



Fingerprint Recognition Based on Ridges, Bifurcation and 3-Branch Position

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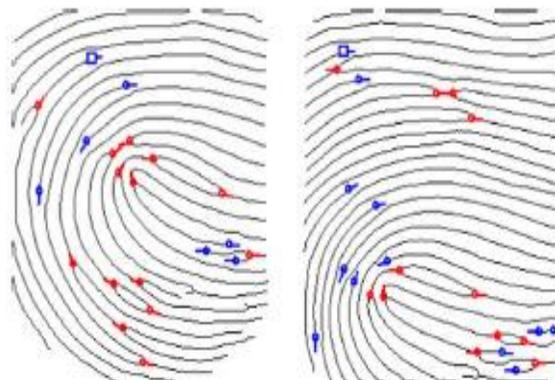
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Abstract: The aim of this research is to solve the problem in recognition of a fingerprint image from the database by introducing a new recognition algorithm based on combined features of minutiae's like ridge end, bifurcation and edges of 3-branch. All of these is more sufficient for recognition. There were many algorithms based on pixel correlated method, ROI methods etc., presented in past. Those algorithms have lack of speed and require more computational capability. In this paper, we are focus on three minutiae points. In case of ridge determination, we calculate 1-connected components of binary image, in bifurcation case we count only those edges that have bifurcate shape in 4-connected manner (examples , in 3-branch we selected only those pixels that have 3-branch shape in 8-connected means one pixel have diagonal pixel.

Keywords: image processing, minutiae, ridge, bifurcation.

I. Introduction

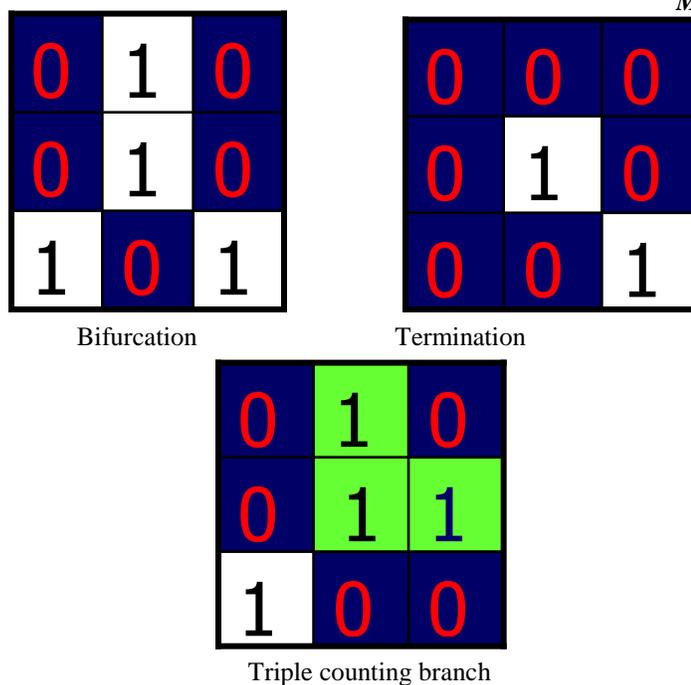
FINGERPRINT recognition [1,5,6] is one of the most adopted techniques for user identification. This is considered as a most reliable feature and the cost of implementing fingerprint recognition methods is very less than other biometric features. It is used in many forensic and commercial applications such as criminal investigation, electronic personal ID cards, etc. Although there is a significant improvement in fingerprint recognition, some challenging tasks may degrade the efficiency of fingerprint matching systems. Hence the fingerprint matching methods should be implemented in such a way that it should overcome all difficulties while matching. Nonlinear distortions, presented in touch-based fingerprint sensing, make fingerprint matching more difficult. As shown in Fig. 1, even though these two fingerprint images are from the same individual, the relative positions of the minutiae are very different due to skin distortions. This distortion is an inevitable problem since it is usually associated with several parameters [6], [3], including elasticity of skin, non uniform pressure applied by the subject, different finger placement with the sensor, etc.



II. Minutia Marking

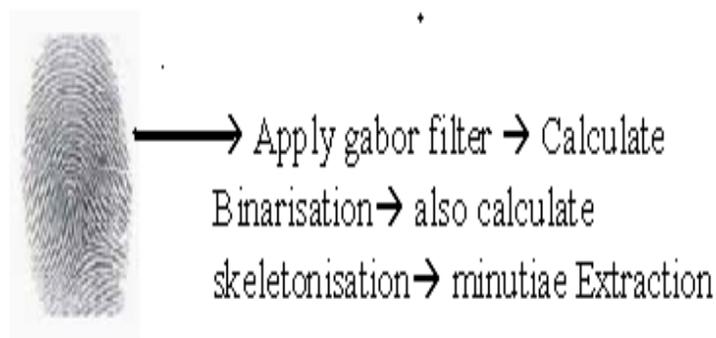
After the fingerprint ridge thinning, marking minutia[2,12] points is relatively easy. But it is still not a trivial task as most literatures declared because at least one special case evokes my caution during the minutia marking stage.

In general, for each 3x3 window, if the central pixel is 1 and has exactly 3 one-value neighbors, then the central pixel is a ridge branch [Figure 4.2.1]. If the central pixel is 1 and has only 1 one-value neighbor, then the central pixel is a ridge ending [Figure 4.2.2].



III. Previous Work

In the previous paper, a fingerprint recognition system based on a novel application of the classifier DECOC to the minutiae extraction[7,9,11] and on an optimized matching algorithm will be presented. To identify the different shapes and types of minutiae, a Data-driven Error Correcting Output Coding (DECOC) has been adopted to work as a classifier. In this work one has been applied throughout the fingerprint skeleton to locate various minutiae. Extracted minutiae have been used then as identification marks for an automatic fingerprint matching that is based on distance and direction between two minutiae and type of minutiae. The algorithm is defined given below.



IV. Proposed Methodology

My proposed work is based on two minutiae points like number of ridges and number of bifurcations. Given below we show the model and algorithm of our proposed work.

Model of the Proposed Work-

Step 1: Take query images.

Query_Img = read a query image
Resize Query_Img in (400,400)

Step 2: Calculate the number of bifurcation in query images.

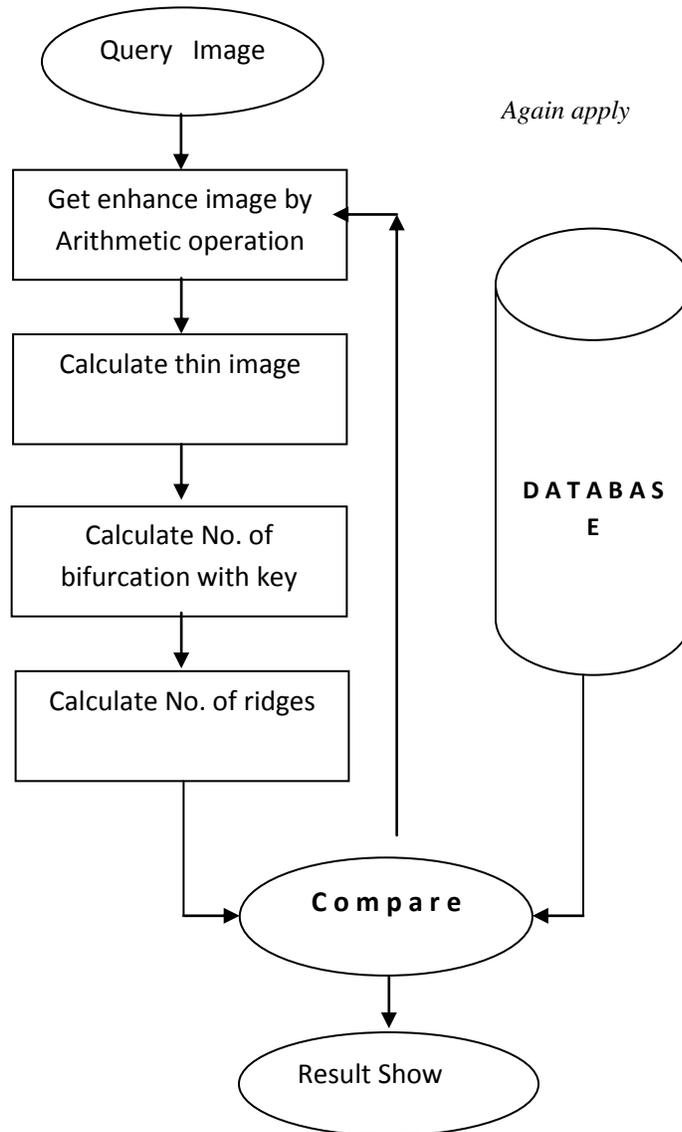
Binary_img = convert(Query_Img)
Calculate-bifur-qry = 3-connected component for bifurcation(Binary_img)
Calculate-ridge-qry = 2-connected component for ridge(Binary_img)

Step 3: Read fingerprint database

N = total number of database image.

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Loop for database-img=1 to N
  Apply step1 and step2 on all fingerprint image database
  Calculate-bifur- database-img = 3-connected component for bifurcation(database-img)
  Calculate-ridge- database-img = 2-connected component for ridge(database-img)
  If (Calculate-bifur-qry =Calculate-bifur- database-img)
    and (Calculate-ridge-qry= Calculate-ridge- database-img)
      Message box(' Matching is done')
  else
      Message box(' Matching is not done')
  end of if statement
end of loop statement
    
```

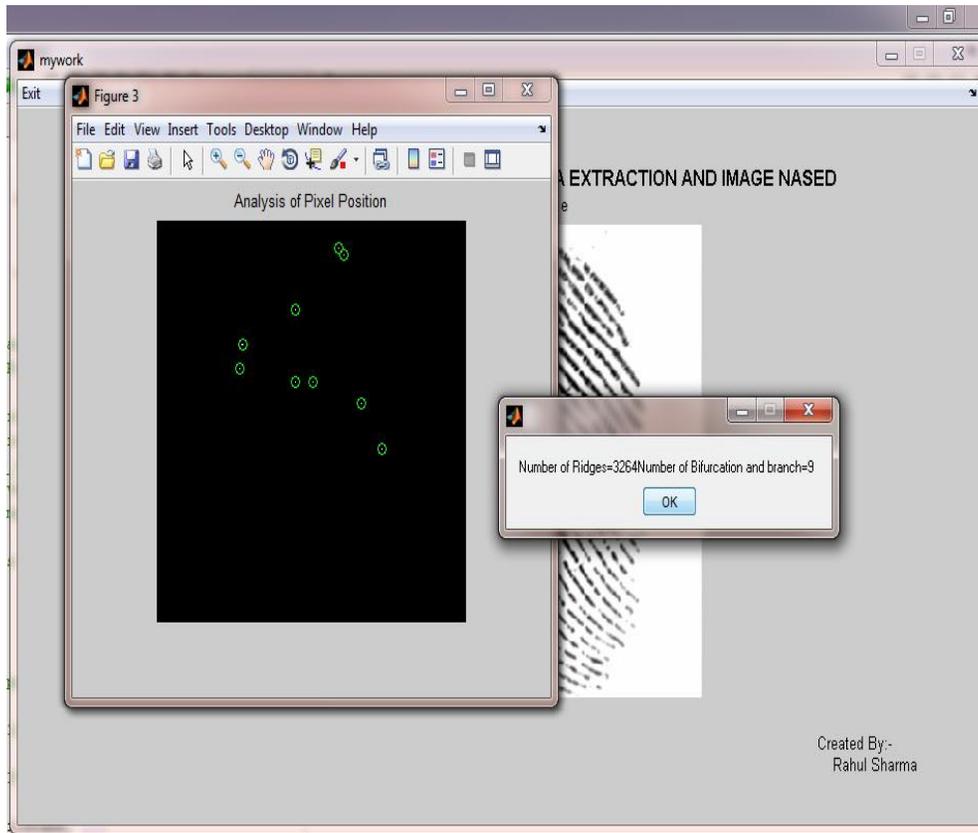


Algorithm for my work-
Input: - Get a query images.
Output: - Find similar image in database.

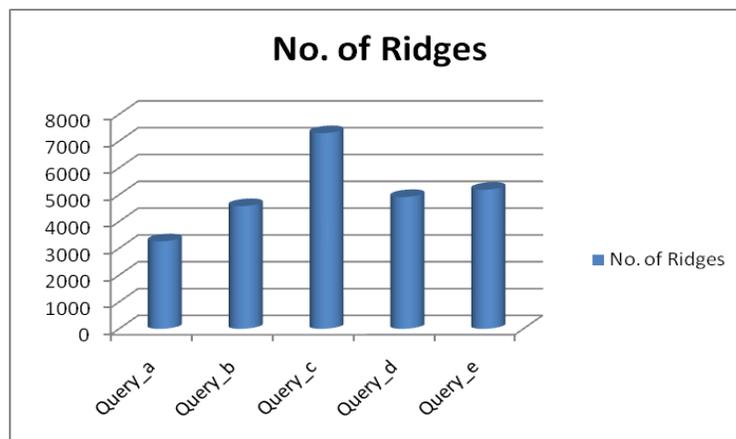
Step 4: Show the recognized result and also show the name of similar database image.

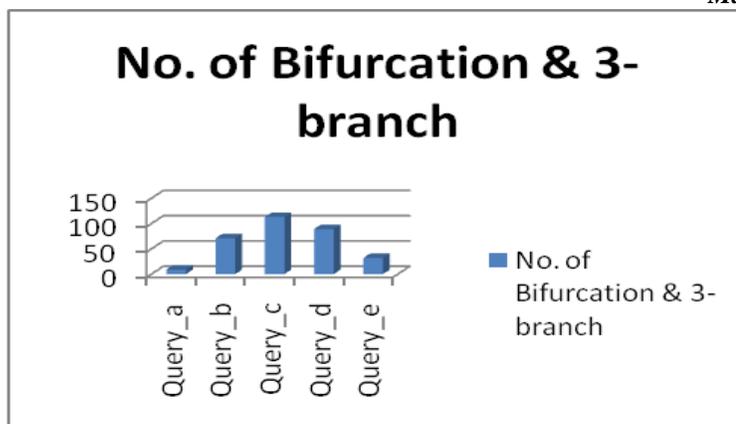
Result and Analysis-

Its show the minutiae points of the query image.



| Query Image | No. of Ridges | No. of Bifurcation & 3-branch |
|-------------|---------------|-------------------------------|
| Query_a | 3264 | 9 |
| Query_b | 4578 | 71 |
| Query_c | 7298 | 113 |
| Query_d | 4917 | 89 |
| Query_e | 5187 | 32 |





V. Conclusion

In this thesis, we have developed a method that is very effectively work on fingerprint images. It selects a fingerprint images then find the perfect matching score from the database. It reduces the deficiency of existing methods like minutia and ridge based recognition. This hybrid method gives better result than all the other individual method. In future we add some concept like DCT, movement invariant, MPEG etc. for better fingerprint images recognition because it take very less time for image enhancement, finding similar images.

It depends strongly on the quality and accuracy of the fingerprint image classification and matching which allow deciding if an image is similar.

Reference-

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