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Automatic Attendance System for Using Face Recognition Based on Deep Learning

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Abstract

Student participation is fundamental in the learning procedure. To record participation, a few different ways should be possible; one of them is through student marks. The procedure has a few weaknesses, for example, requiring quite a while to make attendance; the attendance paper is lost; the organization must enter participation information individually into the PC. In the existing technology or method(LBPH). It is having lot of demerits like it is difficult for the computer to do the face identification when the poses of the probe are different. Due to other objects or accessories (e.g., sunglasses, scarf, etc.) performance of face recognition algorithms gets affected. To beat this, the paper proposed an understudy participation framework that utilizations face acknowledgment. In the proposed framework, Convolutional Neural Network (CNN) is utilized to distinguish faces in images, profound measurement learning is utilized to create facial implanting, and K-NN is utilized to group understudy's countenances. In this manner, the PC can perceive faces. From the tests led, the framework had the option to perceive the essences of understudies who did join in and their participation information was naturally spared. For proposed CNN we have obtained a best recognition accuracy of 98.3 %. The proposed method based on CNN outperforms the state of the art methods.

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1. Introduction

Deep learning is a computerized reasoning capacity that emulates the activities of the human cerebrum in preparing information and making designs for use in dynamic. Deep learning is a subset of AI in man-made brainpower (AI) that has systems fit for taking in unaided from information that is unstructured or unlabeled. Otherwise it is called as deep neural learning or deep neural system. Deep learning, a subset of AI, uses a various leveled level of deep neural systems to do the procedure of AI. The counterfeit neural systems are assembled like the human cerebrum, with neuron hubs associated together like a web. While customary projects assemble examination with information in a straight manner, the various leveled capacity of profound learning frameworks empowers machines to process information with a nonlinear methodology.

Student attendance is a basic part of the learning procedure on the college. By going to class, understudy ready to get significant data from the teacher, with the goal that the understudy ready to improve information and comprehension towards a specific field or even a few aptitudes [1]. Every college is executing its participation framework to make record understudy's essence for following and organization reason. The most widely recognized participation record in India despite everything utilizing a manual methodology. The following are two normal ways for nearness record can be found on today colleges: Lecturers call understudies individually and record into participation paper. Students sign participation paper all alone. Of the two-participation record draws near, there are a few inadequacies, including: It sets aside a long effort to call the names of understudies individually. Student can without much of a stretch distort their companions' marks. Attendance

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record paper can be effectively lost if not appropriately put away and oversaw by the college organization. Additional work is expected to enter participation information into the database.

To beat the above issues, an answer is expected to robotize the participation procedure.

Right now, college understudy participation framework with face acknowledgment is proposed. AI calculation like CNN is utilized as face identification, profound measurement learning claimed by Dlib [2] is utilized to change over face picture into 128-d installing, and K-NN for face grouping. By testing the participation framework, an understudy's face is effectively identified and perceived; at that point the participation information is naturally recorded into the framework, which comprises of understudy ID number, date, and time. With this new framework, the old manual participation approach can be supplanted.

The overall paper organization as follows:

Chapter 2] Literature Survey, Chapter 3] Proposed Methodology, 4] Results and Discussion, 5] Conclusion, 6] References

2. Literature Survey

For the face recognition we have to many Algorithms. In the below part we mentioned about the algorithm and their demerits.

Authors in [7] has proposed a attendance system by using Eigen face database. Eigen faces are the components that divide the face into vectors. These vectors are additionally used to recognize different appearances. Each face can be treated as a direct mix of Eigen esteems. The face pictures can be reproduced utilizing a couple of loads for every one of the Eigen faces. Finding the eigenvectors and eigenvalues are tedious on PPC (Production Planning and Control). The preparing velocity of this calculation is effective and even in time utilization. The exactness of Eigen face identification relies upon light force as it was pixel subordinate. It implies that it tends to be exceptionally utilized in the conditions where light is sufficient. The restriction of this strategy is touchy for lighting conditions. The main limitation of this Algorithm it is sensitive towards light. The Accuracy is 68%.

Authors in [16] has proposed attendance system using Fisher face method by utilizing GUI applications and databases. Fisher Face uses PCA which reduction of face space dimension and then LDA method to obtain the feature of image characteristics. The advantage over Eigen face is, it produces minimum Euclidian and even in the low intensity of light face is recognized. The accuracy is 80%. The failure for recognition is different poses (in motion) and scaling.

Authors in [17] have proposed attendance system by combining PCA, LDA, and LB. Three fundamental modules of computer visions were implemented to manage students during the lecture. Face recognition, motion detection, and behavior analysis were used to monitor the student attendance, assess the concentration or attention and to detect the motion of student during the class. It would be ideal to have a system that can identify the entry and exit times of lecture premises because students have the tendency of going to class just to sign the register and leave without attending the whole lecture. The accuracy was 90%.

Authors in [18] have proposed using LBPH Alg. architecture to address the human face recognition in real time at the low level of resolution. i.e. system operates better even at the minimum low resolution of 35px to identify the human face in various angles, side poses and tracking the face even during human motion. The Accuracy is 90%.

Authors in [19] have proposed an improved face recognition approach based on the combination of Vector Quantization (VQ) and Markov Stationary Feature (MSF). It can not only utilize the MSF framework to extend the VQ histogram-based features with the spatial structure information but can also incorporate more location information extracted from different facial sub-regions so as to improve the accuracy of face recognition system. The recognition rate of 97.6% is obtained.

Problems in existing method are like it is difficult for the computer to do the face identification when the poses of the probe are different. Due to other objects or accessories (e.g., sunglasses, scarf, etc.) performance of face recognition algorithms gets affected.

3. Proof Methodology

To accomplish an understudy participation framework dependent on face acknowledgment, the PC must be capable distinguish understudy's face from the info picture; at that point it will recognize the understudy, and spare the understudy's information, which is their understudy ID number, date, and time. So as to accomplish the PC's capacity to identify faces and perceive understudies' countenances from a photograph, a few phases must be taken. Right now, steps used to make an understudy participation framework dependent on face acknowledgment are clarified.

3.1. Preparing Student Photos

This stage is done to set up a dataset for preparing the neural system and group understudy dependent all over. Right now, understudy photograph was taken, with five photographs. The photographs utilized have a size of 600 px x 800 px. Photographs of an student's face taken from a few sides. The photographs are taken from the frontal side, ±30°to the right, ±60°to the right, ±30°to the left, and ±60°to the left. This is done so as to accomplish higher precision.

3.2. Recognizing Face

In light of the face acknowledgment chart, the means to perceive face will be face location, highlight extraction, and face acknowledgment. This understudy participation framework is similarly made those three strides, with the

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particular strategy utilized for those three stages. The means utilized are as per the following:
1)Detecting face in a picture
2)Marking the one of a kind pieces of the face and change the picture position
3)Embedding face (change the picture into 128-d installing)
4)Classify the outcome utilizing the K-Nearest Neighbor AI calculation
Clarification of the above stages is as per the following:

1) Detecting face in a picture

This stage is done to filter the info picture and decide the area of the understudy's face in the picture.

To see if a face exists in the info picture, Convolutional Neural Network (CNN) is utilized. The CNN face recognition library utilized was made by Dlib [2]. CNN is utilized as a result of its capacity to recognize faces more precisely than HOG [3]. A face is attracted the face territory to show that the PC effectively recognizes a face in the information picture.

2)Marking the remarkable piece of the face and change the picture position

Because of contrasts in facial position, the PC may encounter trouble in perceiving an understudy's face, in light of the fact that the area of the eyes, nose, mouth, and eyebrows have changed. To conquer this, a calculation to scowl milestone is utilized, and picture situating is done so the eyes, nose, mouth and eyebrows are focused. When all is said in done, the human face has 68 explicit focuses. These focuses are called face tourist spots. There are a few different ways to find face tourist spots, yet right now, strategy used to find face milestones is created by [4]. Finding face tourist spots is finished by utilizing a python content.

a) Embedding face
The following stage is installing face utilizing Dlib's CNN or profound metric learning. The fundamental thought behind this is to let PC creating estimation that can assist it with recognizing one individual with the other. The CNN is prepared to delineate in the info picture and produce 128-d installing. 128-d installing is a framework with an element of 128 × 128 [4]. Every understudy's face picture will be gone through the pre-prepared system so as to get the 128-d estimations.

b) Classify the outcome utilizing K-NN
Right now, a classifier is prepared dependent on the face implanting that has been produced. Right now, NN is utilized. The aftereffect of the classifier is the student's ID number.

We compared our proposed methodology with the existing LBPH algorithm. The accuracy rates are 80-90% in LBPH method and 98.3% in CNN method respectively. From the accuracy rate we can conclude that our proposed paper is having more accuracy rate compare to LBPH.

3.3. System Design

The CCTV or Smartphone camera is used to record students' image, and administrator used to receive photo to perform face recognition, and to insert attendance data to the database.

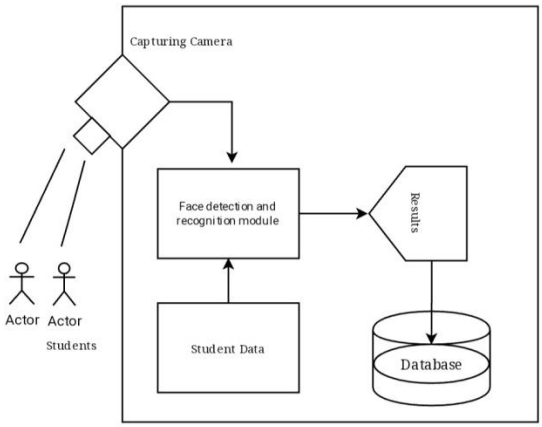

Figure 1: System Design

There are two actors involved, namely students and administrative staff. The administrative staff has the role of inserting data related to students. When a teacher wanted to take attendance, the camera takes a photo of the student's face. Then, data is sent to the administration for processing. The computer administration determines student who is making attendance by recognizing a face from a photo sent by system. After successfully recognizing the face in the photo, the student data, in the form of the student's ID number, date, and time, will be stored in the database.

4. Results and Discussion

This section discussed the result of facial recognition test and student attendance system that has been made. The system is tested using a computer with the specification as follows, Intel Core i5-3570 @3.40GHz 64bit, 8GB of RAM. To find out the accuracy level of face recognition used in this system, a photo of a student whose face has been trained is taken. The size of the photo taken by the system camera is 320 px × 240 px. This is done to make the face recognition process can be accomplished faster, because the more significant the image size, the time needed to recognize the student's face becomes longer. To see if a face exists in the info picture, Convolutional Neural Network (CNN) is utilized. CNN is utilized as a result of its capacity to recognize faces more precisely than HOG. Finding face tourist spots is finished by utilizing a python content. Every understudy's face picture will be gone through the pre-prepared system so as to get the 128-d estimations. With sufficient lighting, as expected, the system can recognize the face of the

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student shows the facial recognition result from one of the student's face. A box with the student's ID number is shown as evidence that the system successfully recognizes the student. The result data is updated in the database.

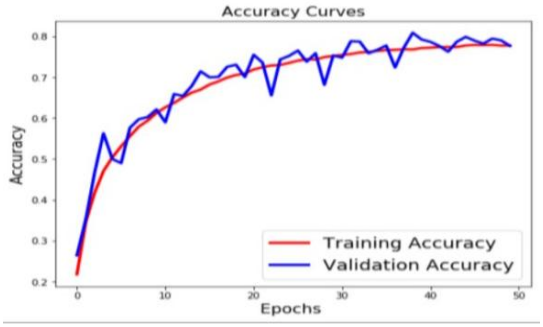

Figure 2: Training v/s Testing Accuracy Curve of LBPH

The accuracy of model is shown in Fig.2 the accuracy is taken against the Training and Validation dataset. We divided our dataset, such as 50% training dataset, 30% testing and rest 20% validation dataset.

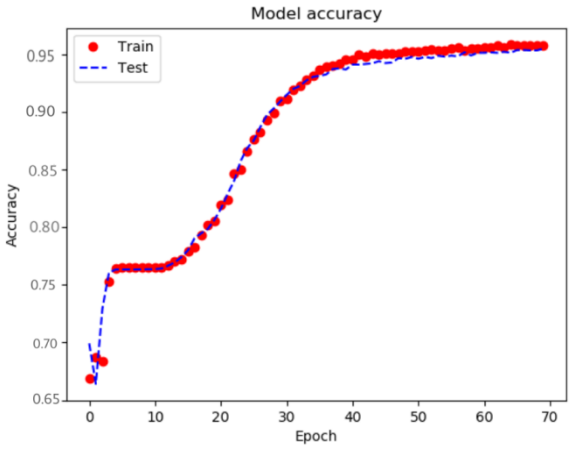

Figure 3: Training v/s Testing Accuracy Curve of CNN (Proposed method)

The best results (accuracy of 98.3 %) using the proposed CNN was obtained for the training images in the Fig3.

5. Conclusion

In this paper, a student attendance system using facial recognition is proposed. By utilizing Convolutional Neural Network to distinguish a face, Dlib's CNN or profound measurement learning for facial installing, and K-NN to group faces, the framework effectively perceives the substance of an understudy who is making participation. Student information that has been distinguished as the student's ID number, date and time, is utilized by the framework to record understudy participation. This framework makes the understudy participation process done naturally and is required to have the option to supplant the old manual participation process, which is presently utilized. In the LBPH method we faced a lot of problems in order overcome from that we used CNN method and accuracy rate of our proposed methods are good i.e. 98.3% compare to LBPH.

For future work, the arrangement is to utilize cloud-based face acknowledgment so as to accelerate the face acknowledgment process. The utilization of another increasingly modern face acknowledgment technique is arranged so as to have the option to think about the presentation, and ideally gives better execution (speed and precision) than the strategy that has been utilized, right now, Convolutional Neural Network.

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