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RESEARCH ARTICLE

A Personal Verification and Identification using Palmprint and Hand Geometry Biometric Recognition System

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Abstract- In this research method demonstrates to the study about identification and verification using hand geometry recognition system. The geometric measurement of human hand have been used for personal verification and authentication on the bases of different type measurements of length of the finger, width of the finger and width of a palm. A human can placed his hand freely on the pegs guided flat black surface of hand geometry module, the hand geometry features and palmprint can be acquired from the same image using a Charge Couple Device(CCD) color camera and digital camera for capturing image. The features extraction from hand geometry and hand palm this work improved to the performance of hand geometry processing. Our experimental result gives 92 percent rate of success in classification.

Keywords- Biometric, Hand geometry, Recognition, Verification and Identification.

1. INTRODUCTION

At this time the organization, industries, intelligence agency needs very secure safe security system. Humans recognize each other according to their various characteristics for ages. We recognize others by their face when we meet them and by their voice as we speak to them. Identity verification authentication in computer systems has been traditionally based on something that *one has* key, magnetic or chip card or *one knows* PIN, password. Things like keys or cards, however, tend to get stolen or lost and passwords are often forgotten or disclosed.

Humans have used body characteristics such as face, voice, gait, etc. for thousands of years to recognize each other. Alphonse Bertillon, chief of the criminal identification division of the police department in Paris, developed and then practiced the idea of using a number of body measurements to identify criminals in the mid19th century. Just as his idea was gaining popularity, it was obscured by a far more significant and practical discovery of the distinctiveness of the human fingerprints in the late 19th century. Soon after this discovery, many major law

enforcement departments embraced the idea of first "booking" the fingerprints of criminals and storing it in a database (actually, a card file). Later, the leftover (typically, fragmentary) fingerprints (commonly referred to as latent) at the scene of crime could be "lifted" and matched with fingerprints in the database to determine the identity of the criminals. Although biometrics emerged from its extensive use in law enforcement to identify criminals (e.g., illegal aliens, security clearance for employees for sensitive jobs, fatherhood determination, forensics, positive identification of convicts and prisoners), it is being increasingly used today to establish person recognition in a large number of civilian applications.

Day by day, biometric identification and verification is gaining more importance and other biometrics techniques have been invented by human, and each technic having its own advantages and disadvantages according to the user performance, acceptance and cost etc [2]. In various types of biometrics techniques, the hand geometry biometric technology have several advantages in comparison to other biometrics system, the hand geometry technic achieved as a medium security technology. Biometric technology is gaining more popularity in the field of security system in recent few years ago [1].

1.1 PRIOR WORK

Biometric system work with the low resolution color image taken from the CCD color camera[4]. First step in the biometric system is that hand geometry features which are composed measurements length of the fingers, width of fingers and of palm of human hand. Hand geometry based authentications is very effective for other reasons. Hand geometry systems measure various distances on the hand, including the overall length, width and thickness of the hand as well as the dimensions of the fingers. Since distances computed on the hand vary substantially with pose and finger configuration, sensing devices often use physical restraints to ensure consistent hand placement. The system then extracts to the 16 distance features from the fingers and the hand. Using a database of 50 people, the authors report a verification rate of over 90% at a false acceptance rate of 0.01.

1.2 PROPOSED WORK

The hand geometry and palmprint images can be feature extracted from image and features measurement of hand geometry are based on the measurements of length of finger, width of finger, area of hand palm and width of palm, after feature extraction we go to the next step matching, at this stage approximate. 92features available for matching, all these features extracted from the single shot hand image of every user are used to automatically extract the palmprint and hand geometry features [3]. This is achieved by first thresholding the images acquired from the digital camera. The resultant binary image is used to estimate the orientation of hand since in absence of pegs user does not necessarily align their hand in a preferred direction. The rotated binary image is used to compute hand geometry features.

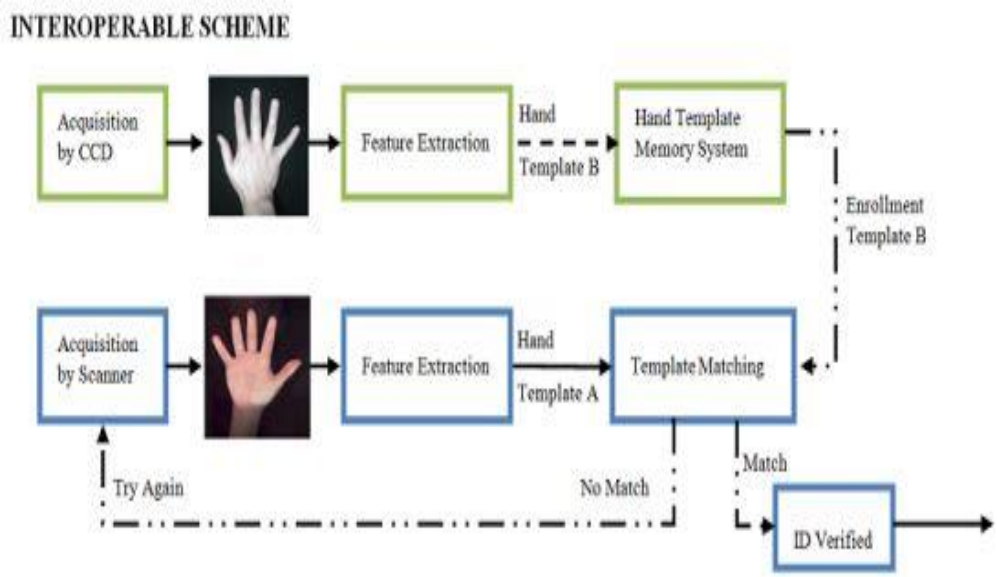


Fig 1: Block diagram of personal identification and Verification system using hand geometry palmprint

2. IMAGE ACQUISITION

In image acquisition system is very simple does not needs any special equipment. The color low resolution CCD (Charge Couple Device) color camera or digital camera (1280*960 pixels) is used to acquire hand image [4]. The user makes sure that his finger does not touch to each other and hand must touch on the black surface of hand geometry system.

Fig 2: Color image acquire from CCD camera

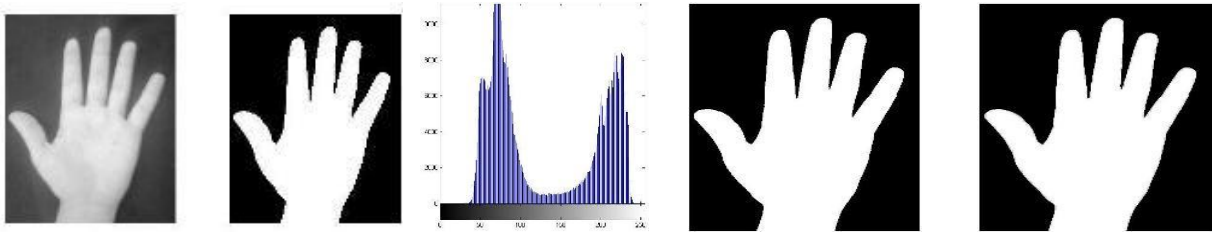
Fig. 3: Color image converted into the grayscale image

The resultant binary image is used to estimate the orientation of hand since in absence of pegs user does not necessarily align their hand in a preferred direction. The rotated binary image is used to compute hand geometry features. This image also serves to estimate the center of palm print from the residue of morphological erosion with a known structuring element (*SE*). This center point is used to extract the palm print image of a fixed size, from the rotated gray level hand images. Each of these palm print images is used to extract salient features. Thus the palm prints and hand geometry features of an individual are obtained from the same hand image. Two schemes for the fusion of features, fusion at the decision level and at the representation level, were considered. The decision level fusion gave better results.

3. IMAGE PREPROCESSING

In image preprocessing a hand image captured by the CCD color camera and that image consider as hand geometry on the hand geometry module or system. Acquired image is color image, it is converted to a gray scale image. The median filter is used for the removing the noise from the grayscale image. The background of the

grayscale image is black so we consider to the as digital image, the digital image have two colors black and white. So we assume to the boundary of black and white image. These all images represents to the image morphology, all image shows here:

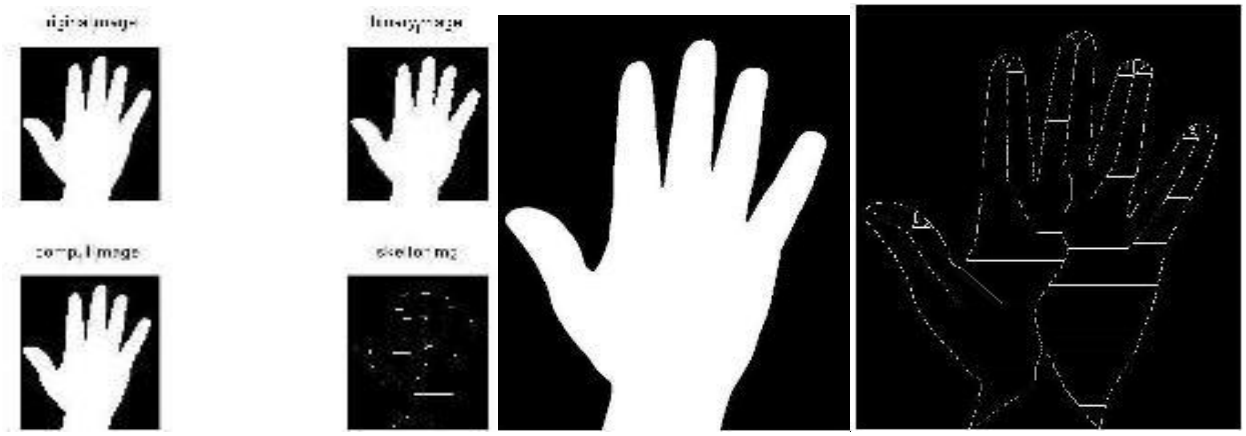


(a) (b) (c) (d)

Here the every image shows to the every stage of image conversion like color image to grayscale image, grayscale image to black & white image, black & white image to binary or digital image. The color image conversion into gray scale image at hand geometry recognition system worked as image morphological.

4. FEATURES EXTRACTION

The features extraction is based on hand geometry measurements like finger width, hand palm, hand palm width and thickness of the fingers. Here first of all we assume to boundary of noiseless black and white hand image, and after then taken to the edge detection of hand geometry image.



(a) (b) (c)

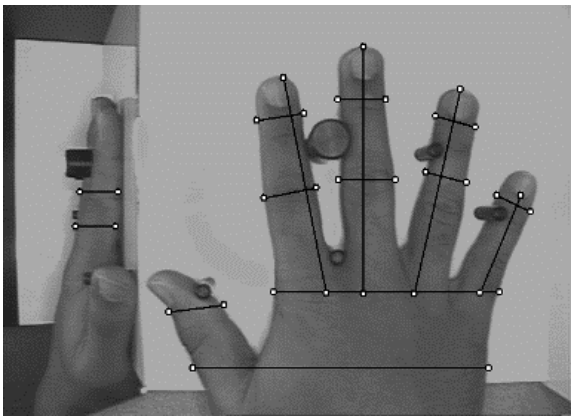


Fig.4: Measurements of hand geometry

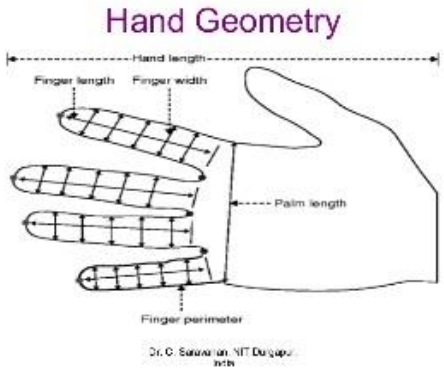


Fig.5: Features extraction of hand geometry

5. MORPHOLOGICAL IMAGE PROCESSING

In morphological image processing system an image shows to the different types of features. Morphological image processing is a collection of non-linear operations it is related to the shape or size morphology of features in an image. Morphological operations rely only on relative ordering of pixel values and therefore are especially suited to the processing of binary images. Morphological image shows in this section.

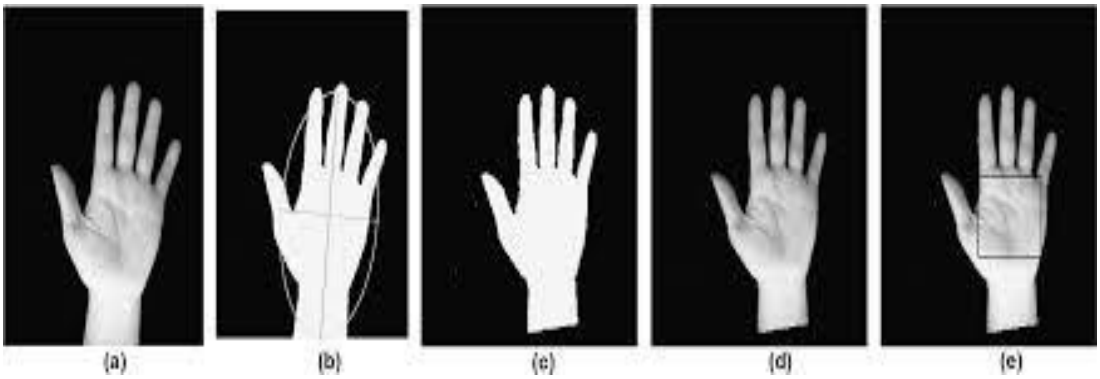


Fig.6: Morphological image representation

Morphological technique proved that an hand geometry image with low or small shape and template are called structural image element. The structuring element is positioned at all possible
Location in the image. The field of mathematical morphology contributes a wide range of operators to image processing, all based around a few simple mathematical concepts from set theory. The operators are particularly useful for the analysis of binary images and common usages include edge detection, noise removal, image enhancement and image segmentation.

Morphological techniques typically probe an image with a small shape or template known as a structuring element. The structuring element is positioned at all possible locations in the image and it is compared with the corresponding neighborhood of pixels. Morphological operations differ in how they carry out this comparison. In image morphological system fundamentals definitions-From these two Minkowski operations we define the fundamental mathematical morphology operations *dilation* and *erosion*

5.1 *Dilation*-The term dilation is defined as that dilation operator takes two pieces of data as inputs. The first is the image which is to be dilated. The second is a (usually small) set of coordinate points known as a structuring element (also known as a *kernel*). It is this structuring element that determines the precise effect of the dilation on the input image. The mathematical dilation for binary image as follows:

(i) Suppose that *X* is the set of Euclidean coordinates corresponding to the input binary image, and that *K* is the set of coordinates for the structuring element.
(ii) Let *Kx* denote the translation of *K* so that its origin is at *x*. Then the dilation of *X* by *K* is simply the set of all points *x* such that the intersection of *Kx* with *X* is non-empty.

If *at least one* pixel in the structuring element coincides with a foreground pixel in the image underneath, then the input pixel is set to the foreground value. If all the corresponding pixels in the image are background, however, the input pixel is left at the background value.

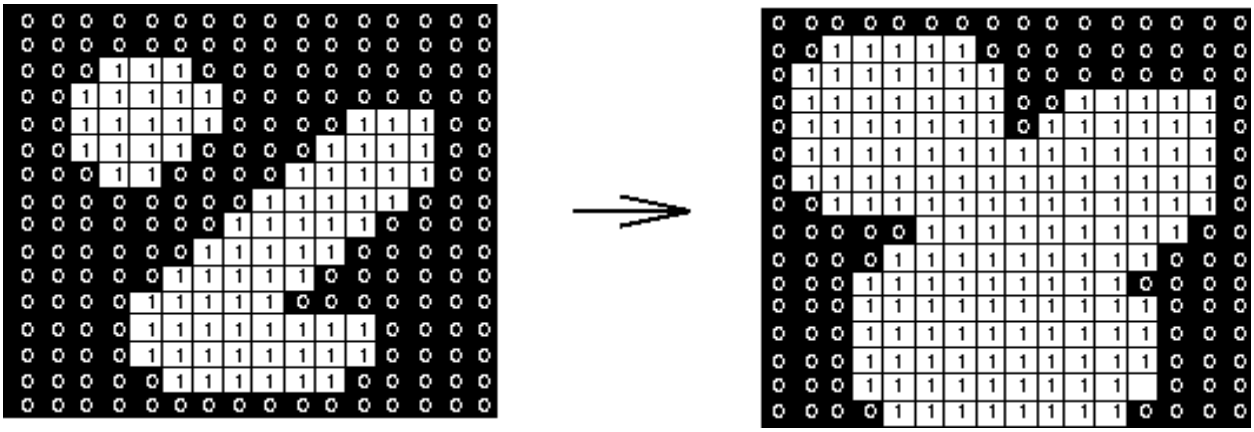


Fig.7: Dilation 3×3squre structure

Most implementations of this operator expect the input image to be binary, usually with foreground pixels at pixel value 255, and background pixels at pixel value 0. Such an image can often be produced from a grayscale image using thresholding. It is important to check that the polarity of the input image is set up correctly for the dilation implementation being used.

5.2 *Erosion*- If for *every* pixel in the structuring element, the corresponding pixel in the image underneath is a foreground pixel, then the input pixel is left as it is. If any of the corresponding pixels in the image are background, however, the input pixel is also set to background value.

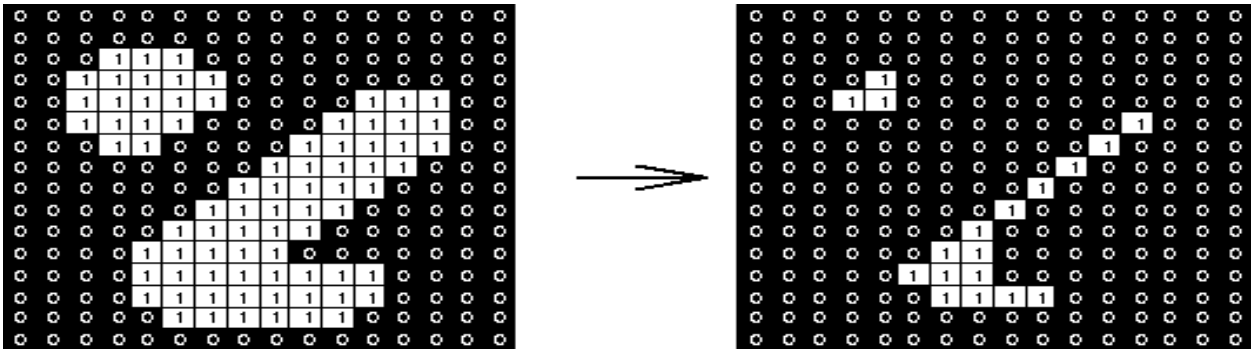


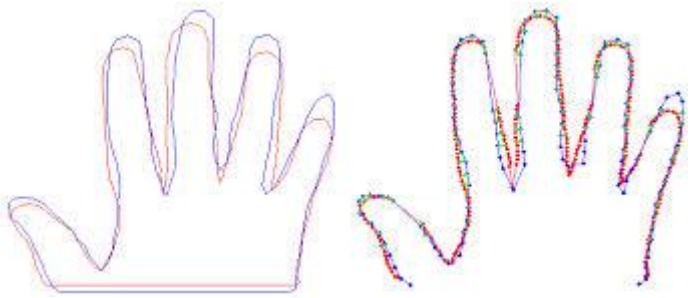
Fig.8: Erosion3×3squre structure

The structuring element may have to be supplied as a small binary image, or in a special matrix format, or it may simply be hardwired into the implementation, and not require specifying at all. In this latter case, a 3×3 square structuring element is normally assumed which gives the shrinking effect described above.

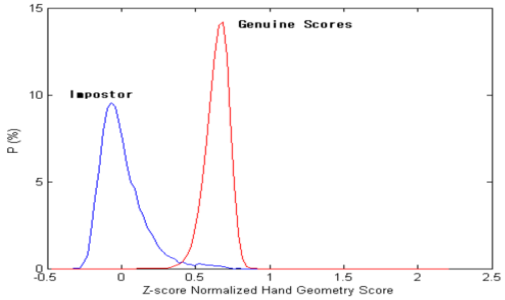
6. EXPERIMENTAL RESULT

The experimental result is taken from the based on verification, the hand geometry verification system has been tested by using a database of 250 images. Database of this system consists of 10 different acquisitions of 25 people.

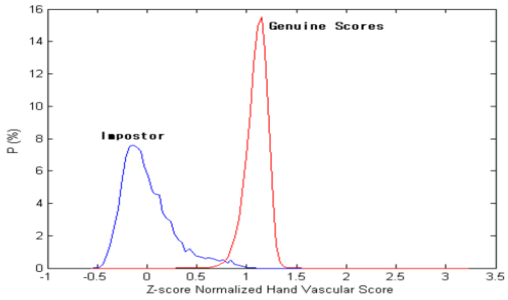
Most of the considered users were within a selective age range from 21 to 30 years old. Five images of each user's hand were selected to compute the feature vector which is stored in the database along with the user's name.



In order to study the effectiveness of system, the false rejection rate and false acceptance rate are plotted for different threshold value. A false rejection rate is obtained by comparing database feature vectors from the same hand feature vector while a false acceptance rate is obtained by comparing the feature vectors of different hands.



(a) Z-Score Normalized hand Geometric



(b) Z-Score Normalized Hand Vascular

It can consider a multimodal biometric verification system that utilizes the combination approach to fusion at the match score level. The problem of score normalization in multimodal biometric systems is identical to the problem of score normalization in meta search [12].

CONCLUSION

In this study, presented an a new method for hand geometry recognition system, that is Skelton algorithm for recognition to the an individual person hand geometry pattern. The algorithm proposed to the separating hand from the background of image.

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