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RECONSTRUCTION OF FINGERPRINT IMAGES

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ABSTRACT: ***A Finger Print Reconstruction application that helps with the reconstruction of latent fingerprint images. Offline fingerprints find immense application in the fields of user authentication and criminal identification. However if an insider or a illicit gets illegal access to the printed database of fingerprints at a criminology department, then he might corrupt or destroy them. This situation tends to loss of evidence, which could have been useful at the time of post detection. Altered fingerprint reconstruction is a challenging problem due to the following reasons. Friction ridge structure can be severely damaged by abrading, cutting, burning, Or applying strong chemicals on fingertips, resulting in a number of unreliable minutiae. The image is then classified based on SIFT features***

Minutiae in well-defined ridge area may not belong to the fingerprint of interest if a portion of skin on the fingertip was transplanted from other parts of the body

Keywords: Minutiae, reconstruction, classification, SIFT

I. INTRODUCTION

FINGERPRINT play a crucial role in identification of individual, we use biometric for attendance and for authentication purpose. Fingerprints are foolproof ,cannot be forged. We cannot duplicate others fingerprint, and its important clue obtained in crime. Fingerprint left at the crime plays a important role in crime investigation.

Scope and Objectives

Main aim of this application is to provide users the best platform to reconstruct and classify the finger prints.

Reconstructing the fingerprint image, minutiae extraction ,i.e the ridge ending and the bifurcation enable easy search of subject details. Classification of image based on SIFT features.

Existing System

There are many algorithms and tools available for the reconstruction i.e for inpainting torn fingerprint reconstruct etc..Initially quality of the captured latent fingerprint data is assessed so that further improvement can be made on it to recognize the fingerprints. Latent fingerprints are the fingerprints left accidentally. Hidden fingerprints are restored, enhanced and matching of hidden fingerprints with original data is performed. Assessment of clarity boundary vary as different examiners using the assignment of clarity value of different regions for extracting the minutiae from the fingerprints[2] .

II. PROPOSED METHODOLOGY

Proposed System

A Framework design for the fingerprint reconstruction, minutiae extraction and classification.

The captured image is pre-processed converting the grayscale image to the binary image by binarization process, then the image is reconstructed using a thinning process and from the reconstructed image the minutiae features are extracted so that the ridge ending and the ridge bifurcations are generated. The images are classified based on the SIFT features extracted from the images[3][8].

III. METHODOLOGY

The grayscale image is read first and then the image is converted to binary image (i.e the pixel values will be either 0 or 1). After binarization of image the binary image is thinned objects to lines. It removes pixels so that an object without holes shrinks to a connected stroke. An object with holes shrinks to a connected ring halfway between each hole and the outer boundary.

It repeats the operation until the image no longer change and removes all connected components (objects) that have fewer than the given no of pixels from the binary image producing another binary image.

This operation is known as an area opening, here we are removing the objects containing fewer than 100 pixels. With the help of 3*3 window we search for ridge ending and bifurcation in ridges, for minutiae marking the binary image is converted to color image with RGB values. The ridge ending are marked using red color, the ridge bifurcations are marked using blue color. Here together the ridge endings and ridge bifurcations we call it as a minutiae[4].

classification.

Here the image is resized or resized to 256*256 resolution. Using the SIFT(Scalar invariant feature transform) algorithm we extract the feature and feature description of the image[8].

The scale-invariant feature transform (SIFT) is a feature detection classification Algorithm used to detect and describe local features in images. SIFT keypoints of objects are first extracted from a set of reference images and stored in a database.An object is recognized in a new image by individually comparing each feature from the new image to this database and finding candidate matching features based on Euclidean distance of their feature vectors. From the full set of matches, subsets of key points that agree on the object and its location, scale, and orientation in the new image are identified to filter out good matches. Finally the probability that a particular set of features indicates the presence of an

object is computed, given the accuracy of fit and number of probable false matches[8]. Object matches that pass all the tests can be identified as correct with high confidence for classifying we create a database of feature descriptors of 1480 images. Probabilistic neural networks (PNN) are a kind of radial basis network suitable for classification problems. A probabilistic neural network is created using the database the network acts as a nearest neighbor classifier ,here we have 148 categories to classify.(pnn is a two-layer network. The first layer has radbas neurons, and calculates its weighted inputs with dist and its net input with netprod. The second layer has compete neurons, and calculates its weighted input with dotprod and its net inputs with netsum.

Only the first layer has biases. In pnn sets the first-layer weights to P', and the first-layer biases are all set to 0.8326/spread,resulting in radial basis functions that cross 0.5 at weighted inputs of +/ spread. The second-layer weights W2 are set to T.)[8].

DATA FLOW DIAGRAM

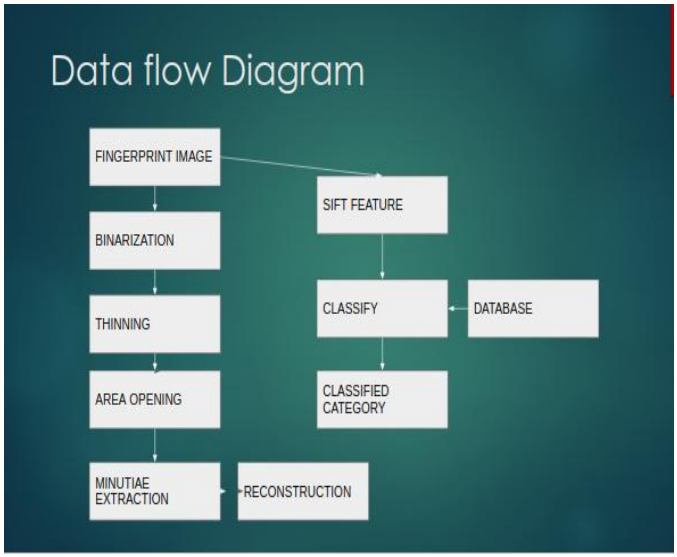

Figure 1 Data flow diagram

MODULES

Module 1: Collect formally available fingerprint
Module 2: Reconstruct the fingerprint
Module 3: Collecting the reconstructed fingerprint
Module 4: Classify the reconstructed fingerprint
Module 5: Display the final output.

IV. TECHNOLOGIES USED

MATLAB- MATLAB is a multi-paradigm numerical computing environment and proprietary programming language developed by MathWorks. MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages.

VLFeat -The VLFeat open source library implements popular computer vision algorithms specializing in image understanding and local features extraction and matching. We use sift function of vlfeat for extraction of features and feature descriptors.

RESULT SNAPSHOTS

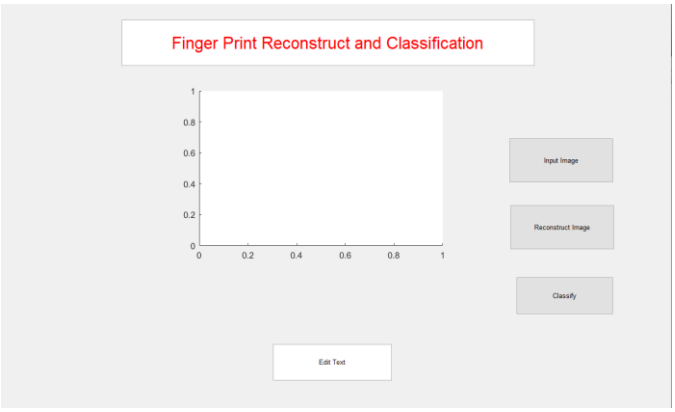

Figure 2.1 UI of application

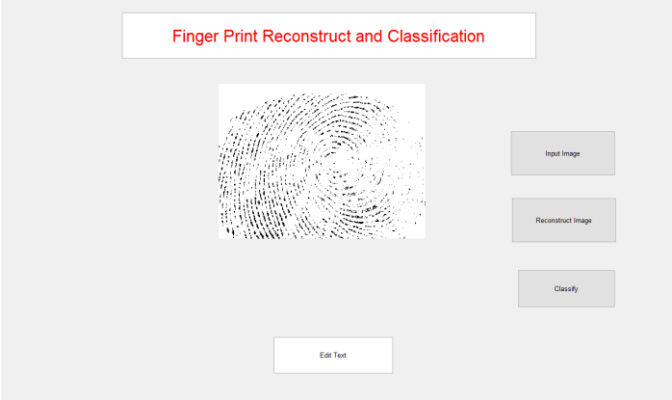

Figure 2.2 Taking input image

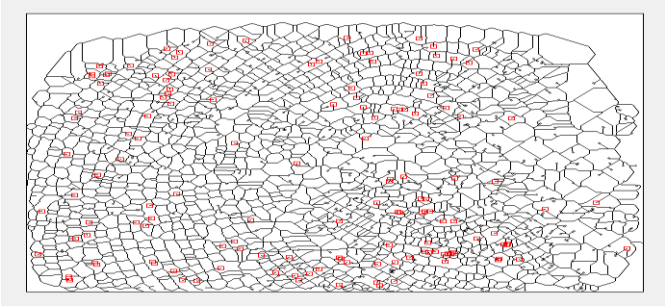

Figure 2.3 Identified ridge ending marked red

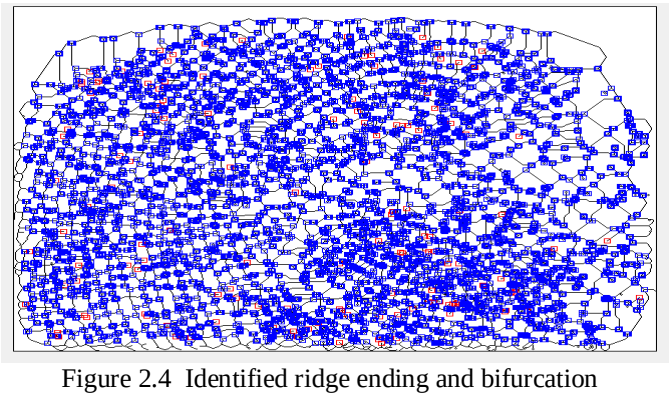

Figure 2.4 Identified ridge ending and bifurcation

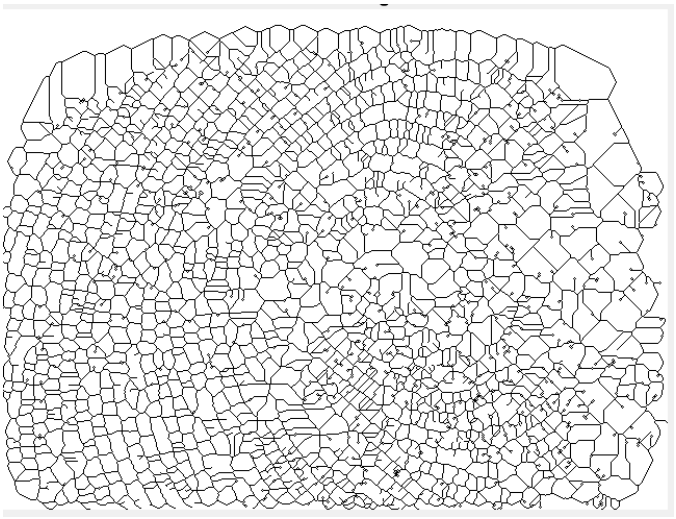

Figure 2.5 Thinned image

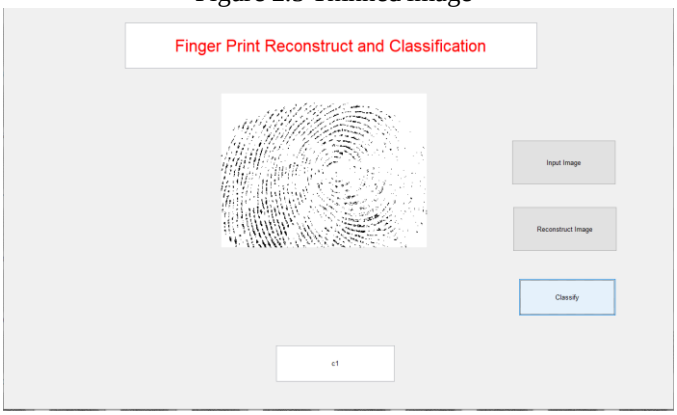

Figure 2.6 classification result

V. CONCLUSION

We have tried to resolve the challenges of latent fingerprint identification like spoiled ridges of latent fingerprints, higher value of background noise, lack of publicly availability of latent fingerprint dataset and non-availability of any specific method for fingerprint matching. To overcome these, a framework for latent fingerprint reconstruction, enhancement and recognition is presented

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[8] https://en.wikipedia.org/wiki/Scale-invariant_feature_transform

