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Image Based Hand Recognitions

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Abstract- The use of hands as biometric evidence is not very new, and commercially available. The proposed method is compared to other methods a method for extension. This will give better result as seen from the output. The personal attributes used in a biometric recognition system may be hand recognition This paper investigates a new approach to achieve performance improvement for hand area geometry systems by recognition of area of finger and hand and also the relative area between finger and hand which reduces the conventional hand geometry based personal verification systems.

Keywords- Biological Models, Contour Detection, Human Computer Interaction, Image Analysis

I. INTRODUCTION

In many fields of security requirements biometric system is used since it is more easy, convenient and reliable. The rising field of the biometric equipment is addressable in the automated detection of individuals, based on their physiological and behavioral traits. The broad category of human hand verification schemes, denoted as biometrics encompasses several techniques starting at computer vision to pattern recognition[1]. The personal attributes used in a biometric recognition system may be hand recognition, face recognition, fingerprints identification, retina detection, hand and finger geometry verification, human knee identification and contour detection, human ear shape recognition or behavioral features extraction of the individual, such as voice print, hand writing detection and recognition, verification of signature etc[2-4].

Depending on the security level of the application the complexity of the program will be more complex structure, one who can optimize to use one or more of these individual features. In this paper, we investigate the hand area, finger area and relative area based unique personal

attribute and the angle between two fingers based on the length of them for the recognition of hands. We apply image enhancement, an edge detection technique, removal of some region and then we apply our finial relative area based approach with hand finger area calculations and determination of angles. Hand geometry recognition systems may provide three kinds of services verification, classification and identification. For verification (hand geometry and the system verifies her identity along with the user identity, for classification known legitimate but does not supply any identity information of the user, for identification the user does not supply any identity information other than the hand based geometry and may be an intruder. The system tries to identify the individual or deny access. Therefore we seen that verification based on relative hand area may be a smart substitution due to its unobtrusiveness, low-cost and easy interface, and low data storage requirements and these systems have gained immense popularity and public acceptance as evident from their extensive deployment for applications in access control, attendance tracking and several other verification tasks.

II. PREVIOUS WORK

With the development of ever increasing technological systems that require authentication, personal identification and detection have become an absolute necessity with the decreasing of personal contact among the people, the utilization of technical means for this type of personal identification is increasing. Shape-Based Hand Recognition [1] shows that hand shape can be a viable scheme for recognizing people with high accuracy, at least for population of sizes within hundreds. Three-Axis Tactile Data and Edge Extraction Using Image[2] shows that image-data processing is very effective for obtaining geometrical data, there are several problems such as excluding the background, adjusting lighting and coordinating transformation. Hand shape based confirmation schemes in this novel approach are principally based on geometrical features. Sanchez-Reillo et al. [3] measure the angles of the inter-finger valleys with the horizontal, finger and palm heights, finger widths at different latitudes and finger deviations. Öden, Erçil and Büke [4] have used fourth degree implicit polynomial representation of the extracted finger shapes in addition to such geometric features as finger widths at various positions and the palm size. The resulting sixteen features are compared using the Mahalanobis distance. Jain, Ross and Pankanti [5](have used thickness of the hand, length and width of the fingers, a peg-based imaging schemeand include aspect ratio of the palm to fingers. Bulatov et al. [6] extract geometric features similar to [3,4, and 5] and compare two classifiers. The method of Jain

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and Duta [7] is similar to the contour shape difference via the mean square error and it involves fingers alignment. Lay [8] introduced a technique where the hand is illuminated with a parallel grating that serves both to segment the background and enables the user to register his hand with one the stored contours. The geometric features of the hand shape are captured by the quad tree code. Finally let's note that there exist a number of patents based on either geometrical features or on hand information-based personnel identification, profile [8]. Here we may use a sobel and canny edge detection technique which is better output than the other edge detection techniques pittwise and other algorithms which are based upon some gradients, hysteresis [2-3]. A generative models for recognitions of hand and total pixels calculations principal to along-likelihood objective function which aims to enclose hand-like pixels within the projected silhouette of the three dimensional model while excluding background- like pixels. Segmentation and hand-pose estimation are jointly addressed through the minimization of a single likelihood function [2]. Pose is determined through gradient drops in the hand edges (both left and right pixels) of such an area-based objective function. Pointing Based Object Localization [3] computationally feasible, recognize the object. In our paper we employ a hand area based approach for person identification and/or verification. The algorithm is based on some pre-processing steps the acquired image and there after we apply an edge detection algorithms then an area based algorithms is applied.

III. PROPOSED WORK

In our proposed scheme we use two phase, one is **First phase** and other is **second phase**.

In First phase to enhance the image quality we have some image enhancement and noise reduction techniques are used, this is done by the original colour or grayscale image pass into high pass filter and combine this high pass filtered image and original input image to enhance the image and grayscale conversion due to removal of noise. The process of locating sharp discontinuities in an image the edge detection the edge detection technique is proceeds. These discontinuities may be some abrupt changes in pixel intensity which may be boundaries of objects in an image or scene. Some methods of edge detection involve convolving the image with an operator, which is constructed to large gradients in the image returning values of zero while in uniform regions in the image. There are an exceptionally large number of edge detection operators available, such as canny, sobel, laplacian, Robert's cross operator, Prewitt's operator each of these designed to be very sensitive to the certain types of edges. Here we use to detect edge of the hand canny edge detection technique is applied [10]. Then to detect only contour of the hand we use some operations they are removals from the binary image that are have fewer than some certain values pixels, producing another binary image. Determine the connected components, compute the area of each component, and remove small objects. The algorithm for the initial phase is given below.

IV. METHODOLOGY

Algorithm

Step1:- Converts input colour images to gray scale which is done by eliminating the saturation and hue information while retaining the luminance and the image returns a gray scale colour map.

Step2:- Pass the colour image into the high pass filter.

Step3:- Add grayscale image and high pass image to get enhanced image.

Step4:- Takes a grayscale or a binary image (from step3) as its input, and returns a binary image of the same size as binary image, with 1's where the function finds edges and 0's elsewhere to find edges of local maxima of the gradient using canny edge detection algorithm.

Step5:- Removes from a binary image all connected components (objects) that have fewer than certain values pixels and producing another binary image. This are done by the determination of connected components, computation the area of each components, removal small objects.

Greyscale conversion removes noise. It converts the true colour RGB image to the grayscale. The output in the form of grayscale is shown in figure2.

Figure1: Input Image

Figure2: Grayscale Image

A high-pass filter is a device that passes high amplitude and attenuates reduces the amplitude of lower than its amplitude,

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this amplitude may frequencies. A high-pass filter is usual modeled as a linear time-invariant system and it is sometimes called bass-cut filter. This is shown in fig: 3.

Figure3: HPF Image

Combing this high pass filter image and gray scale image we get enhanced image. This is shown in fig: 4

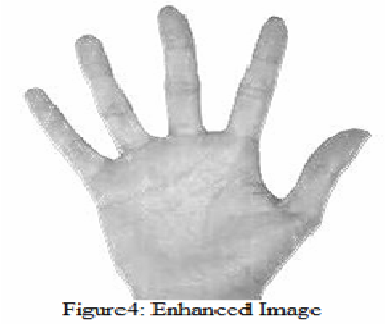


Figure4: Enhanced Image

Due to the most obvious low error rate and as the optimal edge detector the canny edge detection algorithm is applied here to detect edges. From this output we eliminate smallest area and also connect the component ultimately gets the contour of hand image results. These are shown in Figure 5,

Figure5: Hand with edge detection

Figure6.

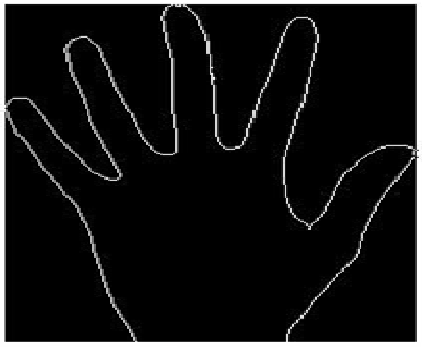


Figure6: Contour of hand

In the Second phase we calculate area of the fingers, hand and calculate relative area of the hand and area is calculated by the number of pixels. Then we calculate the angle between two fingers based on the length of the corresponding fingers. We scan the image (contour of hand) from left to right and top to bottom. When scanning is running and touches the first point, it is saved in a variable .Then scan next line and continues the scanning of that row until two points is found. Then checks these two points individually with the previously saved point, if the slope of these two points with the previously saved point is same then these two points are considered to the same finger points and calculate the area between them. If one of them does not belong to the same slope then the unmatched point is saved another variable as it is belong to another finger and checks next intersecting point of that row. Continue this process until all the line is scanned. As a result we got the top points of each finger (b1, b2, b3, b4, b5), the bottom points of each fingers (a1, a2, a3, a4, a5, a6), area of individual fingers, area of hand (area between the fingers ends and the boundary of hand). Then calculate the relative area (total fingers area is divided by hand area) and the angles between two fingers.

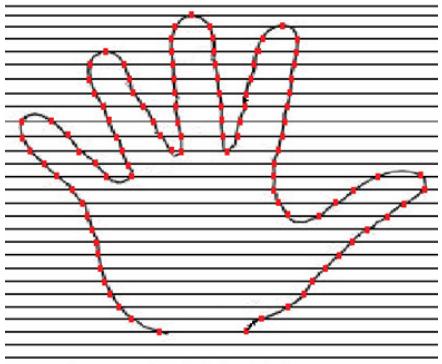
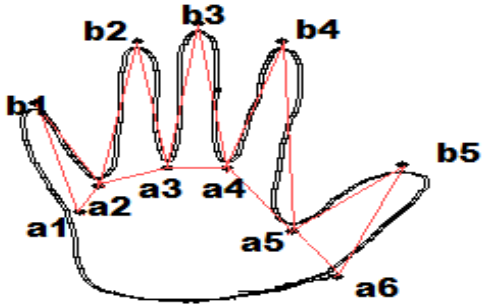


Figure7: A view of pixel calculations



Angle between fingers

Algorithm:

Step 1: Scan each pixel left to right and top to bottom and search from first row.

Step 2: When an intersecting pixel is found it is saved in a variable.

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Step 3: Scan next line, count total number of pixel until the number of first pixel is two

If both of these two pixels has same slope value with previously saved pixel then calculate the area between these two pixels and saved the value corresponding finger area. Otherwise, save the first pixel value to another variable. Then continue scanning of that row.

Continue this process for until all lines are scanned.

Step 4: After scanning all the line calculate the length of each finger and then find the angle between two fingers.
Step 5: Then calculate the hand area (area between end of each finger and the pixels of boundary line of hand).
Step 6: Then calculate the relative area of hand and finger (finger area is divided by hand area).

V. CONCLUSION

The proposed work shows how to utilize the area and relative area of the finger and hand based on hand shape and the angle between two fingers based on the length of finger using very simple algorithms. The database consists of several different hands with different pose. Some of these hands may belong to the same person obtained by placing the hand at different alignments on the scanner but they get true results. Thus proposed scheme encouragingly allows very little false approval and false dismissal rates. Consequently hand-based biometry is friendlier and it is less prone to disturbances and robust to environmental conditions. Moreover less data needs to be stored for hand recognition system than finger print system which results in a smaller database.

VI. SCOPE FOR FURTHER RESEARCH

There are some improvements are possible such as in this system we have only considered some2D images of the static figure, but in real time we may need recognition to extract the hand form moving scene or the video. Therefore we need to be upgraded to maintain dynamic hand recognition. All the above methods can be further enhanced for colour images and binary images. Some more improvements are possible if we measure 3D volume of this hand and fingers then the measurement will be very accurate.

ACKNOWLEDGMENT

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