ISSN 2277-2685
IJESR/April-June. 2025/ Vol-15/Issue-2s/521-524
Pitaka Jagadeesh Manikanta *et. al.*, / International Journal of Engineering & Science Research

Face Recognition Using CNN

Pitaka Jagadeesh Manikanta
PG scholar, Department of MCA, CDNR collage, Bhimavaram, Andhra Pradesh.
Ch.Jeevan Babu
(Assistant Professor), Master of Computer Applications, DNR collage, Bhimavaram, Andhra Pradesh.

bstract: ***The importance of security issues has increased with the on-going advancement of computer technology and the increasing reliance of humans on network technology. To prevent attacks and security flaws, user authentication is essential. There are various forms of authentication, including facial recognition, voice recognition, SMS one-time passwords, and fingerprint scanning. One of the crucial uses for image processing in both still photos and video is face recognition. Making an automated system that can recognise faces as well as a human is a real task. This paper's primary goals are to examine the value of CNN, describe the many datasets used in face recognition systems, and analyse the various CNN models. The deep learning CNN can be applied to face recognition to boost authentication security.***

Keywords: CNN, Face recognition, Deep Learning.

I. INTRODUCTION

Due to the demand for computer technology, daily tasks are increasingly being handled electronically rather than with pen and paper or face-to-face. With the development of computer technology, there is a growing need for user identification and authentication that is quick and precise. It is essential to comprehend user authentication because it is a crucial stage in the procedure that prevents unauthorised users from accessing sensitive data. Many biometric authentication techniques are available, including voice, typing, face pattern recognition, fingerprint recognition, and typing. Skin deformation reduces the accuracy of fingerprint recognition.

Due to background noise and the fact that the user would not be identified as a match if they had a cold, voice authentication is difficult to utilise. Nowadays, facial recognition is routinely employed to identify people. The features of a human face vary from person to person. The only item required for facial recognition is a camera.

It provides affordable, reliable personal identification that may be applied in a variety of settings. An efficient facial recognition system that is quick and precise allows for user identification and authentication. It plays a crucial role in numerous applications, including those related to access control, smart cards, attendance tracking, security gates, business, government, and biometrics.

An authentication method based on facial traits is known as facial recognition. [2] Several algorithms, including Gabor wavelet-based solutions, face descriptor-based approaches, and Eigen face-based methods, have been used in the past for facial recognition [1].

CNN has been used for facial recognition because of its high frequency and positive recognition rate. This essay discusses the various CNN models and their significance in facial recognition. This will make it easier for the researchers to choose the optimal approach for future advancements in this area.

The goal of a face recognition system is to be able to identify a person's face in an image or video.

The two essential components of a face recognition system are

Facial Recognition: Finding a human face in a photograph or video is a process known as "face detection."

Authentication by face: Facial recognition is a technique for verifying or identifying people based on their facial traits.

II. LITERATURE SURVEY

This project aims to provide a theoretical framework and a vocabulary that can be used to explain and examine the relationship between recognition and other components of face processing, as well as how humans recognise familiar faces. Faces can provide seven types of information, including facial speech codes, expressions, names, identity-specific semantics, visually derived semantics, and structural and visual information. Structure encoding techniques produce descriptions appropriate for face recognition, facial expression, and facial speech analysis software by a functional paradigm. Name codes are extracted after obtaining identity-specific semantic codes from person identification node. .[2]

There is a problem with face identification in the field of image analysis and computer vision. Information security is evolving into a crucial and difficult problem. Security cameras are widely used in businesses, colleges, ATMs, banks, and other locations with security systems at the moment. Using a digital image, a biometric method called facial recognition is used to identify or authenticate a person. Technology for face recognition is used in security systems. A face in a picture should be promptly recognised by a face recognition system. In order to do this, its features must first be extracted, and then it must be realised regardless of illumination, expression, lighting, posture, ageing, and picture alterations (translate, rotate, and scale). [3]

An experimental assessment of three acquisition scenarios—close, medium, and great distances between the camera and the query face—is described for face identification at a length. The three situations consider templates registered in supervised environments. Based on realistic yet doable and widely accessible data, these three representative scenarios are analysed using the NIST Multiple Biometric Grand Challenge data to pinpoint the critical variable components that influence face recognition at a distance. Two quantitative methods are used to conduct the scenario analysis. The information content of split faces in the various contexts is first examined. Second, using well-known features (PCA and DCT) and matches, we look at the performance across scenarios of three games, other two standard approaches (SVM and GMM). The findings demonstrate how much the acquisition arrangement affects face recognition at a distance's verification ability. [4]

Facial recognition has seen a lot of activity recently. This report presents an up-to-date review of critical human facial recognition studies. We start by giving a general overview of face recognition and its applications. The literature is then evaluated to include the most recent facial recognition techniques. These face datasets and their flaws are described along with the face recognition algorithms used to assess their effectiveness. [6]

Scale Invariant Feature Transform (SIFT) technology has proven effective for generic object detection and identification. This study presents Partial-Descriptor-SIFT and Volume-SIFT (VSIFT), two innovative face recognition methods based on the original SIFT algorithm (PDSIFT). We contrast feature-based approaches, SIFT and PDSIFT, to holistic approaches, the null space approach (NLDA), Fisher face (FLDA), and Eigen feature regularisation and extraction (ERE). PDSIFT outperforms the original SIFT technique substantially better, according to research on the AR and ORL databases. Additionally, PDSIFT outperforms FLDA and NLDA by a wide margin and can match ERE's most successful holistic approach in terms of performance. [7]

Face recognition is crucial for real-world applications, including human-machine interfaces, security systems and video surveillance. In comparison to classic machine learning techniques, deep learning-based algorithms have demonstrated for image recognition superior performance in terms of processing speed and accuracy. The Convolution Neural Network (CNN) architecture is enhanced in this research by adding two normalisation operations to two of the layers. Batch normalisation and Network acceleration are other terms for the normalisation process. In CNN's fully linked layer, faces were categorised using the CNN architecture and Softmax classifier was utilised to extract distinctive facial features. In the experiment portion, our Face Database has

demonstrated that the suggested approach has enhanced face recognition performance. [8]

III. PROPOSED METHOD

Fig. 1 displays the block diagram for the suggested CNN recognition method. In three steps, the algorithm is carried out as follows,

1. The source photos are resized to 16x16x1, 16x16x3, 32x32x1, 32x32x3, 64x64x1, and 64x64x1.
2. Create an eight-layer CNN structure with a convolutional, max pooling, convolutional, max pooling, convolutional, max pooling, and convolutional layer as its first layer.
3. After extracting all the features, classify the data using the softmax classifier.

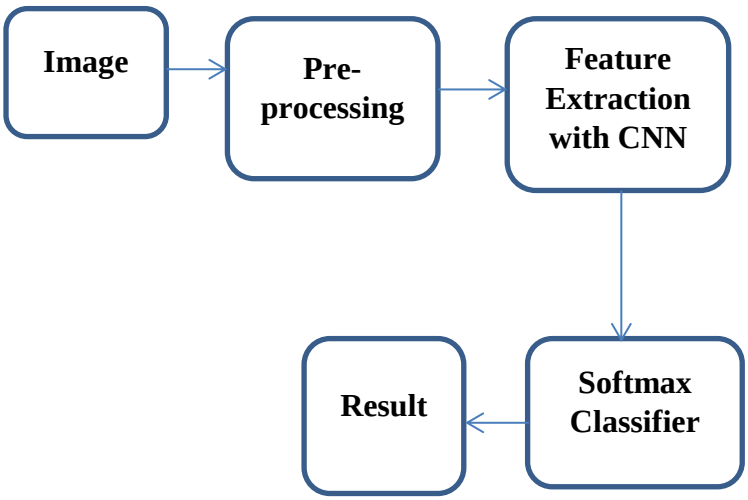

Fig.1. the block diagram for proposed algorithm

IV. RESULT

Double click on 'run.bat' file to run project to get below screen

Fig.2. Run.bat file

In above screen webcam will run continuously and to train Naïve Bayes now click on 'Train Naïve Bayes Algorithm' button and get below output

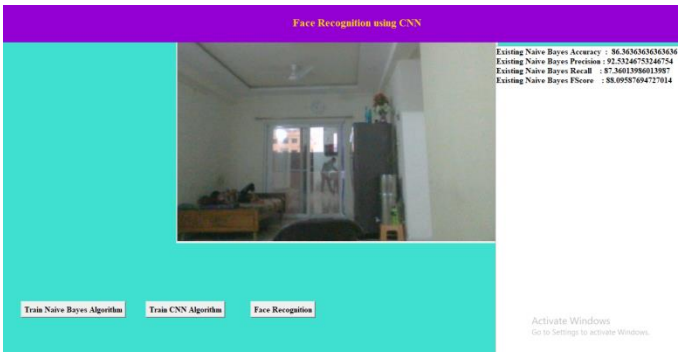

Fig.3.Trained naïve Bayes

In above screen with Naïve Bayes we got 86% accuracy and now click on 'Train CNN Algorithm' button to get below output

Fig.4.Train CNN algorithm

In above screen with CNN we got 98% accuracy and now show person face in webcam and then click on 'Face Recognition' button to get below recognition output

Fig.5.Face recognition output

In above screen showing person image in webcam and then click on 'Face Recognition' button to get below output

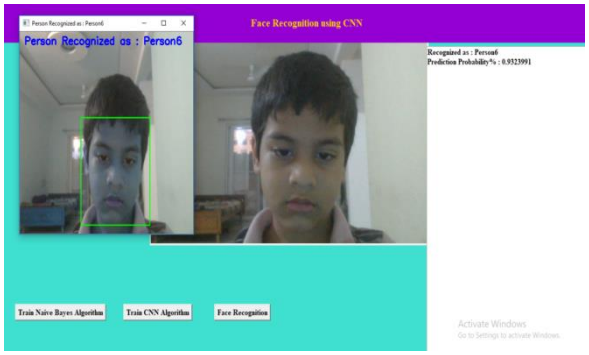

Fig.6.Prediction Probability

In above screen in blue colour text we can see person recognized as 'Person 6' and in text area we can see prediction probability % as 0.93.

Similarly you can recognize all persons given in dataset and application may recognized output side persons also and for that we need to set some thresholds. While testing you note down prediction probability of dataset persons and unknown persons and based on those values will put some constant threshold. For example if prediction probability > 0.95% then only recognized else display unknown person.

V. CONCLUSION

In this paper, a review of facial recognition using CNN in various contexts is offered. In order to identify the presence of a human face, CNN can capture real-time images from security cameras. Face recognition can be done using CNN models as ResNet, Mobile Net, VGG, Alex Net, and Google Net. Both real-time video and images can be used with this architecture. ResNet-50-based architecture can be employed in the covid scenario to recognise masked faces. Transfer learning is a technique we can employ to deliver great accuracy. Accuracy can be improved by expanding the training set. The time required for computing likewise grows as the number of layers does. This essay will contribute to the development of an effective face recognition-based authentication system by CNN.

REFERENCES

[1] S. G. Bhele and V. H. Mankar, "A Review Paper on Face Recognition Techniques," Int. J. Adv. Res. Comput. Eng. Technol., vol. 1, no. 8, pp. 2278–1323, 2012.

[2] V. Bruce and A. Young, "Understanding face recognition," Br. J. Psychol., vol. 77, no. 3, pp. 305–327, 1986.

[3] D. N. Parmar and B. B. Mehta, "Face Recognition Methods & Applications," Int. J. Comput. Technol. Appl., vol. 4, no. 1, pp. 84–86, 2013.

[4] W. Zhao et al., "Face Recognition: A Literature Survey," ACM Comput. Surv., vol. 35, no. 4, pp. 399–458, 2003.

[5] K. Delac, Recent Advances in Face Recognition. 2008.

[6] A. S. Tolba, A. H. El-baz, and A. A. El-Harby, "Face Recognition : A Literature Review," Int. J. Signal Process., vol. 2, no. 2, pp. 88–103, 2006.

[7] C. Geng and X. Jiang, "Face recognition using sift features," in Proceedings - International Conference on Image Processing, ICIP, pp. 3313–3316, 2009.

[8] S. J. Wang, J. Yang, N. Zhang, and C. G. Zhou, "Tensor Discriminant Color Space for Face Recognition," IEEE Trans. Image Process., vol. 20, no. 9, pp. 2490–501, 2011.