JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Automated Attendance System Using Face Recognition

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Abstract : This study plans to perceive faces in a picture, video, or by means of live camera utilizing deep learning-based Convolutional Neural Network model that is quick as well as precise. Face acknowledgment is a course of recognizing faces in a picture and has reasonable applications in various spaces, including data security, biometrics, access control, policing, cards, and reconnaissance framework. Deep Learning utilizes various layers to find understandings of information at various extraction levels. It has worked on the scene for carrying out analysis in facial acknowledgment. The cutting edge execution has been bettered by the presentation of deep learning in face acknowledgment and has animated progress in viable applications. Convolutional neural networks, a sort of deep neural network model have been demonstrated to make progress in the face acknowledgment space. For continuous frameworks, examining should be finished prior to utilizing CNNs. Then again, complete pictures (all the pixel values) are passed as the contribution to Convolutional Neural Networks. The accompanying advances: highlight choice, highlight extraction, and preparing are acted in each step. This could prompt the suspicion, that convolutional neural network execution gets an opportunity to get muddled and tedious.

***IndexTerms* – Deep learning, CNN, Face recognition**

Introduction

Face acknowledgment is an exceptional strategy for performing verification biometrically. It has wide applications in areas of money, security, and the military. Face acknowledgment has acquired a ton of interest over the most recent couple of years, which has driven a few scientists to chip away at growing new methods and working on the current ones. Its great many applications requests to specialists and keeps them driven. Face acknowledgment can be performed on a constant video by considering it as a succession of casings where each edge is viewed as a solitary picture. Before facial acknowledgment can be done, we should initially guarantee the presence of a face in the casing.

This should be possible by performing face recognition. In this step, the model recognizes the face and isolates it from the picture for ID, disposing of excess information that isn't needed for facial acknowledgment. This diminishes the quantity of pixels on which the model needs to deal with and subsequently expanding the general productivity. Be that as it may, facial acknowledgment [12] likewise faces a few issues, making it extremely difficult to perform. Different variables like posture variety, beard growth, picture brightening, picture foundation, and looks influence the picture, and the result can vary in light of these qualities.

In circumstances where the face isn't apparent or stowed away from the camera, the face probably won't actually be distinguished. Consequently, the picture utilized as contribution to the model could be in various circumstances rather than the picture, which is to be analyzed. We are endeavoring to impart this procedure in colleges, with the goal that normal issues like higher time-utilization during participation, understudies stamping intermediary participation, and mass bunks during talks can be forestalled. Checking participation in classes is a staggering undertaking for the teachers as it isn't just tedious, yet in addition the understudies will generally stamp intermediary participation, which prompts wrong records of participation. Manual participation is surely intense for the teachers, as it makes it challenging to keep a record of the understudies.

Ordinary ways frequently have their troubles. Most of these techniques need constancy. It prompts a rising requirement for better techniques for participation. This exploration stresses involving facial acknowledgment as a method for stamping participation. Ongoing mechanized participation checking without burning through instructors' valuable time is the principal objective of this undertaking. In addition to the fact that this technique saves time, however it is likewise more solid than conventional strategies

I. Related Work

Dr. Priya Gupta et al. [1], acquired an exactness of 97.05% utilizing their proposed strategy. They performed highlight extraction with the assistance of haar Fountains, which were, thus, took care of forward to the network rather than crude pixel values. The intricacy was enormously diminished as it prompted a lessening in the excess info highlights. It utilizes Deep Neural networks, which makes the model extremely effective regarding utilizing less assets and making it quicker.

Haar overflows [10] utilize various highlights that are prepared first with the assistance of a preparation set, which comprises of both positive as well as regrettable pictures. After we have prepared the classifier, it tends to be utilized to recognize assuming the article is available in any test picture or not.

These have been tremendously valuable in undertakings connected with facial recognition as they make the cycle a lot quicker as it has extensively less calculations when contrasted with different techniques. Various channels can be utilized for elements like eyes, nose, mouth.

R. Rahim et al. [2], utilized the Fisher Direct Discriminant(FLD), which was found by Robert Fisher in 1936. It is a famous example acknowledgment strategy, which has applications in face and items acknowledgment. It builds the precision of the arrangement by shaping between class, and intraclass disperses. The calculation can perceive the faces even with changes in certain qualities of the faces, similar to appearances or wearing glasses.

Faizan Ahmed et al. [3], show a similar report on the various strategies for performing facial identification and acknowledgment. They accomplished an exactness of 96.7% utilizing the Adaboost classifier [4] alongside Haar highlights and a precision of 90.88% utilizing the Help Vector Machine(SVM) [5] classifier for the Face location application. For Facial Acknowledgment, they utilized the accompanying strategies with following methods:

i. Principal Component Analysis(PCA) [6] technique which utilizes the idea of Eigenfaces, with an exactness of 71.15%. The calculations expected in this strategy are a lot of lower when contrasted with different techniques as it just thinks about the 2D face acknowledgment issue. Consequently the intricacy is decreased overwhelmingly.

ii. Direct Discriminant Analysis(LDA) [7] technique utilizes Fisherfaces, with an exactness of 77.90%. It for the most part centers around lessening the quantity of highlights being applied on each face.

iii. Nearby Twofold Pattern(LBP) [8] has a precision of 82.94%.

iv. Gabor Classifier [9], which thinks about the nearby highlights, has a precision of 92.35%. It isn't planned explicitly for face acknowledgment, however its channels can perceive different noticeable elements in an article.

Convolutional Neural Networks [11] are a kind of Neural Network that is for the most part utilized in the field of picture order, especially Face Acknowledgment. Convolutional Neural Networks take an information picture and change the loads of the network-in light of the information picture so it can separate it from different pictures. This permits the network to learn and distinguish the significant qualities (that are fundamental for perceiving various faces) all alone.

The requirement for human oversight is subsequently limited it can consequently separate the pictures into discrete classes. Convolutional Neural Networks additionally decrease the requirement for pre-handling expected to prepare the model, subsequently it uses less calculation power. Because of these benefits, deep learning calculations like convolutional neural networks have turned into the norm in facial acknowledgment.

II. Proposed Methodology

We have proposed a technique for a computerized participation framework utilizing facial acknowledgment. The framework ought to have the option to distinguish faces in each picture. Further, in the wake of perceiving the identified faces, it ought to have the option to check the participation of understudies whose faces are perceived by the framework. The essence of the framework is that it denotes the participation of just those understudies who have gone to in excess of a little over half of the complete class; the other understudies are checked missing. The proposed framework requires a camcorder in the class to be an underlying necessity. The proposed framework is intended to deal with pictures of understudies. The basic thought is to remove elements of understudies' faces from the recording, and contrast these highlights and those which are separated from the preparation pictures utilized for preparing the model. Assuming these elements match, the understudy is checked present for that solitary casing.

The improvement of this philosophy is with the end goal of facial acknowledgment alongside metadata of the picture for following the area. Because of the improvement in innovation, the global positioning framework has additionally been gotten to the next level. The essential design of the proposed face acknowledgment model is displayed in the above figure. Right away, the pictures from virtual entertainment or from any means are taken pre-handled in which the size of the pictures is altered to the necessary size for the CNN model to be prepared on. The other stage is the preparation of the model. In this stage, the proposed CNN model is created by utilizing convolution and thick layers of artificial neurons.

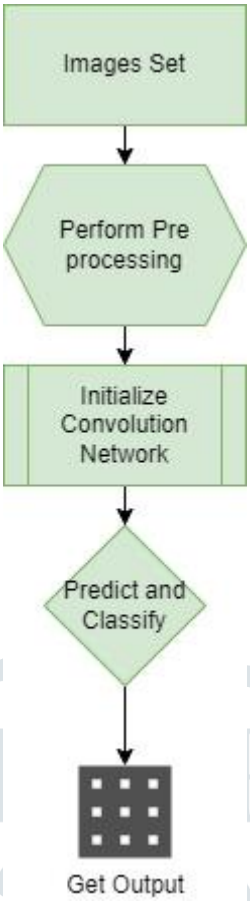

Figure 1.0 System Flow Diagram

3.1 Technique

To fit the image into the model for training in the pre-processing as follows:

1. Initially take all the images as a group and save them in a folder.
2. The respective classes and images are stored in Blank multidimensional array.
3. The images are can be read by computer vision library OpenCV, images will be converted into the numerical arrays.
4. File is used for a set of 100 images after the combination of the [image_array, class] to save.
5. To read all images along with their respective class the below file is used.
6. The images and their respective class of the images which is stored in a file will be shuffled and saved in another file.

3.2 CNN Functionality

The above created file is imported and adjustment of size from multidimensional array to compressed array to fit into the proposed CNN model.

1. Firstly, 3 layers of Convolutional 2D layers are built and along with the respective softmax activating functions and pooling functions.
2. The sequential network is designed with five layer is built with three layers as hidden layers .
3. For resizing the data and flattening layer is utilized which is known as initial layer.
4. The neural network nodes with the initial hidden layer and rectified with the linear activation function as second layer.
5. To construct 512 neural network nodes and rely activation function the third layer is used i.e second hidden layer.
6. Taking 128 nodes rely as activation function and neural network as the fourth layer.
7. Soft maximum to normalize the k real numbers into probability with a same number of nodes with available classes and activation function is a final layer.
8. Compilation will done By using the Adam Optimizer
9. With the help of sparse categorical cross entropy process and track the damage in the network.

Figure 2.0 Flow Diagram

Pre-Processing Images

1) The system captures around 50 images of every individuals face. The images are converted into grey scale as LBPH operates using images in greyscale and the images are stored in a folder. The stored images will be saved with a name and ID unique to that person.

2) Face Detection When a person appears in front of the camera, the camera detects that a face is present and a frame appears around the face. The entire frame is converted to grey scale as LBPH works only on grey scale images.

3) A scale factor is used to compensate for multiple faces present in front of the camera

Feature Extraction

1) The LBPH algorithm makes use of binary values and stores the data in a file. The binary values are different for each face.

2) The Region of Interest (ROI) are parts of the face from where features are extracted. Information about the gradients in the face is captured.

3) The image of a person's face is divided cells comprising of 8 pixels. Each pixel present has a gradient and compares itself with its neighbor pixels.

Face Recognition

1) In the comparison module, face recognition process is carried out.

2) When a face is detected by the camera it checks the corresponding values of the current visible face with values stored in the file.

3) If the values are a match, then the face is recognized and the name associated with that face is displayed.

III. Experimental Setup

The ORL Data set of Faces contains ten unique pictures of every one of 40 particular subjects (400 distinct pictures). For certain subjects, the pictures were taken at various times and under differing the lighting. In this data set the various states of mind of the pictures (faces) like open and shut eyes and chuckle or without snicker with different subtleties like having facial hair or being clean shaven, regardless of glasses are introduced. Every one of the pictures were taken against a dull homogeneous foundation with the subjects in an upstanding, front facing position (with capacity to bear some side development). The brow and hair of individuals can be detectable in the connected pictures. The face circumstance towards the camera point is variable start to finish and left to right side.

Figure 3.0 The ORL Face Dataset

We analyzed our model both quantitatively as well as quantitatively. We first assessed the number of faces the model was able to detect, i.e., quantitative analysis, when given realtime video input, and then measured the accuracy of the model by calculating the number of faces that were recognized correctly, i.e., qualitative analysis. Also, the result of our framework, when stored in the database is sorted according to the dates on which the lecture has taken place. Initially, all the students for a lecture are marked absent and on recognizing their faces, and if they follow certain criteria mentioned above, the model updates their attendance in the database marking them present for the lecture.

In our case for automatic attendance based on facial recognition, the system admin can take multiple images of the student at the time of registration, which would be used for the training dataset for high accuracy. This makes the proposed attendance system reliable for marking attendance of students during lectures in the universities. The trend analysis of a different number of images per person on the accuracy of the system.

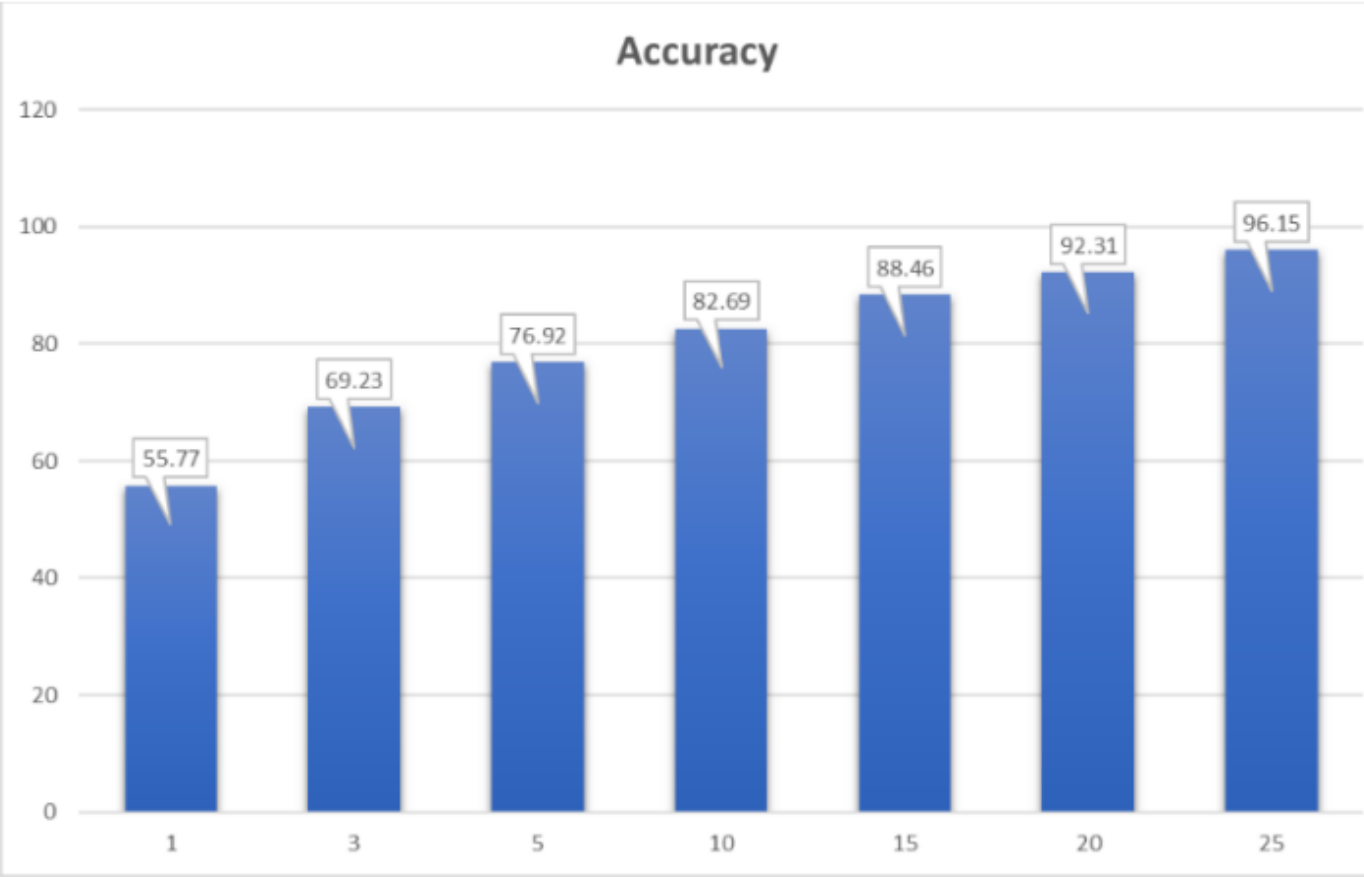

Figure 4.0 Graph depicting dependency on the accuracy of the model on the size of the training set

Performance Measures can be calculated with the help of Precision and Recall. These are important for evaluation matrices. Precision is positive predictive value and recall is a sensitivity. It measures relevant percentage of results whereas Recall gives percentage of total relevant results which are correctly classified by the algorithm.

	A	B	C	D
PCA	75.2	77.5	82.1	85.6
LBPH	78.1	81.3	86.7	88.9
KNN	71.4	73.8	79.2	81.4
Proposed CNN	93.9	95.7	97.5	98.3

Table 1.0 Performance Comparison

Using Convolutional Neural Network for facial recognition helps in reducing time and the processing power used as compared to other conventional methods. The model has great accuracy. For 25 images per subject, we achieve an accuracy of 96.15%. Although the accuracy is assumed to be very low for fewer images, it is compensated by the extra step that ensures that the student is marked present only if the number of frames their faces are identified is greater than the predefined threshold of 60%. This results in accuracy that is much higher than expected. This model can also be applied to online classes. During online lectures too, the conventional methods would waste precious time. They cannot be considered very reliable either, as anybody can log in as a student if they have the login credentials. Instead of manually taking attendance, which might be tedious for large groups of students, attendance will be taken automatically in the background. Facial recognition would ensure that attendance is reliable..

IV. Conclusion

In this framework we have executed a participation framework by which speakers or showing collaborators can record understudy's participation. It saves time and exertion, particularly in the event that it is a talk with colossal number of understudies. One more utilization of this framework is that it is equipped for denoting the presence of representatives at any work environment. The framework can be helpful in numerous different regions and can supplant the current frameworks of participation stamping we introduced a trial assessment of the exhibition of the proposed CNN. The general exhibitions were gotten utilizing an alternate number of preparing pictures and test pictures. The convolutional neural networks accomplish the best outcomes up to this point. Utilizing complex designs, it is feasible to arrive at a precision pace of around 98 %. Notwithstanding this great result, CNNs can't work without adverse consequences. Extremely tremendous preparation datasets lead to a high calculation burden and memory utilization, which then needs high handling ability to have the option to be applied helpfully. We have introduced a quick, programmed framework for face acknowledgment which is a mix of a neighborhood picture test portrayal, a self-putting together guide network, and a convolutional network for face acknowledgment. The Face Acknowledgment based Robotized Participation Framework is straightforward, precise, and works productively. This framework works consequently once the enlistment of a

singular understudy is made by the organization. There is a need to use a couple of calculations that can see the appearances to further develop the framework execution and acknowledgment exactness.

REFERENCES

[1] P. Gupta, J. Tripathi, M. Sharma, and N. Saxena, "Deep Neural Network for Human Face Recognition," MECS, p. 9, 2018.

[2] R. Rahim, "Research of Face Recognition with Fisher Linear Discriminant," IOP Conf. Ser., 2018.

[3] A. Najam, Z. Ahmed and F. Ahmed, "Image-based Face Detection and Recognition," IJCSI, 2012.

[4] A. Tikare, S. Kadam, and K. T. Talele, "Efficient Face Detection using Adaboost," in IJCA Proc on International Conference in Computational Intelligence, 2012.

[5] B. McCane and I. Kukenys, "Support Vector Machines for Human Face Detection," in Proceedings of the New Zealand Computer Science Research Student Conference, 2008.

[6] M. A. Turk and A. P. Pentland, "Face recognition using Eigenfaces," in Proceedings of the IEEE, 1991.

[7] J. Lu, N. Plataniotis, and A. N. Venetsanopoulos, "Face recognition using LDA-based algorithms," in IEEE Neural Networks Transaction, 2003.

[8] T. Ahonen, A. Hadid, and M. Peitikainen, "Face recognition with local binary patterns," in "In Proc. of European Conference of Computer Vision, 2004.

[9] L. Wiskott, M. Fellous, N. Krger, and C. Malsburg, "Face recognition by elastic bunch graph matching," in IEEE Trans, 1997.

[10] P. Viola and M. Jones, "Rapid Object Detection using a Boosted Cascade of Simple Features," IEEE Computer Society Conference on Computer Vision, 2001.

[11] Yamashita, R., Nishio, M., Do, R.K.G. et al. Convolutional neural networks: an overview and application in radiology. Insights Imaging 9,611–629 (2018).

[12] "A Summary of literature review: Face Recognition" by Kittikhun Meethongjan & Dzulkifli Mohamad, August 2007, Postgraduate Annual Research Seminar 2007

[13] King, Davis E. "Dlib-ml: A machine learning toolkit." Journal of Machine Learning Research 10.Jul (2009): 1755-1758.