Slap Fingerprint Segmentation Using Symmetric Filters Based Quality

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Abstract- **This presents a novel approach in segmenting multiple fingerprints from an image. Such an image is taken by a scanner capable of recording several fingers simultaneously. In the existing System, Entropy of the image is used to determine different components of fingers, while geometrical and spatial properties of these components are considered to segment fingerprints from the slap image.In the Proposed algorithm divides each slap image into non-overlapping square blocks and identifies foreground and background blocks using average pixel intensity in that block. Blocks are joined to find the foreground block's connected components. Finally clusters containing finger-tips are selected using geometric characteristics of a finger. It is defined by using symmetric filters which measure the uniformity in ridge-valley structure irrespective of linear or curved pattern. Some of the remaining non-fingerprint components are removed by using geometrical locations. . It makes use of a new distance measure to index these fingerprint components. It has been tested on a database of 6,096 images of 1,016 subjects, which has accurately segment each slap image into four fingerprints.**

Index Terms- **Geometry, Authentication, Image segmentation, Algorithm design and analysis, Clustering algorithms, Indexes, Labeling.**

I. INTRODUCTION

1.1 GENERAL

The term digital image refers to processing of a two dimensional picture by a digital computer. In a broader context, it implies digital processing of any two dimensional data. A digital image is an array of real or complex numbers represented by a finite number of bits. An image given in the form of a transparency, slide, photograph or an X-ray is first digitized and stored as a matrix of binary digits in computer memory. This digitized image can then be processed and/or displayed on a high-resolution television monitor. For display, the image is stored in a rapid-access buffer memory, which refreshes the monitor at a rate of 25 frames per second to produce a visually continuous display.

THE IMAGE PROCESSING SYSTEM

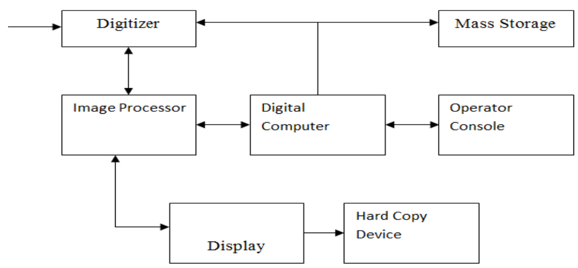


Figure 1:Block Diagram for Image Processing System

DIGITIZER

A digitizer converts an image into a numerical representation suitable for input into a digital computer. Some common digitizers are

- Microdensitometer
- Flying spot scanner
- Image dissector
- Videocon camera
- Photosensitive solid- state arrays.

In the Existing approaches, A desirable improvement could be realized by implementing an adaptive window size. The characteristics of a hand differ greatly from person to person. In the fields of the applications mentioned, the algorithm should be able to scale better between small and fragile as well as big and tall hands. A combination of two-staged mean shift and ellipse-fitting algorithms as well as an elaborate subsequent set of rules is used to segment the single fingertip images. First, the mean shift which is a well-established feature-space analysis technique is used to identify the different components of the fingers. For the step, ellipse fitting as described above is applied to all candidates, again using a circular search window. In order to calculate a robust average angle of the hand, ellipses with problematic features are identified and rejected. Then the orientation and size of each component is determined by the application of a robust ellipse-fitting algorithm. Finally the rules locate the fingertips.

In the Proposed System, to improve its performance, quality of components is used to eliminate several non-fingerprint components. It is defined by using symmetric filters which measure the uniformity in ridge-valley structure irrespective of linear or curved pattern. Some of the remaining non-fingerprint components are removed by using geometrical locations. For performance evaluation, a challenging database is used which contains slap-images. To enhance the fingerprint images based on the thersholding process. The feature points are to be extracted based on the Gabor filter representation. To measure the quality based on the PSNR value represent as the both tested and trained fingerprints. Then the rectangular box is to be indicates as the fingerprint is real or fake. It handle various challenges like the presence of dull prints, large rotational angles of the hand, small variation in the orientation of the fingertips and non-elliptical shape of components, we evaluated the segmentation results in two aspects: a comparison with the ground truth foreground and matching performance based on segmented region.

II.SYSTEM REQUIREMENTS

2.1 HARDWARE REQUIREMENTS

- Hard Disk : 40 GB
- Processor : Any processor above 500 MHz
- RAM : Above 512 MB
- Input device : Standard Keyboard and Mouse.
- Output device : VGA and High Resolution Monitor.

2.2 SOFTWARE REQUIREMENTS

- Operating system : Windows Family
- Simulator : MATLAB

III. SYSTEM IMPLEMENTATION

MODULES

- Preprocessing
- Segmentation
- Gabor based Shape extraction.
- Binarization
- Fingertip Locations

PREPROCESSING

An input image is read from graphics file. Bilinear interpolation is adopted to resize the image into a standard or assuming constant size based on the threshold values. This process identifies the ridge region of the input image. The given input image is segmented into blocks of size n x n and the standard deviation (STD) in each region is evaluated. If the standard deviation is above the threshold it is marked as part of the fingerprint. The image is normalized to have zeroed mean, unit standard deviation prior to performing this process so that the threshold specified is relative to a unit standard deviation. , the orientation angle is negative and if the orientation is greater than zero, the orientation angle is positive. This is done to ensure whether the rotation should be in clockwise (negative) or counter clockwise (positive).Depends on the orientation. To identified the distorted fingerprint.

SEGMENTATION:

The image is divided into the block representation. The average gradient of each block and used it to separate the image foreground from the background. The idea was that the fingerprint foreground area has a high gradient response, while the background area has a very low gradient response. Again, there is no formal account of how the pixel-block size was arrived at. The idea of convolution to separate the image foreground from the background. Each pixel-block was convolved with a series of Gabor filters and the variance of the responses of these filters was used for the separation, but then again, there is no formal account of how the pixel-block size was arrived at. Other implementations that failed to give an account of the pixel-block size. The ultimate end result of the algorithm is for it to be able to produce a segmented image. This is an image that only contains the fingerprint area. This outcome is indicative of the fact that the proposed algorithm does achieve its initially intended task.

GABOR BASED SHAPE EXTRACTION:

Fingerprint image enhancement an efficient Gabor Filters based method. Gabor filters tuned to the local ridge orientation and frequency. Firstly, the image is segmented to extract it from the background. Next, it is normalized so that it has a prespecified mean and variance. After calculating the local orientation and ridge frequency around each pixel, the Gabor filter is applied to each pixel location in the image. As a result the filter enhances the ridges oriented in the direction of local orientation. Hence the filter increases the contrast between the foreground ridges and the background, while effectively reducing noise to set the parameters with respect to the orientation and the frequency, respectively. Next, the image is binarized. The simplest way to use image binarization is to choose a threshold value, and classify all pixels with values above this threshold as white, and all other pixels as black. The problem is how to select the correct threshold. In many cases, finding one threshold compatible to the entire image is very difficult, and in many cases even impossible. Therefore, adaptive image binarization is needed where an optimal threshold is chosen for each image area the binary image; successive black pixels along the scan line are defined as a run. Generally, a run-length encoding of a binary image is a list of contiguous horizontal runs of black-pixels. For each run a location of the starting pixel of a run and either its length or the location of its ending pixel must be recorded. It runs in a binary fingerprint images form.

BINARIZATION:

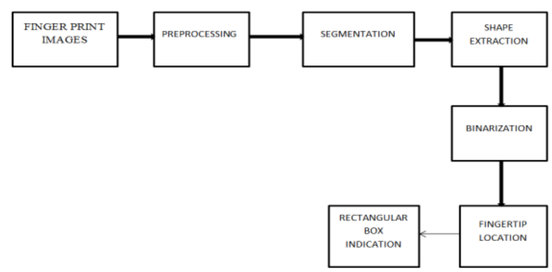
Most minutiae extraction algorithms operate on binary images where there are only two levels of interest: the black pixels that represent ridges, and the white pixels that represent valleys. Binarization is the process that converts a grey level image into a binary image. This improves the contrast between the ridges and valleys in a fingerprint image, and consequently facilitates the extraction of minutiae. In this stage gray-Scale image is converted into binary image. Because the binary image is greater than the binary image.To transform the digital binary pattern to a connected Skelton of unit width. To basic implementation available for this approaches called parallel and sequential fields. In the sequential field patterns based on the results that are obtained, all the pixels are examined and changed. In the Parallel field patters are based on the Pixels are examined simultaneously.

FINGERTIP LOCATIONS

In order to correctly pick the four fingertips from a set of candidates, we estimate the slap orientation for the approximate region of each finger. By analyzing the properties and features of the slap images, we made the following observations: for the upright slap image, if we project and sum the numbers of the slap image pixels along the column direction, the curve follows a very nice four-peak, three-valley pattern. On the contrary, if we sum the image along other directions, the four-peak, three-valley pattern disappears. Based on this observation, given the threshold slap image, we rotate the threshold image by 45˚ and obtain the rotated image. For both the original threshold image and the rotated image, we project the pixels on the finger regions along both the X and Y directions, count the number of the pixels, and obtain four curves .The algorithm picks the curve among the four curves which is most similar to the four-peak, three-valley pattern. For example, the last curve follows the four-peak pattern the most, which is corresponding to the projection of rotated image along Y direction. Thus the approximate slap direction is estimated.

IV. SYSTEM DESIGN

SYSYTEM ARCHITECTURE DIAGRAM



V. SYSTEM STUDY

FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

VI. CODINGS

```
warning off all;
clc;
close all;
clear all;
[filename1
pathname]=uigetfile({'*.png';'*.bmp';'*.tif';'*.jpeg'});
r=imread([pathname filename1]);
% R=rgb2gray(R);
R=im2double(r);
R=imadjust(imresize(R,[380 580]),[0.3 0.7],[]);
figure;imshow(R,[]);
title('ORIGINAL TEXTURE IMAGE');
c=imadjust(imresize(R,[380 580]),[0.3 0.7],[]);
figure;imshow(c,[]);
title('INTENSITY ADJUSTED IMAGE');
[E C]=text_edgemap(R);
figure,imshow(E,[]);
title('IMAGE AFTER AREA THRESHOLDING');
figure,imshow(C,[]);
title('RECTANGULAR REGION');
[HIST GAUSS]=tex_enhance(C);
G1=conv2(double(HIST),double(GAUSS),'same');
figure,imshow(G1,[]);
```

VII. SCREENSHOT

ORIGINAL IMAGE

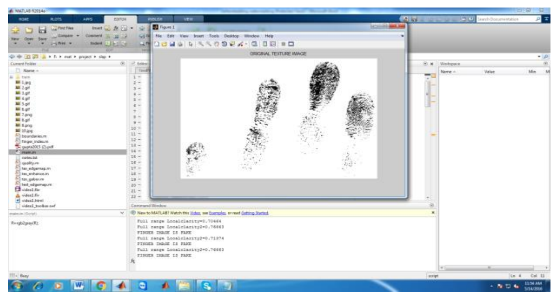
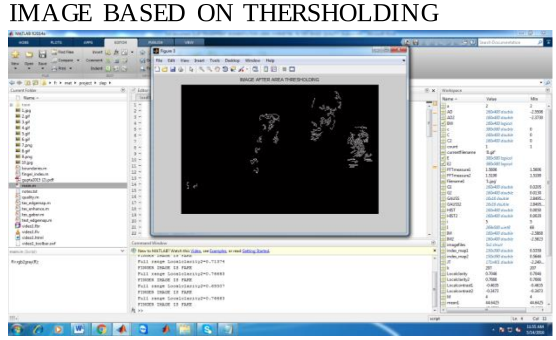
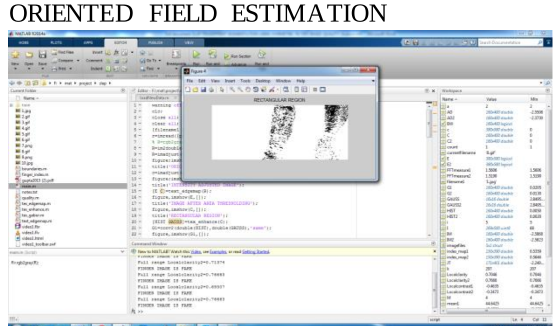


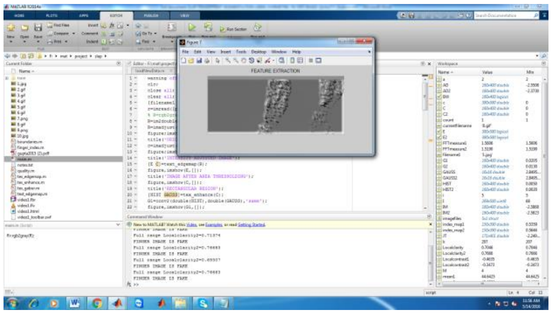
IMAGE BASED ON THERSHOLDING



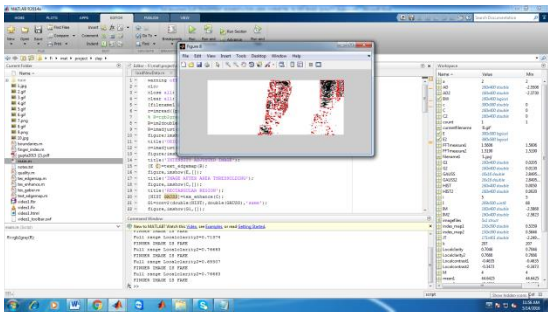
ORIENTED FIELD ESTIMATION



FEAUTURE EXTRACTION



SHAPE BASED RECTANGULAR REPRESENTATION



VIII. CONCLUSION

An efficient four slap fingerprint segmentation algorithm has been presented. The algorithm is found to perform better than all well-known existing four slap fingerprint segmentation algorithm. It can detect several factors such as finger/thumb locations, slap/thumb directions, and finger region intensity quickly at very limited system cost. Using our approach users no longer need to assess subjectively the quality of the captured biometric samples. In essence, our approach promotes more effective communication between the user and the self-capture system. It can accurately segment the fingerprints from a given slap-image and can correctly classify these fingerprints into one of following fingerprint classes: index, middle, ring and little fingers of the left or right hand. A fingerprint and non-fingerprint component present in a slap-image has been extracted from the slap-image by using entropy. Some non-fingerprint components have been detected and removed by using quality of components. Such a quality is estimated by measuring the uniformity in ridge-valley flow irrespective of linear or curved pattern. Uniformity for linear and curved pattern are measured by using various symmetric filters which are eventually consolidated to obtain the quality. Subsequently, geometrical locations of the remaining components have been analyzed to remove some non-fingerprint components.

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