iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** III **Month of publication:** March 2017

DOI: http://doi.org/10.22214/ijraset.2017.3126

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

Volume 5 Issue III, March 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology IJRASET)

Fingerprint Detection Using Minutiae Extraction

S. Sripavithra[1], S. Akalya[2], S. Rajarajeswari[3], J. Kannan[4], N. Sumathi[5]
[1,2,3,4,5]*Dr. Mahalingam College of Engineering and Technology, Pollachi*

Abstract : In biometric application, identification of real or fake fingerprint is important for security purpose. It is mainly for the concern of fingerprint safety in authentication system. Ploy-Doh, silicon or other artifacts are used for making the fake fingerprints. The local feature descriptors are used for detecting the fingerprint but it is not satisfying the real world application. Based on the new trend convolutional neural network is used. It provides the better optimization process for both feature extraction and classifier training. Local binary pattern and minutiae extractions are used as a texture descriptor. These texture descriptors are used to identify the accuracy in the fingerprint image. Local binary pattern is used to convert the grey scale image into a binary image. It will check the accuracy of the fingerprint based on the 3x3 matrices pattern. Minutiae checks the ridge and bifurcation by following the process of binarization and thinning. Later the fusion algorithm is used to fuse both LBP and minutiae.

Index Terms: Convolution neural network, Histogram equalization, Local binary pattern, Minutiae extraction.

I. INTRODUCTION

The biometrics is aiming for the automatic discrimination of the subjects in a reliable manner to achieve the target application based on one or more signal derived from physical or behavioral traits which involves fingerprint, face, iris, voice, palm or handwritten signature.

Biometric technology provides several advantages for the security based on information like password, PIN, etc or by physical devices like key, card, etc. there are different finger print detection algorithm which is classified into two (i.e.) Hardware and software approaches. Hardware approaches which include blood pressure, skin distortion, odor. Software Approaches includes detection of finger with the training sample data.

By using the image of the fingerprint the real and fake fingers are distinguished using the features. The features will classify the fingerprint with some measurements like ridge strength, continuity and clarity. The local descriptor uses both local amplitude and phase.

The histogram equalization is used to enhance the contract of the images by ranging the pixel value uniformly. The convolutional neural network will classify the finger print image and compare with the training data .the local binary pattern will measure the accuracy of the improved fingerprint, with the both feature extractor the good result is achieved in fingerprint detection benchmark.

II. EXISTING SYSTEM

A. Histogram Equalization

The histogram equalization is the most popular technique used to enhance the contrast in the image. In accordance with the sample distribution the contrast of the images are enhanced with histogram equalization method.

It is an effective technique which uniformly distributes the pixel values. Then it will stretch the contrast of high histogram region and compresses the contrast of low histogram region. HE is used in the applications like image processing, radar image processing, texture synthesis, and speech recognition. It will not preserve the brightness of the image.

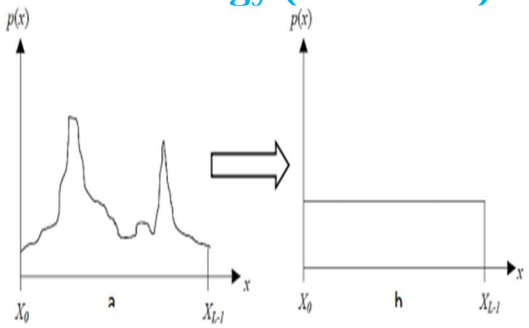
It will classify the images based on the frequency of gray level. To overcome the drawback of image brightness several techniques has been proposed.

Some methods often produce the image with annoying visual artifacts and unnatural appearances, even though the image brightness is preserved.

B. Local Binary Pattern

Local binary pattern was designed for texture descriptor. The features can be extracted from the image by dividing the images into several small regions. It contains the binary patterns which describes the surrounding pixels in the regions. Then the region will be concatenated into single feature histogram.

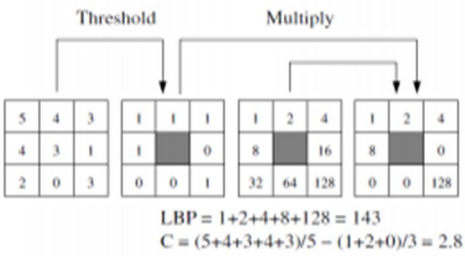
Volume 5 Issue III, March 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)



The images will be compared by the distance between their histogram. Local binary pattern is a fine scale descriptor. The pixels are developed by thresholding the values of the 3x3 neighborhood of the pixels against the central pixels. With the LBP operator, good rates were reported with the images.

During the LBP process the designer faces the three fundamental problems: The first problem is how to describe different local pattern of the texture and how to extract these local patterns. The second issue is how to take the primary subset of these local patterns for the representation. The third issue is how to utilize these selected local patterns.

The basic definition is extended to arbitrary circular neighborhoods, and several types of extensions have been developed. The LBP operator has made as a powerful technique of image texture; it shows the good results in the accuracy and complexity. The examined window is divided into cells of 16x16 pixels; every pixel is compared with the neighbors in both clockwise and anticlockwise direction. If the center pixel is greater than the neighbor then it is written as 1 else 0 and then compare with the histogram.



C. Convolution Neutral Network

CNN is also called as hierarchical neural network which alters the convolutional layer with sub sampling layer.It has many other layers called

1) Image processing layers
2) Convolutional layers
3) Max-pooling layers'
4) Classification layer

D. Image Processing Layer

It is an optional preprocessing layer that has predefined filters which are kept fixed in training. Rather than the raw input the additional information can be provided to the network like edges, gradients. The contrast extracting layer improves the recognition rate.

E. Convolutional Layer

Convolutional layer has number of maps, kernel sizes, skipping factors, and the connection table. Each and every layer has maps of same size(Mx, My). Kernel is shifted over the valid region of the input image. The pixels skipped by kernel in x and y direction is defined by skipping factors which are between the subsequent convolutions.

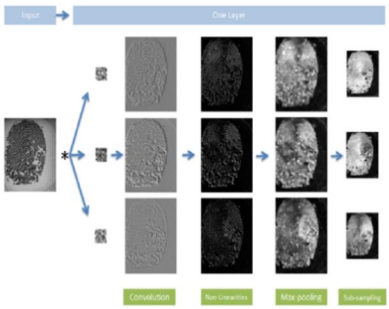
F. Max Pooling Layer

The main difference between the implementation and CNN is the use of maximum pooling layer instead of sub sampling layer. The

max pooling layer leads to faster convergence, select superior invariant features, and improve generalization whereas the sub sampling layer skips the nearby pixels prior to convolution instead of pooling or averaging. Position invariance is enabled in max-pooling layer; it down samples the input image by a factor along each direction.

G. Classification Layer

Convolutional filter max-pooling rectangles, skipping factors of kernel sizes are chosen so that the output maps of the last convolution layer are down sampled to 1 pixel per map, or a fully connected layer combines the outputs of the topmost convolution layer into a 1D feature vector. One output unit per class label is connected with the top layer.



H. Drawbacks

The drawbacks of existing system are

1) Accuracy is less.
2) t takes the decimal value as whole value and process
3) All the ridges are not analyzed

III. PROPOSED SYSTEM

After the contrast has been enhanced the feature extraction is carried out in the fingerprint with the minutiae process. The finger print impression and minutiae point has been extracted. The feature has been extracted in three steps. They are binarization, thinning and minutiae extraction. To improve the accuracy in minutiae feature extraction method binarization and thinning process is used.

A. Binarization

The first step involved in the minutiae extraction process is binarization. It is used to convert the 8 bit gray scale images into 1 bit image(black and white).In this image, the value zero is ridges and value 1 is valleys. Therefore, ridges are black in color and valleys are white in color.

The black and white images are called as binary image. The color which defines the object is called foreground color and other images are called background color of the image. The main aim of the binarization is to convert gray scale image into black and white image. Thresholding and segmentation process is used binarized images.

B. Thinning

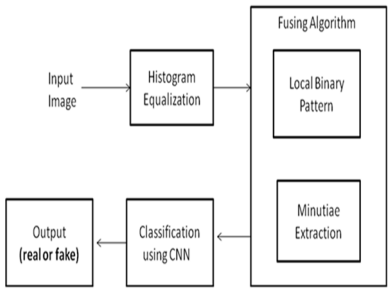
The second step involved in minutiae extraction process is thinning. After thinning process, ridge in the fingerprint become one pixel wide. The main use of applying the thinning process is to reduce the pixel value of the ridges in the fingerprint. The parallel thinning algorithm is used in thinning process. This algorithm is not an efficient one because it takes too much time and it is very complex in nature. It uses the morphological thinning operator to execute the process. Thinning process works only in black and white images. It plays an important role in the minutiae extraction process because it reduce the amount of data and time. In morphological thinning algorithm shape of the image can also be analyzed.

C. Minutiae Extraction

The third step involve in minutiae extraction process is minutiae making. It produces the better result when more number of minutiae has been detected. This process is carried out after the pre-processing step. It works on the pixels (1 or 0). There are two methods involved in this process. The first method deals with one value and second method deals with the value zero. The better

Volume 5 Issue III, March 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

result will be produced when the impression of the image is good. Therefore the contrast of the image is enhanced by pre-processing step. It assigns one or two class labels which includes ridge bifurcation and ridge ending. With the help of pattern recognition process the more information is obtained and because of the accuracy is improved.



Merits

The merits of the proposed system are

1) Accuracy of the fingerprint is improved.
2) It check all the ridges in the fingerprint
3) Time efficiency is increased

IV. CONCLUSION

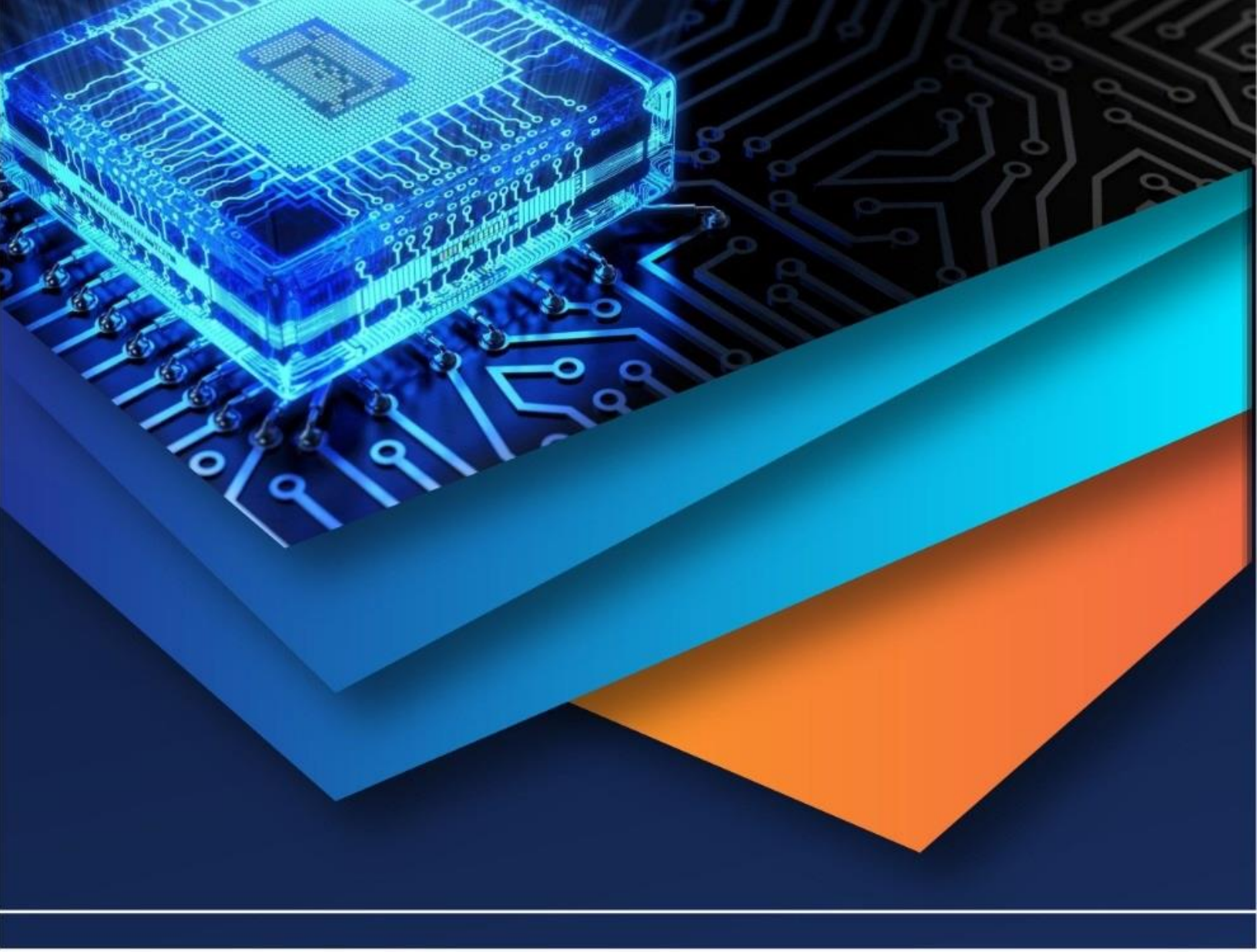
In this paper CNN was used to differentiate the real and fake fingerprint. This model produces the good accuracy on training sets(400 samples).No task specific hand engineered technique was used .The pre trained networks showed the stronger generalization capabilities in data sets. The histogram equalization technique was used to improve the accuracy of the images. Local binary pattern was used to split their images into several small numbers of images and extract the feature in the image and like that minutiae extraction technique will also extract the feature using some steps like binarization, thinning and minutiae. And later this feature extractors are fused together to find the real and fake fingerprint.

A. Comparison of Existing and Proposed System

S.no	Parameters	Existing	Proposed
1	Time taken	129secs	0.9secs
2	Accuracy	69%	77%
3	Noise	42 dB	50dB

REFERENCES

[1] Rodrigo FrassettoNogueira, Roberto de AlencarLotufo, and Rubens Campos Machado, “Fingerprint Liveness Detection using Convolutional Neural Networks”, IEEE Transaction,2016
[2] A. Antonelli, R. Cappelli, D. Maio, and D. Maltoni, “Fake finger detection by skin distortion analysis,” IEEE Transactions on, vol. 1, no. 3, pp. 360–373, 2006.
[3] A. Krizhevsky, I. Sutskever, and G. E. Hinton, “Image net classification with deep convolutional neural networks,”2012, pp. 1097–1105.
[4] A. K. Jain, Y. Chen, and M. Demirkus, “Pores and ridges: High resolution fingerprint matching using level 3 features,” IEEE Transactions on, vol. 29, no. 1, pp. 15–27, 2007.
[5] J. Galbally, F. Alonso-Fernandez, and J. Fierrez,“A high performance fingerprint liveness detection method based on quality related features,” vol. 28, no. 1, pp. 311–321, 2012.
[6] L. Ravi Kumar, S. Sai Kumar, J. Rajendra Prasad, "Fingerprint Minutiae Match Using Bifuration Technique," International Journal of Computer Science &Communication Networks, vol 2(4), 478-486,2011.
[7] NeerajBhargava, RituBhargava, Manish Mathuria,"Fingerprint Matching Using Ridge-End and Bifurcation Points," International Conference in Recent Trends in Information Technology and Computer Science .
[8] P. D. Lapsley, J. A. Lee, D. F. Pare Jr, and N. Hoffman, “Anti-fraud biometric scanner that accurately detects blood flow,” Apr. 7 1998, uS Patent 5,737,439
[9] SandipPawar, AjitGhodke, BharatratnaP.Gaikwad, "A Survey of Minutiae Extraction from Various Fingerprint Images,", volume 6, Issue 6, June 2016.
[10] V. Mura, L. Ghiani, G. L. Marcialis, F. Roli, D. A. Yambay, and S. A. Schuckers, “Livdet 2015 fingerprint liveness detection competition 2015.”
[11] Y. Chen, A. Jain, and S. Dass, “Fingerprint deformation for spoof detection,” in Biometric Symposium, 2005, p. 21.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY