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Deep Feature Fusion for Iris Biometrics on Mobile Devices

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Abstract – *If the fast growing mobile technology, when it comes to sensitive transactions such as financial or payment applications, it is required to follow the security in all kinds of transactions made through mobile devices. Image based biometric authentication creates good impact on security. In the existing system a deep feature fusion network is used that exploits the unique information in iris regions. It first applies max-out units into the convolution neural network (CNN) to generate a compact representation for each modality and then fuses the difference in the features of two modalities through a weighted concatenation. In the proposed system a deep neural network based classification algorithm is used, edge detection with different feature extraction is used for recognition. The proposed system authenticate for a particular access and which can be implemented in MATLAB software.*

Key Words: **Biometric, Deep Neural Network, Feature fusion, MAT lab software, Authentication.**

1. INTRODUCTION

In today's world, hacking of personal and financial account on mobile devices is a biggest problem. Authentication with face, fingerprint and voice plays a prominent role. Iris biometric recognition and authentication is more secure compared to other biometric authentication. In the existing systems the methodology for recognition is not appropriate. The proposed system uses back propagation algorithm for comparison. For recognition of pattern feature fusion with different feature extraction algorithm is used. The proposed system consists of three modules which are pre-processing module, segmentation module and classifier module. Thus the output is more appropriate and gives accurate authentication.

2. OBJECTIVE

The main objective is to recognise the authorised user's iris pattern and grant authentication for access on mobile devices. This model proposes an efficient and effective way for iris recognition and authentication using back propagation algorithm which is a deep neural network technique. The pattern recognition is done using different feature extraction algorithm so that non users can't use the personal or financial accounts without the user's permission.

3. EXISTING SYSTEM

In the existing system convolutional neural network is used for comparison of pattern which is limited to orientation identification, processing time and data storage capacity. The output is not appropriate with this technique. Moreover the pattern of user iris is recognized with a single extraction algorithm. This is limited to certain environmental conditions so that the pattern is not recognized accurately and the authentication is inappropriate. The quality of image is problem in this method. This system is not secure as it gives authentication even to non-users.

4. PROPOSED SYSTEM

The proposed system overcomes the limitations of the existing system. The input image is pre-processed in order to enhance the features of the image. The pattern is recognised by feature fusion where different feature extraction algorithms are used and the value of each extraction algorithm is considered and the pattern is chosen, so the pattern is more accurate. A back propagation algorithm which is comprised under deep neural network is used in order to compare the iris patterns. The proposed system gives a chart that indicates the performance, error histogram training state, processing time and validation checks. This makes the output more appropriate, the processing time is minimised and so the proposed system is effective and efficient.

5. BLOCK DIAGRAM

The fig 1 shows the block diagram of the proposed system.

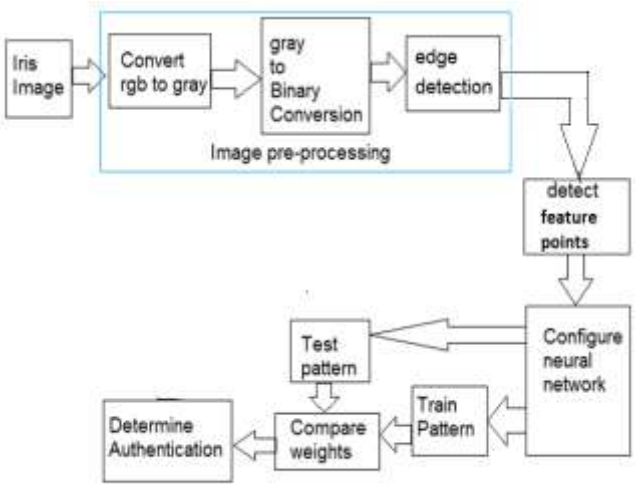

Fig -1: Block diagram

6. SYSTEM DESIGN

6.1 Neural Network

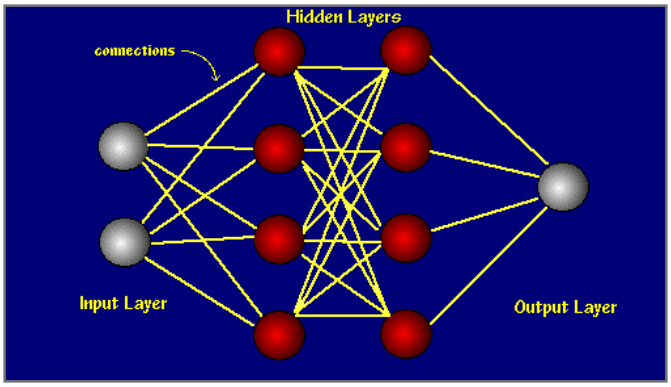

Fig -2: Neural Network

Neural Networks are organisation of layers which are made up of multiple nodes interconnected with functions. Neural network reads the relationship between input and output data layers with the help of the hidden layers. This process is done through finding the connection in weights of input layer with hidden layer as well as hidden layer with output layer. Neural Networks derives the meaning of complicated and imprecise data. The process of neural network is similar to the function of neurons in human brain. The different set of data is analysed by Neural Network and they are trained to find the connections between different data and give corresponding outputs. They are used for pattern recognition, adaptive learning, real-time operation and self-organisation.

6.2 Pre-Processing Module

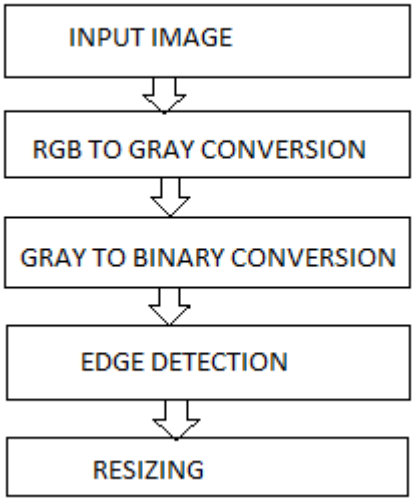

Fig -3 Pre-Processing flow chart

The pre-processing is done to enhance the features of input image. The input image is the user's eye image which converted from RGB to GRAY image. The binary conversion takes place as these values are required to train the Neural Network. The edge detection is used for finding the boundary of the iris image. SOBEL edge detection is used as it is more suitable for finding the edges of image without noise and its values. At last resizing of image is done to get same size of image each and every time.

6.3 Segmentation and Feature Extraction

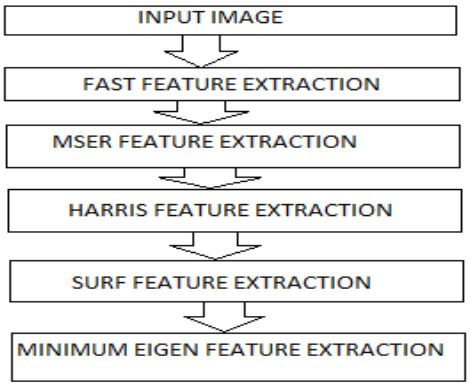

Fig – 4**:** Feature Extraction

In this module, segmentation of iris and feature extraction for pattern recognition is done. Segmentation is partitioning of image. Here iris is segmented from the input image. Different feature extraction algorithms are carried out to get the values of feature points. FAST, SURF, HARRIS, MIN EIGEN, MSER feature extraction algorithms are used. The unique pattern of user's iris image is found through this process. The determined values are given as input to the neural network.

6.4 Classification

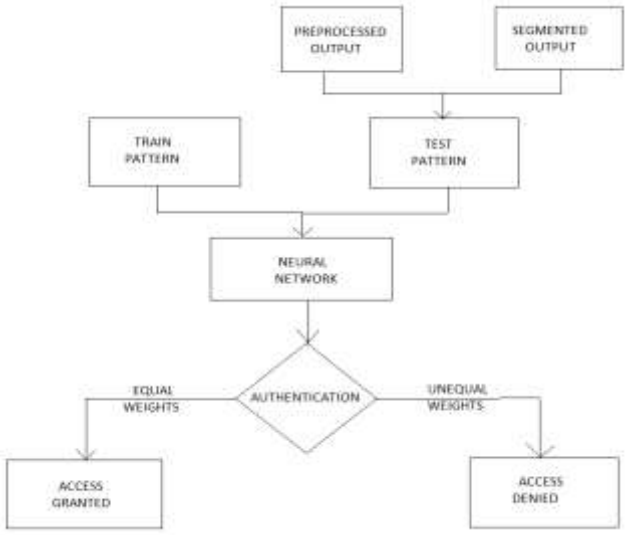

Fig -5: Authentication process

The above figure is a block diagram for classification technique where neural network is used. The pre-processed output and segmented output (feature extracted output value) is given as test pattern to the neural network. It compares the result of test pattern with the stored train pattern. Thus the classification of pattern is done and the authentication is granted when weights of test and train pattern are equal. The access is denied if the pattern weights are unequal.

6.5 Neural network chart

A neural network chart is finally generated in order to check the performance, training state, error histogram, regression and fit of the process. The validation check, time, performance, gradient and epoch (number of iterations) are shown in this chart. A dialog box which shows the authentication result is shown after the generation of the performance chart. The dialog box contains a grant message when the iris pattern matches with the user's pattern and it contains denied message when the iris patterns does not matches.

Fig -6: Performance Chart

6.6 Output

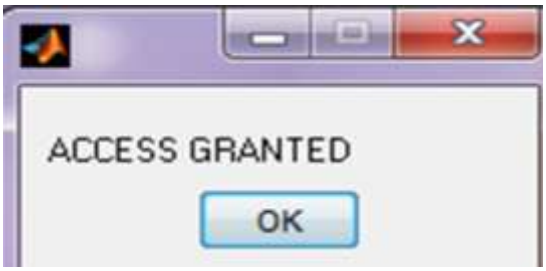

Fig -7: Dialog box

The output of the system is a dialog box that contains "ACCESS GRANTED" or "ACCESS DENIED" message.

7. METHODOLOGY

The method showcased here is the pattern recognition and authentication system. This system uses iris image of user's iris as input. It is pre-processed and segmented. Then the pattern is recognized by feature extraction algorithm. The neural network uses back propagation algorithm for classifying the pattern and determines authentication. The performance chart for the process is generated to check the accuracy. The output is a dialog box with an access granted or denied message.

8. CONCLUSION

The proposed system has the ability to recognize the accurate iris pattern of user and grant authentication of different applications or accounts. There are many advantages with the proposed system as compared with the existing system which include low cost, low processing time, appropriate output and accurate authentication. By this model we can easily secure our personal or financial accounts and other application and need not to memorize passwords.

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