FACE-RECOGNITION BASED SECURITY SYSTEM USING DEEP LEARNING

Dadi Ramesh¹, Yerrolla Chanti², Syed Nawaz Pasha³, Mohammad Sallauddin⁴

¹Asst. Professor and Member Center for Artificial Intelligence and Deep Learning Computer Science & Engineering, S R Engineering College, Warangal, India.
², ³, ⁴Asst. Professor, Computer Science & Engineering, SR University, Warangal, India.
¹dadiramesh44@gmail.com

Abstract

Now days, Security plays an important role in day-to-day life. The use of the internet in human life has become the day to day activity and with the internet the use of automation devices has increased. All transaction needs to secure authentication to complete. Hence, we have introduced a Face Recognition method. It can apply in many fields such as to authenticate users, security issues etc., It mainly plays a significant role in real time surveillance systems. We implemented the Convolution neuron network to automatically create dataset and recognition with the graphical user interface. Before creating a dataset the system takes permission from the user then it creates the dataset and trains the model for farther authentication.

Keywords: Security, deep learning, neural network, authentication.

I. Introduction

Face recognition is a process of identifying the human being based on their faces. After the availability of new technologies like deep learning, Internet of things, the researchers are concentrated on the image data. The image recognition plays a major role in the authentication processes like object identification, face recognition [VI] [VII], and medical science also. In this paper we concentrated on face recognition on different motions for authentication. Most of the researches are proposed systems on face recognition by different technologies like pattern matching, heuristic approach, and Eigen [VII] [VIII] values. In face recognition the researches should concentrate on many features like skin, a pattern of the face, chin, fore head etc., Till there are many challenges in face recognition methods those are rotating face, face with a mask, etc. We are proposing a new system for face recognition in this we have created a framework using tinker for recognizing face and some advanced python libraries [IV]. In this framework, we will take the details of the user
such as Id, name. Then the user images are uploaded into the system and images are trained for further recognition. Then the images are verified against the user, if the authentication is accessed then it will return a message that “Login Success”.

II. Related Work

Ran He, etc. all proposed in [IV] A Wasserstein CNN model which works on heterogeneous images having large variations like lighting, expression, pose, and distance. And WCNN model is trained on the equal number of images and the model will classify images into NIR labeled, Wasserstein distance and VIS labeled images. WCNN is the end to end network which can consider all types of features and all types of images. The dataset contains different lenses of images. And the results are better than VGG model. The accuracy they got is 99.5%

Dr. Eyad I. Abbas etc. all proposed in [V] Eigen faces levels on the faces recognition rate using principal component analysis. They used ORL FACEDATABASE which contains different types of background images. First they converting all images into eigen faces and weights also assigned from that with distance classification model they predicted the distance between images. And also face recognition rate. The accuracy they got is 95%.

Sharmila, etc. all proposed in [III] different human face recognition techniques and their analysis. In this they have implemented a system that will create a dataset of recognized faced and automatically trained the model for face recognition [V]. For extracting features they used eigen faces which is based on the eigen vectors. And fisher faces which work on linear description analysis. And the new method is local binary patterns to the recognition of faces based on the binary values.

III. Proposed System

We implemented a new system that contains a GUI and deep learning model. The GUI based system will take user information with an image. And this information will be sent to the user for authentication if it is confirmed the user can access the system [X]. Otherwise new information will be collected from the user for training the model.

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\text{Fig. 1: System Architecture}
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III.i. Model Implementation

We used Alexnet Conventional neural network [I] for training our dataset. This is having conventional layers followed by pooling layers and lastly dense layers. In conventional layers [X] the activation function is Relu. The network has 60 million units. And the dropout rate 0.50 means at every iteration 50% nodes will be dropped from the network to overcome the over fitting. Relu is the nonlinear activation function used in CNN [VIII] [IX] [XI] instead of other activation functions.

Fig. 2: Simple deep learning architecture

III.ii. Dataset

The data set is generated automatically with a unique id of the user. When the system got permission from the user then it captures the images of human beings and stores in a separate folder [VII].

The preprocessing of images [XII] has done using OPENCV a python library. By this we converted all images into same the dimensions that is 200 * 200, and all images are converted into gray scale. And with using Numpy all images are converted to multidirectional arrays for training.
III.iii. User Interface

We implemented a user interface using PHP where the actual user can give authentication to human beings. This user interface will take the image of the person after confirmed authentication. For every human being image a unique number will be assigned [VIII]. The user interface works in two ways. The first way whenever a human being image is captured it will check in the database, if the image is in the database then it will give permission to enter. In the second case when a human being face is not there in the database then it will inform the user for authentication [XIII]. If the authentication is confirmed then it will take multiple images of that person and unique id will be allocated and a separate dataset will be created and it will be sent to the AI model to train on the dataset for future purpose.

Fig. 3: Collected images
III.iv. Result Analysis

We trained the model up to 16 epochs in every iteration the model accuracy has increased. And the dropout rate also applied to remove 50% nodes at every iteration. The training and testing images are selected 20:80 from an automatically created data set. In the final dense layer the activation function is sigmoid for binary classification of image recognition [XII]. The accuracy of the model is better than other models even though our dataset completely different. The model trained on different types of images with including all directions of a face.

![Face Recognition System](image)

**Fig. 4:** user interface

![Model Accuracy](image)

**Fig. 5:** Model accuracy

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IV. Conclusion

Face recognition is playing a major role in security field. So our work is on recognition of feces in different model and angles. For that we designed a user interface and a model is trained with generated data. The results are showing good accuracy in every iteration of the model is increasing when compared with other models. In future we will improve the accuracy of the model and we take the dataset with different angles to train the model.

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