

Finger Print Matching Based On Minutiae and Orientation Map Feature Extraction

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ABSTRACT

Biometric is the process of identification of the person based any one of the human body part. Identification of the persons using finger print is more commonly employed in all the recognition systems. Features were extracted from the finger print images based on the ridges and edges in the input images. Supervised learning methods were employed for the recognition of the palm print images. For the identification of the person the features were extracted from the images.

KEYWORDS

Miniature, Orientation Map, Fingerprint, Recognition, Test image, Train image, True positive, True negative

INTRODUCTION

The extracted features were then recognized using distance metrics..Biometrics refers to the quantifiable data (or metrics) related to human characteristics and traits. Biometrics identification (or computer science as a form of identification and access control. It is also used to identify individuals in groups that are under surveillance. Biometric identifiers are the distinctive, measurable characteristics used to label and describe individuals. Biometric identifiers are often categorized as physiological versus behavioral

characteristics. Physiological characteristics are related to the shape of the body.

EXISTING SYSTEM

The distorted finger prints were taken as input. The distortions in the finger prints were cleared and the matching process is employed. For removal of distortions in finger print images orientation map is employed for the identification of the distortion location in the input image. The period map and the orientation map were extracted from the images. From the period and the orientation map the registration process is employed in order to register the patterns of finger print in the input images

DISADVANTAGES

The registration process require tedious training for the creation of the training set. The registration process may fail in cases where the finger print cannot be acquired more exactly. The classifier requires labels and training of the dataset. The process of online matching for training and identification of label were difficult

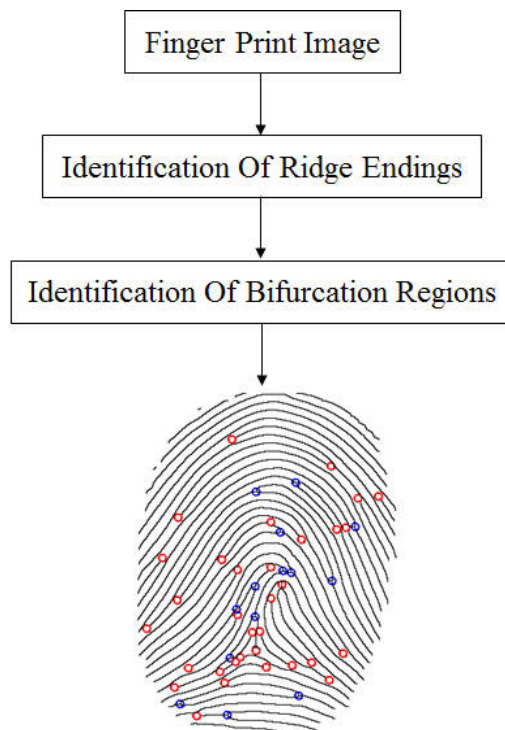
PROPOSED SYSTEM

The input finger print is taken. The features were extracted from the finger print using Miniature feature extraction and Orientation map estimated. The Minutiae feature extraction is helpful for the

identification of the important ridges and corners in the input images. Based on the finger print the persons were identified by the Minutiae points in the images. The Minutiae points were extracted based on the identification of the ridges and the edges in the finger print images

MINUTIAE FEATURE EXTRACTION

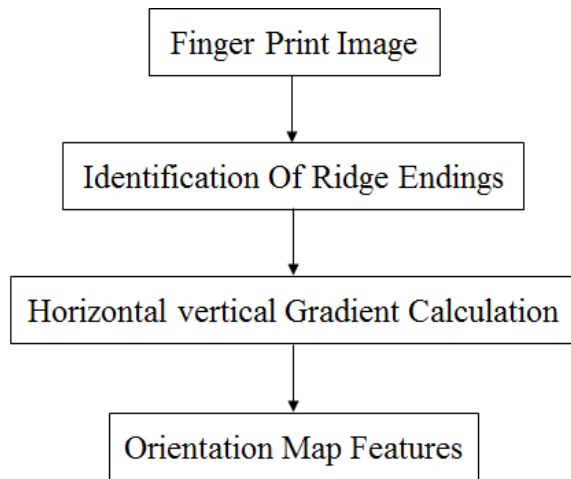
Based on the finger print the persons were identified by the Minutiae points in the images. The Minutiae points were extracted based on the identification of the ridges and the edges in the finger print images. The edges were identified by identifying the pixels that are white in the initial edges of the image. The ridges were identified by identifying the pixels nearby the identified edge pixels. The pixel locations of the ridges and the bifurcations were saved as features.



A ridge ending is defined as the point where a ridge ends abruptly. A ridge bifurcation is defined as the point where a ridge forks or diverges into branch ridges. Collectively, these features are called minutiae. Most of the fingerprint extraction and matching techniques restrict the set of features to two types of minutiae: ridge endings and ridge bifurcations.

ORIENTATION MAP EXTRACTION

The orientation is an angle formed by the ridge inclination and the horizontal line. As the ridge has no direction, the term orientation are used instead and the angle varies from 0 to 180. Each region of the fingerprint, except the region of singularities, has a common ridge orientation, therefore instead of computing the orientation at each pixel point, generally they are computed for each block. Initially, the horizontal and vertical gradient are computed at each pixel using for example the sobel operator, then the image are divided in small blocks of size $W \times W$ (e.g., size 8×8) and computed the angle by analyzing the block. The block size depends on the inter-ridge distance, i.e. it should include at least one ridge and one valley in a block. The block orientation can be determined from the pixel gradients by averaging or voting (optimization).



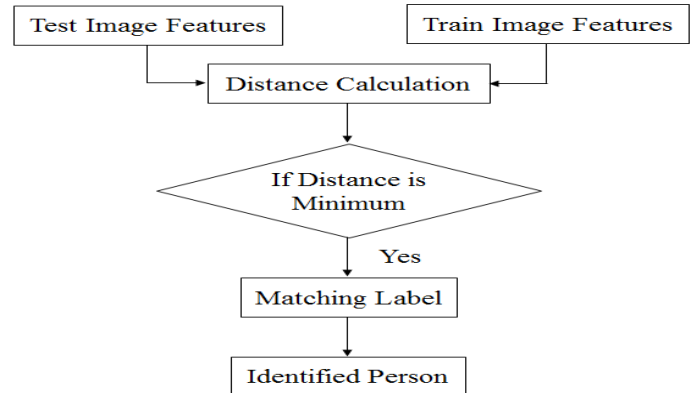
The orientation field of a fingerprint image represents the directionality of ridges. Fingerprint image typically divided into number of non-overlapping blocks and an orientation representative of the ridges in the block is assigned to the block based on grayscale gradients in the block. The block size depends on the inter-ridge distance, i.e. it should include at least one ridge and one valley in a block. The block orientation can be determined from the pixel gradients by averaging or voting

RECOGNITION

The features were extracted for all the images from the database and the values were extracted as features. Matching process is done based on the measurement of distance between the test image features and training image features. The Euclidean distance is measured between the test image features and the train image features.

$$d_{xy} = \sqrt{\sum_{i=1}^n (x_i - y_i)^2}$$

The images that is having minimum distance is identified as the matching finger print.

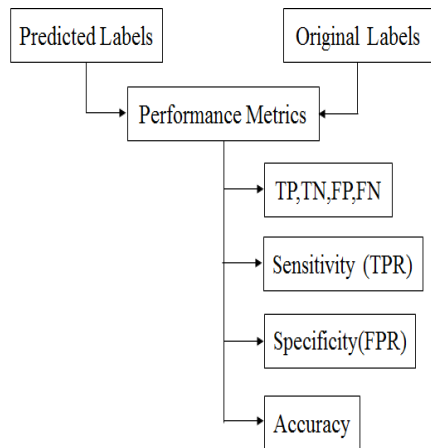


PERFORMANCE MEASURES

The True positives, True Negatives, False Positives, False negatives, True Positive rate (Sensitivity), false positive rate (Specificity) and accuracy of the process is measured. The accuracy of the process represents to which extend the classifier classifies the images based on the given label. The sensitivity of the process represents how exactly the classifier correctly classifies the data to each category. The specificity of the process represents how exactly the classifier correctly rejects the data to each category.

$$\text{Sensitivity or TPR} = \frac{TP}{(TP + FN)}$$

$$\text{Specificity or FPR} = \frac{TN}{(FP + TN)}$$



$$ACC = \frac{(TP + TN)}{(FP + TN) + (TP + FN)}$$

CONCLUSION

The proposed method is capable for the identification of the persons in a more accurate manner. The extracted features extraction method were more reliable. For feature extraction miniature feature and orientation map features were extracted. The matching process is employed based on the distance measured using Euclidean distance measures

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