output in excel sheet

Conclusion and Future Enhancement

Thus, our Research work's motivation is to take the image of the scholars, crop their faces, compare it with the stored info in the database to make sure their presence or absence, mark attendance to the actual student to take care of the record. Thus, the Smart

automatic attendance management system for university students using face detection methodology helps in increasing the accuracy and speed ultimately achieve the accurate real-time presence of the scholars to satisfy the necessity for updating attendance automatically.

This will be often implemented in larger sectors like in an exceedingly seminar hall, there it useful in sensing the presence of the people if they are in big in number. Sometimes bad lighting environment in the class may affect quality of the image which indirectly degrades system performance, this can be overcome within the latter stage by improving the standards of the video quality or by using some algorithms.

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