IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Vol. 8, Issue 6, June 2021

DOI: 10.17148/IARJSET.2021.86127

Face Recognition system using Convolution Neural Network

Miss Shital Balu Wankhede[1], Dr. D. D. Patil[2]

[1]Student, [2]Head Of Dept. & Associate Professor

[1,2]Shri Sant Gadge Baba College of Engineering and Technology, Bhusawal, India.

Abstract: Face recognition is of great importance to real world applications such as video surveillance, human machine interaction and security systems. As compared to traditional machine learning approaches, deep earning-based methods have shown better performances in terms of accuracy and speed of processing in image recognition. This paper proposes a modified Convolutional Neural Network (CNN) architecture by adding two normalization operations to two of the layers. The normalization operation which is batch normalization provided accelerating the network. CNN architecture was employed to extract distinctive face features and Softmax classifier was used to classify faces in the fully connected layer of CNN. Global Position Systems and other navigation systems that collect spatial data through an array of sensors carried on by people and distributed in space have changed the way we navigate complex environments, such as cities. However, indoor navigation without reliable GPS signals relies on wall-mounted antennas, WiFi, or quantum sensors. Despite the gains of such technologies, underlying these navigation systems is the dismissal of the human wayfinding ability based on visual recognition of spatial feature. Face recognition is a method to identify or verify the identity of an individual using their face.

Keywords: *Face Recognition, Convolution Neural Network and Deep Learning*

I.INTRODUCTION

Face recognition (FR) from the real data, capture images, sensor images and database images are challenging problem due to the wide variation of face appearances, illumination effect and the complexity of the image background. FR is the process of recognizing the face of a relevant person by a vision system. FR possess the importance to give biometric authentication that is used in different applications, especially in security. Face recognition is achieved using Deep Learning's sub-field that is Convolutional Neural Network (CNN). A stored database of the subjects is manipulated using image processing techniques to accomplish this task. The original small dataset is augmented to be a large dataset via several transformations of the face images. The process of face recognition refers to identifying the person by comparing some features of a new person with the known persons in the database. FR technology is identified as an active area of research in recent years because of the rise in security demands and the potential of the technology in law enforcement and commercial use. In this research we have developed a model which detects the captured image, then identify it from the database and then finally verify the image identified image with the captured image.

II.LITERATURE SURVEY

Face perception is an important part of the capability of human perception system and is a routine task for humans, while building a similar computer system is still an on-going research area. The earliest work on face recognition can be traced back at least to the 1950s in psychology [Bruner and Tagiuri 1954] and to the 1960s in the engineering literature [Bledsoe 1964]. Some of the earliest studies include work on facial expression of emotions by Darwin [1972] and Ekman [1998] and on facial profile-based biometrics by Galton [1888]). But research on automatic machine recognition of faces really started in the 1970s [Kelly 1970] and after the seminal work of Kanade [1973]. Over past 30 years extensive research has been conducted by psychophysicists, neuroscientists, and engineers on various aspects of face recognition carried out by humans and machines.

III.METHODOLOGY

CNN is a category of Neural Network that has proven very effective in areas such as image recognition and image. Fully Connected Layer (FCL) is regarded as final pooling layer feeding the features to a classifier that uses Softmax activation function. The goal of employing FCL is to employ these features for classifying the input image into various classes based on the training dataset. The sum of output probabilities from the FCL is 1. This is ensured by using the Softmax as the activation function. The Softmax function takes a vector of arbitrary real-valued scores and squashes it to a vector of values between zero and one that is summed to one. The block diagram of the proposed CNN recognition system is given in Fig. 3.1. and discussed in the following steps.

IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Vol. 8, Issue 6, June 2021

DOI: 10.17148/IARJSET.2021.86127

3.1 Face Detection

The main function of this step is to detect the face from capture image or the selected image from the database. This face detection process verifies that weather the given image has face image or not, after detecting the face. This output will be further given to the pre-processing step.

3.2 Pre-processing

This step is working as the pre-processing for face recognition. In this step the unwanted noise, blur, varying lightening condition, shadowing effects can be remove using pre-processing techniques Once we have fine smooth face image then it will be used for the feature extraction process.

3.3 Feature Extraction

Extractions are performed to do information packing dimension reduction, salience extraction, and noise cleaning. After this step, a face patch is usually transformed into a vector with fixed dimension or a set of fiducial points and their corresponding locations. In this step features of face can be extracted using feature extraction algorithm.

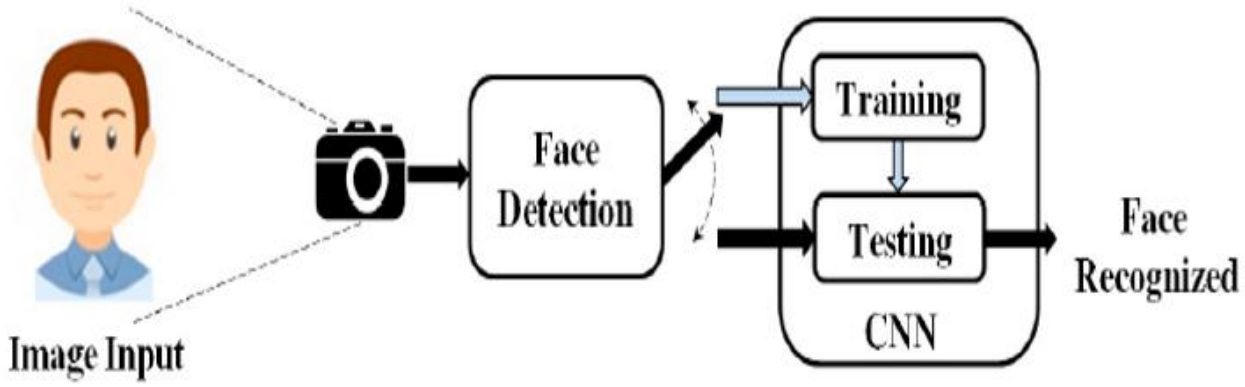

Fig 3.1 Block diagram of proposed real-time face recognition system

The CNN recognition algorithm discussed above is implemented in the model using following steps which can be summarised in Fig 3.2.

a) Resize the input images as 16x16x1, 16x16x3, 32x32x1, 32x32x3, 64x64x1, and 64x64x1.

b) Build a CNN structure with eight layers made up of convolutional, max pooling, convolutional, max pooling, convolutional, max pooling, convolutional, and convolutional layers, respectively.

c) After extracting all features, use Softmax classifier for classification.

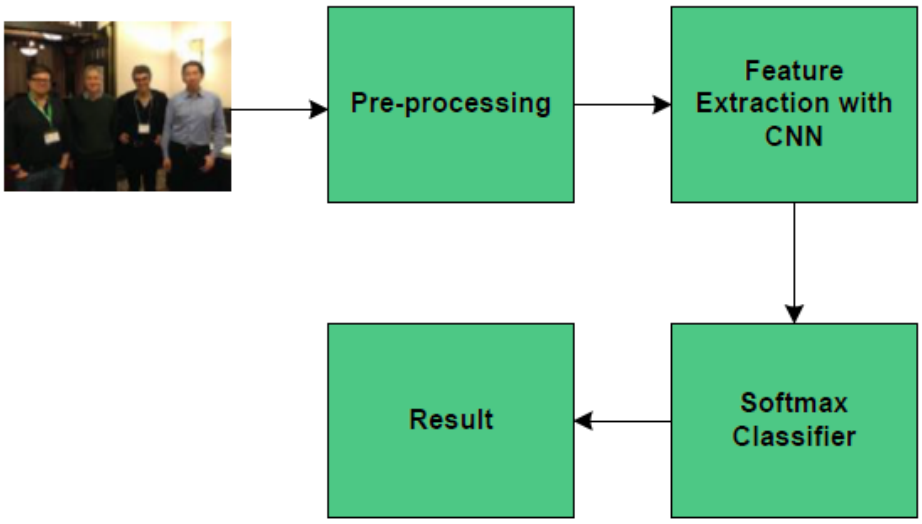

Fig 3.2 The block schema of the proposed algorithm

IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology
Vol. 8, Issue 6, June 2021

DOI: 10.17148/IARJSET.2021.86127

IV.RESULT AND DISCUSSION

The implementation of a very basic face recognizer which can identify the face of the person seen on a web cam is inspired by two path breaking papers which uses deep convolution neural network namely Facenet and Deepface. The execution results of the model code are discussed below:

4.1 Capturing the Face Image

Following code captures 10 face images of a person. They all are stored in images folder with the name user_1 to user-10. Then the code selects good, captured image (See Fig4.1) from the set of 10 images. It then renames it with the name of person and delete rest of the captured images. The selected image will be used for identifying and recognize the person using one shot learning.

Fig 4.1 Capturing the Face Image

4.2 Constructing the Neural Network Model -

The model code has been constructed based on Facenet's Inception Model.

4.3 Loading the Model with Pretained Weights -

Facenet is trained by minimizing the triplet loss. The mode will now be loading a previous trained model.

4.4 Recognizing the faces using different functions.

Deepface has the **recognize_faces_in_cam** function captures image from the webcam, detects a face in it and crop the image to have the face only which is then passed to receive **recognize_ face** function, which then identify or verify the image (See Fig 4.2).

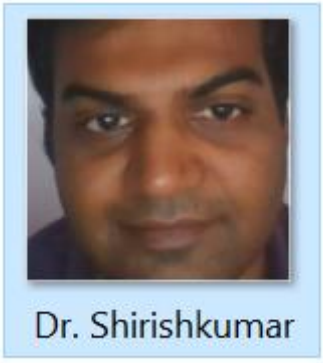

Fig 4.2 Face Recognizer Image

V.CONCLUSION

Every researcher has their own approach for recognizing face from an image or video database. Many researchers have tried to solve the problems associated with earlier proposed methods but there is still some advantages and limitations. This paper has combined the previous recent approaches and discusses the method architecture, the algorithm and database for training or testing images and finally the performance to measure the face recognition system.

IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Vol. 8, Issue 6, June 2021

DOI: 10.17148/IARJSET.2021.86127

ACKNOWLEDGMENT

The authors would like to thank Shri Sant Gadge Baba College of Engineering and Technology, Bhusawal, India for providing all necessary resources required for this project.

REFERENCES

1) R Samet, and M Tanriverdi. (2017) "Face Recognition based Mobile Automatic Classroom Attendance Management System." International Conference on Cyberworlds, Chester, United Kingdom, 20−22 September, IEEE Computer Society, pp. 253−256.
2) Ouanan H, Ouanan M, and Aksasse B. (2018) "Pubface: Celebrity face identification based on deep learning." IOP Conference Series: Materials Science and Engineering, IOP Publishing Ltd., 353 (1): 1−6.
3) Fei Z, and N de With. (2005) "Real-time face recognition for smart home applications." International Conference on Consumer Electronics, Las Vegas, USA, 8−12 January, IEEE Press, pp. 35−36.
4) Shalmoly M, and Soumen B. (2016) "Face Recognition using PCA and Minimum Distance Classifier." Fifth International Conference on Frontiers in Intelligent Computing: Theory and Applications, 16−17 September, Bhubaneswar, India, Springer, pp. 397−405.
5) A Krenker, J Bešter and A Kos," Introduction to the Artificial Neural Networks", Edited Kenji Suzuki, Published by InTech,, Janeza Trdine, Croatia, (2011), pp 3-18.
6) Er. P Kumar, Er.P Sharma, "ARTIFICIAL NEURAL NETWORKS- A Study", International Journal of Emerging Engineering Research and Technology, Volume 2, Issue 2, (2014), pp. 143-148.
7) H Liy, Z Linz, X Shenz, J Brandtz, GHua," A Convolutional Neural Network Cascade for Face Detection", IEEE Conference on Computer Vision and Pattern Recognition, Boston, MA, (2015), pp. 5325 – 5334
8) H A. Rowley, S Baluja, T Kanade," Rotation Invariant Neural Network-Based Face Detection", IEEE Computer Society Conference on Computer Vision and Pattern Recognition, Santa Barbara, CA, (1998), pp. 38 – 44.
9) H M. El-Bakry," Fast Face Detection Using Neural Networks and Image Decomposition", International Computer Science Conference, Hong Kong, China, (2001), pp. 205-215
10) S-H Yooa, S-K Oha, Witold Pedrycz," Optimized face recognition algorithm using radial basis function neural networks and its practical applications", International journal on Neural Networks, volume 69, (2015), pp. 111-125.
11) A Roy Chowdhury Tsung-Yu Lin Subhranshu Maji Erik Learned-Miller," Face Identification with Bilinear CNNs", Computer vision and pattern recognition, (2015).
12) M.Nandini, P.Bhargavi, G.Raja Sekhar,"Face Recognition Using Neural Network", International Journal of Scientific and Research Publications, Volume 3, Issue 3, (2013), pp. 1-5.
13) Z. Lei, D. Yi, and S. Z. Li, "Learning Stacked Image Descriptor for Face Recognition," IEEE Trans. Circuits Syst. Video Technol., vol. 26, no. 9, pp. 1685–1696, Sep. 2016.
14) P. Sukhija, S. Behal, and P. Singh, "Face Recognition System Using Genetic Algorithm," in Procedia Computer Science, 2016, vol. 85
15) S. Liao, A. K. Jain, and S. Z. Li, "Partial face recognition: Alignment-free approach," IEEE Trans. Pattern Anal. Mach. Intell., vol. 35, no. 5, pp. 1193–1205, 2013.
16) G. E. Hinton, S. Osindero, and Y. W. Teh, "A fast learning algorithm for deep belief nets.," Neural Comput., vol. 18, no. 7, pp. 1527–54, 2006.[38] Y. Bengio, Learning Deep Architectures for AI, vol. 2, no. 1. 2009.