WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Survey on CNN Based Iris Recognition System Preventing Fraudulent Bank Transactions

Navya V K[1], Angelina Mathews[2], Archana N[3], Blessy Bose[4], Chaithanya M[5]

[1]Assistant Professor, Department of Computer Science and Engineering, MVJ College of Engineering, Bangalore, Karnataka, India.
[2,3,4,5]Undergraduate Scholar, Department of Computer Science and Engineering, MVJ College of Engineering, Bangalore, Karnataka, India.

A B S T R A C T

The design of a user authentication system is very important to provide accurate results in the detection of personal identity and identification. Iris recognition has ways been used as a form of biometric identification for individuals that has been actively researched for years and has been popular considering the aspects of it being a most accurate biometric identification method. In this particular investigation proposes a system that focuses on the development of an Iris Recognition System that is based on the CNN algorithm with high precision and efficiency.

Keywords: CNN, Iris Recognition, Bank Transaction, Authentication

1. Introduction

The term Iris recognition in general refers to the automatic procedure of recognizing certain individuals totally and only based on their respective iris patterns that considered to be unique to every person and cannot be duplicated. All the previously generated iris recognition algorithms have shown very low false match rates and a high matching efficiency when matched with the large databases that consists of information pertaining to iris. These claims are shown in the fact that :

(a) Individual iris's have a complex textural pattern of the stoma that varies significantly across individuals making it difficult to duplicate

(b) The distinguishing characteristics give improved performance results.

The CNN algorithm is a deep learning neural network that has been outlined for the processing of structured arrays of data. This is the major characteristic that makes CNN flexible and structured for computer vision. A CNN model contains multiple convolution layers that are precisely stacked on top of each other. The construction of the CNN network is a done as a multi-layered feed forward neural network, constructed by assembling many invisible or hidden layers above each other in a particular order sequentially.

2. Literature Review

2.1 Iris Recognition With Off-the-Shelf CNN Features: A Deep Learning Perspective

During the research done it is noted that in the study conducted, it has shown that the task of iris recognition is approached from the perspective of a deep learning network. Recognizing the iris in a given image is identifying the stoma of the iris which is a unique feature different to every individual and this further authenticates the validity of the user. The wide array of experiments that were conducted harnessed the features of the ILSVR Challenge and with the outcome it is noted that not only the usual CNN features but Off-the-shelf CNN features that are generally used for the original idea of object recognition can be also implemented in the task of iris recognition. It is also further noted with the experiments conducted that the advantages of using CNN in automated fields proves crucial in formulating new algorithms that will aid the larger applications implementing iris recognition using the stated algorithm. Off-the-shelf CNN algorithm is successfully harnessed for the iris recognition task and its effectual features are used to extract the features visually for each image and this reduces human task.

2.2 Iris Recognition using Convolutional Neural Network

Iris recognition is considered to be the most reliable and safest method of biometric recognition that is because of the fact that the particular for of biometric uses the stable and unique feature of the human body that further ensures high levels of security which makes it a very promising field of high security concern using human iris to identify and authenticate the validity.

In the investigation that was conducted on the CASIA database, a sample size of 100 iris was taken to be examined and the CNN algorithm was used to select the features and its own vectors to be able to identify the individuals. With the result being the identification was done with an accuracy of about 96%. Different methods that were proposed by earlier scientists were also put into the test for the different steps involved such as segmentation, normalization and the resulting hamming distance was used to classify the accuracy levels. The results of the study performed ended with the conclusion that using the method of feature extraction successfully increases the accuracy levels leading to more accurate identification eliminating the room for errors.

2.3 An Iris Recognition System Using Deep Convolutional Neural Network

This particular research leverages the concept of Deep CNN which is considered as a separate class of algorithms and techniques that is used for controlling and makes the learning simpler and faster as it automatically learns the wide array of features that it is presented with and this further helps and enables the system using it to conclude with an effective result.

The authors who have worked on this investigation has used the approach of pre-processing the image fed in a the input and later extract the iris to be send through the stacked layers of the D-CNN approach and later classifies the images accordingly. With repeated iterations and testing the accuracy rate with IRISNet has been seen to increase and this is accompanied with the decrease in the loss rate which helps to be an important aspect with respect to the security level that the field of biometric includes. The system that tested the D_CNN algorithm has shown an average of accuracy with the percentile touching 96% that only keeps increasing with further iterations and ore samples being put to use.

2.4 CNN Based Iris Recognition System: A novel Approach

This particular research paper claims that the iris contains various textual information and with the extraction of these very important dominant features will lead to the main advancement in the recognition of the validity of the images of the iris in both photos that is taken from the databases of IITD and CASIA and also aids in real time identification. Leveraging the features of a deep learning system the problems faced can be overcome which is encountered in the real time identification and retrieval of information based on the iris's image captured. For this to be implemented, the authors have proposed using CNN and a generalized version of a logistics regression model called the Softmax classifier. The main function that the Softmax classifier focuses on is the splitting of the input image into localized and normalized and then classify it into N different classes which enhances the iris region. The one feature or fact that separates the method the author uses in this particular research is that the classified image is passed through lesser number of layers. From the performed analysis of the results obtained it is noted that almost an accuracy of 95% is obtained and for the further increase in the identification accuracy levels, the author has suggested to improve upon the learning rates of the model an also modify the filter number per layers.

2.5 An Efficient and Accurate Iris Recognition Algorithm Based on a Novel Condensed 2-ch Deep Convolutional Network

With the investigation that has been done on this paper, the authors have stated that with the usage of an approach that uses CNN, we can utilizes a method that automatically extracts the required features from a image that is fed in as an input which results in achieving high accuracy levels of output also the method that is being proposed in this study requires less of the training examples and yet it yields results that have a higher accuracy even without using high complex computational power.

This particular paper primarily focuses on leveraging the functionalities of a 2-ch D-CNN with very few training examples and high accuracy of the output. As a high performance classifier model that is being proposed by the authors in the paper, a multi branch CNN model that consists of 3 well designed yet unique augmentation scheme which uses a radical attention for the segmentation and classification and this represents a new framework that can be used for large scale biometric authentication purposes. Further with the output and the results that has been obtained after the iterations and the experiments, it is noted that there are high levels of efficiency and accuracy along with the finding that with the middle layer has an encoding ability. The authors have also suggested using this method and combining other biometric authentication ways too, that also helps in increasing security for future applications as well.

2.6 End to End Deep Neural Network for Iris Recognition

In today's era where technology has taken over even the most simplest of human tasks, the applications of biometric for the safety of various aspects of the human form, It is considered that with the benefits that come along with this including the high accuracy and its contact less way of identification it is a highly important and challenging area of research.

In this particular study that has been conducted, the authors have applied a combined network model that is derived on the basis of the EfficinetNet-b0 that is applied for the recognition task which generates all the work that a particular layer does and extracts it into a unified network. During the iteration phase, the high resolution part of the image is first determined and later the classification procedure takes place which produces the output. During the experiment done and results obtained it is noted that using an end-to-end deep neural network provides a certain amount of accuracy, but with the addition of a visual interpretation a clearer decision making process can be got as an output with a better convergence and efficiency value.

2.7 An Effective CNN Based Feature Extraction Approach for Iris Recognition

According to the researchers that have conducted this study, they have stated that biometric that are based on digital input given to the computer that includes a variety of the user authentication systems, recognizing the features of the iris and decoding the information from that is considered as a best method to be used for ensuring the authenticity of the user accessing contents. In this particular paper, the researchers have used the concept of pre-processing techniques that uses Hough transformation for the iterations and the further classifications of the input images that are imported from the CASIA database. With the results that has been gotten from the experiments conducted during the phase of the study, the levels pf accuracy were noted to be different for the different samples used from the database but with an average testing accuracy being around 96%. The researchers have also put forward the suggestion that to improve the testing accuracy of the method being proposed is to work on adding new methods such as the multi modal authentication with varying levels and opposed methods of fusion.

2.8 A review of Literature on Iris Recognition

According to this study, iris scans of the driver are taken into account when determining whether or not the motorist is intoxicated. Also, an algorithm for iris identification is developed, and its implementation is based on the Gabor Filter [8].

A Charge-coupled device(CCD) camera with infrared light is used to take pictures of the driver's iris when the driver logs in to the system using his or her credentials via the Graphical User Interface (GUI). In order to process the iris images and determine whether or not the driver is intoxicated, the driver must first click the Recognition Process button. This converts the analog iris images to digital images that can be used by the MATLAB program to distinguish between pupil sizes before and after alcohol consumption. Later, depending on the outcome, the microcontroller either starts the car if the system determines that the driver is not intoxicated or does not start the car if the system determines the opposite. Should the pupil photos not work, there is another bypass option for facial recognition.

One of the project's limits is that the driver's eye and the device's CCD camera should be close enough to each other for the device to take superior iris photos with less noise and reflection. To improve accuracy, the camera needs to be able to see more of the iris pattern in the driver's eyes. To position the iris correctly for better plotting of the full image of the iris, the driver must move the eyes appropriately while taking the picture.

2.9 Iris Recognition System

According to the authors of the following research publication have studied upon the system of iris recognition that will do two major things which include verifying the uniqueness of the human iris and along with determining how it performs in validating the authenticity of a user. The recognition system that has been proposed by the author in the study that they have done is able to segment and isolate the iris from the other parts that are present in the image of the human eye.They have also used the Log-Gabor filters to be able to precisely extract and quantize to up to four levels to be able to encode the information present and finally classifying based on the Hamming distance. During the study that was done and the experiments that were conducted, the authors have also come across some limitations that were caused due to the images being pixelated, the different anatomical features of the eye and the addition of noise that were introduced because of the external environmental conditions. It was concluded from the experiments that the proposed system provides an accuracy of about 85% to 92% with room for improvement once the limitations are overcome.

2.10 Neural Network Approach to Iris Recognition in Noisy Environment

The study that was conducted by the authors of this publication have focused on the iris recognition system that overcomes the limitations that are generally associated with the previously discussed algorithms being used by previous systems that does the same authentication procedure. The main primary focus of the following project is to develop a system that is efficient and reliable in recognizing the iris in a noisy environment where the images are prone to errors which in turn affects the testing accuracy percentage. The authors have proposed two methods that when performed gives the output accuracy of up to 95% with reduced error rates and also have reported to take less overall execution time. The proposed methods have been tested on the CASIA and the MMU databases for the samples which first eliminates the noise and errors that occur while the imaging is done and to the cleared image and later a combined approach of LBP and GLCM that performs the feature extraction and matching that leads to the given accuracy percentages is applied. With the proposed procedure, the testing time and the error rates were reduced and the average error rates were recorded to around 7% with the recognition rate from the noisy samples were an average of 93%.

3. Conclusion

There are many ways to be ensuring the safety and security of users information and allowing only authenticated users to access the information and one of the method of user identification and validation is using biometric ways to be able to do the same. While there are multiple ways of biometric recognition that uses the unique features of the human body to validate such as fingerprints, face recognition, iris recognition etc, from all of the biometric ways that are present to authenticate a user, Iris recognition is regarded as one of the safest and most reliable ways for the process. Most of the already present algorithms that are used provide an accuracy of up to 96% and also high error rates. As analyzed from the study done it should be noted that there are limitations which in turn increases the error rates. Therefore algorithms should be formulated in such a way that the output should have high accuracy

rates and less rates which would make information much safe and the validation procedure works smoothly and without any false recognition rates. The extracted additional features will be able to overcome the problem of real time implementation of the process.

References

[1] Kien Nguyen, Clinton Fookes, Arun Ross, Sridha Sridharan, "Iris Recognition With Off-the-Shelf CNN Feature:A Deep Learning Perspective", " IEEEAccess, Vol 6, Apr 2018"

[2] Md. Shafiul Azam, Humanyun Kabir Rana, "Iris Recognition using Convolutional Neural Network", "International Journal of Computer Applications, 0975-8887, Vol 175, No 12, August 2020"

[3] Maryim Omran, Ebtesam N. AlShemmary, "An Iris Recognition System Using Deep Convolutional Neural Network", "Journal of Physics:Conference Series, Ser. 1530012159, Feb 2020"

[4] Sheena S, Sheena Mathew, "CNN Baed Iris Recognition System:A novel approach", " 2nd International Conference on IOT, Social, Mobile, Analytics and Cloud in Computational Visison and Bio-Engineering, ISMAC--CVB 2020"

[5] Guoyang Liu, Weidong Zhou, Lan Tian,Wei Liu, Yingjian Liu and Hanwen Xu, "An Efficient and Accurate Iris Recognition Algorithm Based on a Novel Condensed 2-ch Deep Convolutional Neural Network", "MPDI, May 2021"

[6] Qingqiao Hu, Siyang Yin, Huiyang Ni, Yisiyuan Huang, "An En to End Deep Neural Network for Iris Recognition", "2019 International Conference on Identification, Information and Knowledge in Internet of Things(IIKI2019)"

[7] S.Sujana, Dr. VSK Reddy, "An Effective CNN based Feature Extraction Approach for Iris Recognition System", "Turkish Journal of Computer and Mathematics Education,4595-4604, Vol 12, No 6, 2021"

[8] Samitha Nanyakkara, Prof. Ravinda Meegama, "A Review of Literature on Iris Recognition", International Journal of Research, Feb 2020"

[9] Prof. Shweta M. Nirmanik, "Iris Recognition System", "JETIR, ISSN-2349-5162,Vol 7, Issue 5, May 2020"

[10] Kamal Hajari, Ujwalla Gawande, Yogesh Golhar, "Neural Network Approach to Iris Recognition in Noisy Environment", "International Conference on Information Security & Privacy, ICISP2015, December 2015"