A NOVEL LOW COST EFFICIENT 2-DIMENSIONAL PALMPRINT BIOMETRIC AUTHENTICATION SYSTEM

[1]Sendil Kumar.S, [2]Mrs.Brindha.M
M.Tech Digital Electronics and Communication, HOD Electronics and Communication
Email:[1]sendilkumar1988@gmail.com, [2]hod_electronics@mvjce.edu.in

Abstract—Biometric systems are used extensively for user access control in restricted secure environments. In this paper we are developing a low cost Palmprint biometric system with limited cheaper available resources. We are proposing an algorithm, which will obtain the necessary details from the image and user authentication will be performed accurately with help of templates stored in the database. The proposed system, when implemented in real time will be a low cost biometric system having greater processing capabilities, along with reliability, accuracy and ease of use.

Index Terms— Biometrics, Palmprint, template, thresholding

I. INTRODUCTION

Biometrics is the science and technology of measuring and analyzing biological data. In information technology, biometrics refers to technologies that measure and analyze human body characteristics, such as fingerprints, eye retinas and irises, voice patterns, facial patterns and hand measurements, for authentication purposes.

Authentication by biometric verification is common in corporate and public security systems and consumer products. Being specific of an individual, they guarantee one's identity in security control situations.

Biometric devices consist of:

- Image acquisition device
- Software that converts the acquired image information into digital form and compares with stored template database for verification of the user.

The most crucial aspect in Biometric systems can be divided into two tasks:

- Represent a biometric characteristic in reproducible and stable features that resist input variability.
- Compare such features so users can accurately be identified.

1.1 Types of biometrics [1]:

- Physiological Biometrics
- Behavioral Biometrics

Physiological Biometrics:

A biometric related to the human body and difficult to forgery. It remains unaltered without significant issue. This type of biometric includes iris, retinal, fingerprint, palm print, hand geometry, face and DNA.

Behavioral Biometrics:

It depends upon the behaviour of human, i.e. psychologically dependent. It depends on the present state of mind and can vary frequently as per situation or environment. For example, voice of human being can be affected by various factors as sadness, happiness, disease as throat infection, environment and so on. This type of biometric includes voice print, signature and typing rhythm recognition

II. PALM PRINT BIOMETRIC AUTHENTICATION

Palm print based biometric approaches have been intensively developed recently [2] [3] because they possess several advantages over

other systems. Palm print images can be acquired with low resolution cameras and scanners and still have enough information to achieve good recognition rates. If high resolution images are captured, ridges and wrinkles can be detected. Forensic applications typically require high resolution imaging.

The main distinguishing feature which describes the uniqueness of Palmprint over other biometrics is mentioned below [4]:

- ✓ Uniqueness – high for Palmprint
- ✓ Permanence – high for Palmprint
- ✓ Measurability– high for Palmprint
- ✓ Performance– high for Palmprint
- ✓ Acceptability– high for Palmprint

From the social point of view, low cost of implementation and ease of use makes us to choose Palmprint over other biometrics.

The main advantages of Palmprint systems [5] are:

- ✓ Deployed extensively for physical-access control and attendance
- ✓ Fast and easy.
- ✓ Nonintrusive, suitable for one-to-one verification
- ✓ High reliability and accuracy
- ✓ Robust and user friendly
- ✓ Environmental factors, such as, dry weather that causes the drying of the skin is not an issue

III. SYSTEM ARCHITECTURE

The proposed system architecture consists of stages shown in fig 1 below:

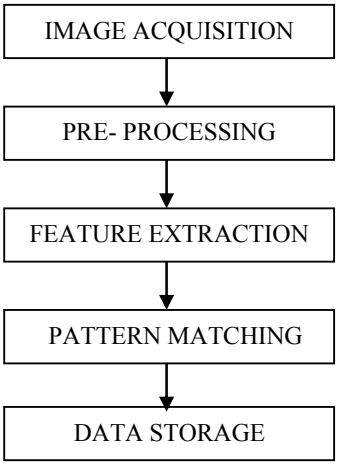

Fig 1 System Architecture

3.1 IMAGE ACQUISITION: Image is read from the computer hard drive using file path. Buffer needs to create for temporary storage of the image. Input image is RGB 32 bit format shown in fig 2 needs to be converted into grayscale for further processing.

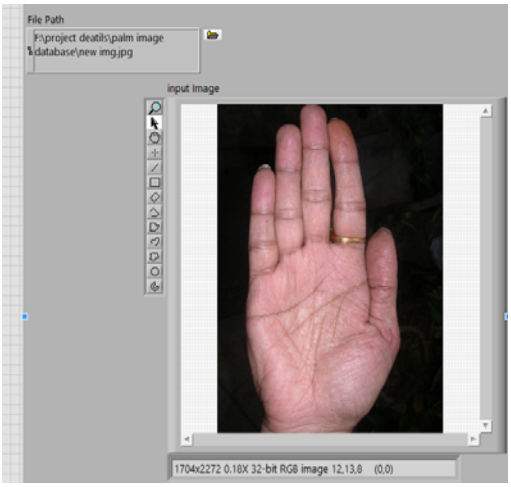

Fig 2 shows image acquisition

3.2 PRE-PROCESSING

It involves Binarizing the palm image, thesholding, Particle Analysis, Particle Filtering and Lookup Table

3.2 a) *Binarizing the palm images:* conversion of 32bit RGB color image to 8 bit gray scale image.fig 3 shows binarizing the palm image

3.2 b*) Thesholding:* applying threshold extracts only the required image information. fig 4 shows thesholding of palm image

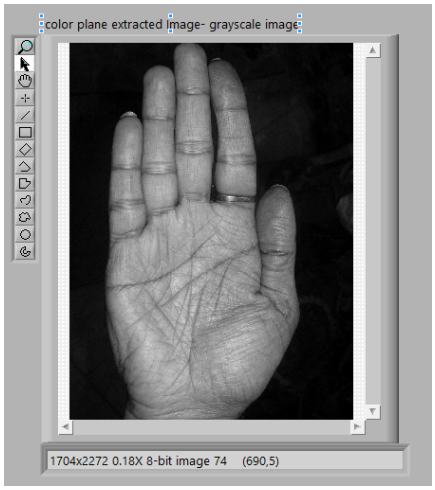

Fig 3 Binarizing Palm Image

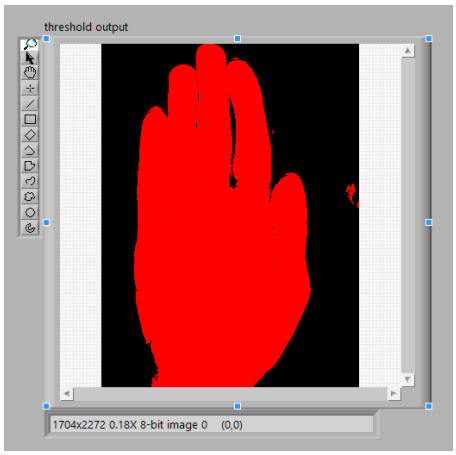

Fig 4 Thresholding

3.2 c) *Particle Analysis:* detects the number of particles in the binary image

3.2 d) *Particle Filtering:* Filters each particle in the image according to the measurement .Measurement parameter chosen is area choose the minimum value and maximum value such that it filters out the unwanted information other than palm. Fig 5 shows particle analysis and filtering

3.2 e) Lookup Table: We need to perform lookup table transformation for particle filtered image, which is user specified lookup transformation by remapping the pixel values in an image. Lookup output is array is multiplied with input bit image (array form). Lookup output has 1 for all the required palm pixels and 0 for noise/background, when multiplied with input image produces required palm region of interest which is further used for template matching. Fig 6 shows extracted palm image

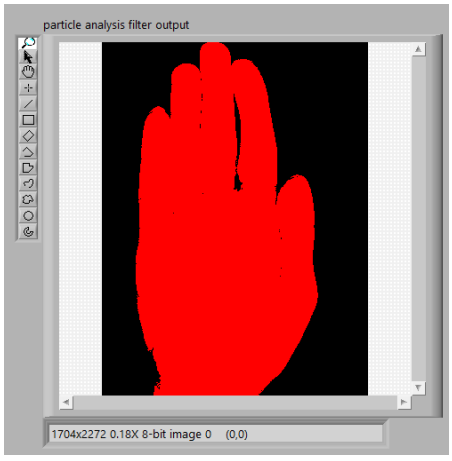

Fig 5 Particle Analysis and Filtering

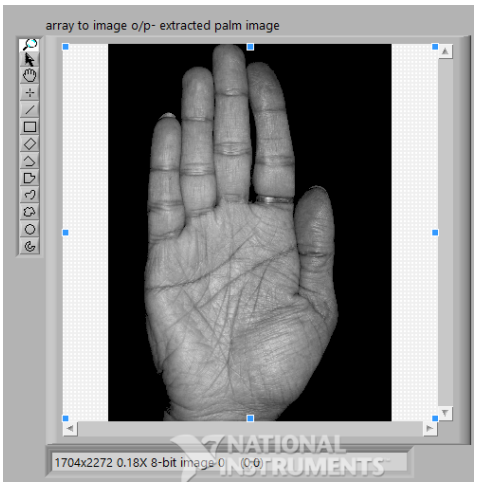

Fig 6 shows extracted palm image to be used for template matching

3.3 FEATURE EXTRACTION

It corresponds to region of interest extraction ROI in the palm image extracted in the previous step. Template image (fig 7) is created will the help of bounding box. The bounding box values (fig 8) corresponds to (x,y) coordinates of the ROI, which will have 5 values.

Template image is extracted and stored in database for comparison with Palm image.

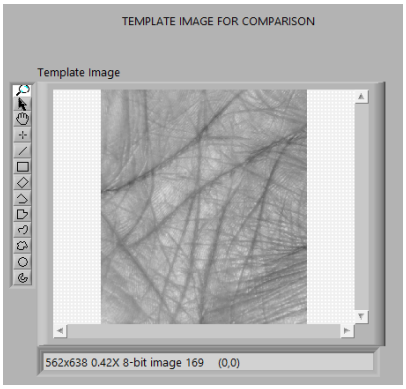

Fig 7 Template image of palm

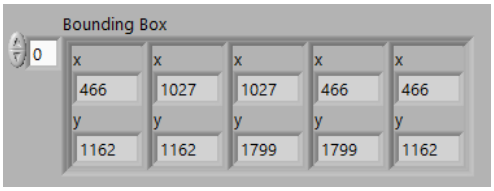

Fig 8 Bounding box values (x, y) Coordinate values

3.4 PATTERN MATCHING

Template image is compared with original palm image. If the template matches with the

image then a red box (fig 9) will be displayed on the palm where exactly the template matches

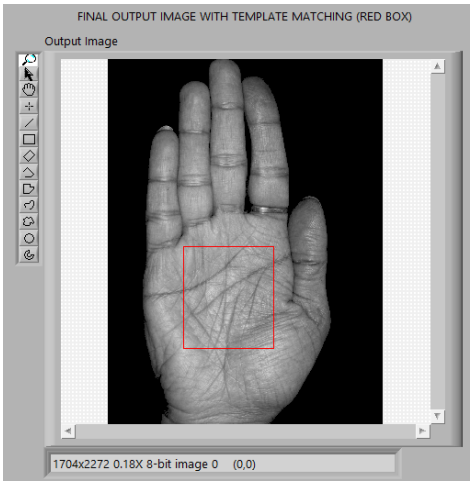

Fig 9 Pattern matching

3.5 DATA STORAGE

All the compared palm images and template is stored in database.

IV. CONCLUSION

This paper focuses on developing a unique solution for biometry authentication using the features of palm by image processing approach using LabVIEW. This method of biometry is commonly accepted and non-invasive. Detailed study of literature was done to understand the overview of the concepts involved in palm based biometry, the reliability and acceptability of this solution path for biometry authentication.

The proposed system is user-friendly and easy to use. In this paper we are using images acquired from camera for image processing. The reliability of this system can be enhanced by using high resolution camera, computer with faster processing capability and by maintaining proper lighting during image acquisition.

REFERENCES

[1] Gursimarpreet Kaur, Dr.Chander Kant Verma "Comparative Analysis of Biometric Modalities "International Journal of Advanced Research in Computer Science and Software Engineering, Volume 4, Issue 4, April 2014.

[2] Miguel A. Ferrer, Aythami Morales, Carlos M. Travieso, Jesws B. Alonso "Low Cost Multimodal Biometric identification System Based on Hand Geometry, Palm and Finger Print Texture" IEEE 2007

[3] Jane Youa, Wenxin Lia, David Zhanga "Hierarchical Palmprint identification via multiple feature extraction "Pattern Recognition 35 (2002) pg 847–859

[4] Himanshu Srivastava "A Comparison Based Study on Biometrics for Human Recognition" IOSR Journal of Computer Engineering (IOSR-JCE) Volume 15, Issue 1 (Sep. - Oct. 2013), PP 22-29

[5] Ajay Anil Joshi, Pallavi Deshpande, Tavildar "Enhancing accuracy for personal identification using hierarchical based fusion of finger geometry and palm print modalities" IEEE 2014 International Conference on Electronics & Communication