Veins Based Bio-Metric Systems for Personal Identification

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ABSTRACT - Finger vein biometrics also called vein matching or vascular technology. It is that type of technique which is used for biometric authentication. Identification of people among each other has always been a tough task for the researchers. There are many technique which are used for identifying for a person but bio-metric technique is the standard one which help us for online identification of individuals on the basis of physiological features. The technology is currently being used or developed for a wide array of applications including employee attendance, credit card authentication, and time tracking, network authentication, end-point security, automobile security, and at ATMs.

I. INTRODUCTION

Like fingerprints or iris patterns, finger views based blood veins patterns are unique for each individual. It provides a safe security because the views are located under the surface of the spin. The fingerprints can be cheated by dummy finger fitted with a copied fingerprints , but the finger vein based identification system is highly safe for authentication .This technology is used for wide variety of applications including credit card authentication employee time and attendance tracking automobile security , computer and network authentication and so on. Finger vein biometric authentication is a modern technology which is used for the various places for identification. For authentication application the pattern of the finger vein is stored in a database. The finger is placed on an attester terminal which contains a near-infrared, light emitting diode light source and a monochrome charge coupled device camera. The hemoglobin present in the blood absorbs the near infrared light emitting diode light and makes the vein to appear as dark pattern and The recorded image is digitized and stored in the database. During authentication, the finger vein is scanned and is compared with the image in the database.so we can say that it is a technique which is used for identification . It can be understand by the following diagram –
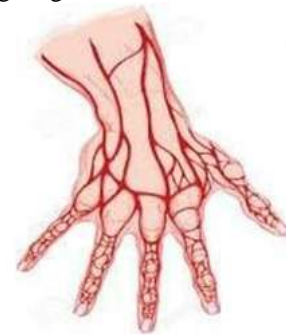
Classification

Veins based identification system are classified into two categories namely uni-veins system and multi-veins system. First of all in uni-veins based system, the veins of single physiological features are used for identifying a person. The example of uni-veins based identification system are head, face, iris, hand, fingers and palm veins based identification system. In multi-veins based system, due veins of two or more physiological features are used for personal identification.

Proposed Methodlogy
The finger vein recognition technique is consists of following five steps –
(1) Acquiring image
(2) Extraction of finger region
(3) Pre-processing
(4) Feature extraction
(5) Matching

Acquiring images -The images are input through the publicly available datasets i.e. THU-FVFDT2, SDUMLA-HMT, and FV-USM

1)   Images from SDUMLA, FV-USM and THU-FVFDT2 database respectively
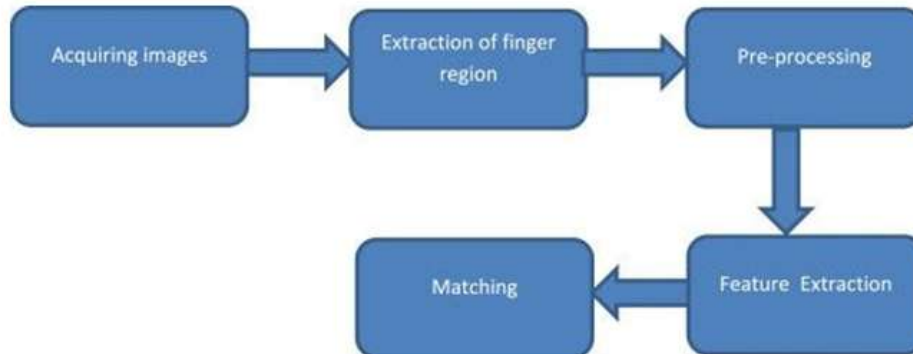
2)   Extraction of finger vein –
The extrication of finger vein is done for region of interest (ROI). The ROI of the given image is acquired by lower-limit. The multidimensional based filter is used in lower-limit. The ROI of extricated image is produced by intertwine the threshold and cropped image.

3)   Pre-processing -
The near-infrared illumination used in the time of image capturing method produces little noise and contrast in finger vein structure. Thus, pre-processing step is most important to increase the standard of given image. After the segmentation of ROI, we apply sharpening filtering and block local normalization. These methods improve the local details of vein structure while enhancing the recognition results. The segmentation of ROI may get the same region with proper finger patterns design for feature extraction. Apart from, better accuracy of extraction of ROI enhance the accuracy rate of the system while minimizes the calculation complexity of subsequent methods.

4)   Feature extraction -
This is very important methods in matching process. The edges and textures important feature finger vein images. The important fractal dimensions features are extracted with the help of PCA. Fractals are not regular geometric objects that have constant irregularity in each scale. Dimensions are the measurable metric of some kind such as depth, height, breadth, and length. They are explained as an indexing factor for featuring characterized fractal design as the ratio between variations in detail to variation in scale. The fractal dimensions are divided into grids and boxes.

5)   Matching -
The matching step for the introduced technique depends on the classification methodology to get the shift matrices of finger vein. The SVM method is used to calculate correspondence among finger vein patches to relate. Contrasting with the existing methods, this method combines the search strategy for matching larger patch sizes. Therefore, this process implements a fast technique to avoid searching for each pixel, which produces significant reduces the computation time.

Background of viens based system -
The veins based images like head veins, face veins, palatal veins, heart veins, hand / finger veins are used for identifying the persons from others. In modern world the veins based technique is widely used in these days because these techniques cannot be modified. The veins of humans are stabled and unique until the human is in living stage. Any other technique that is not based on vein based recognition system, then an expert person can easily modify the techniques like finger prints, palm prints, hand shapes and face shapes recognition systems. These techniques do not identify the uniqueness of a person in complex situations. The veins based security system is much more secured than other security systems. At the starting of this technique finger vein based identification system has been used.1) then palatal based identification system has been used for identifying the individual. 2) The face vein based technique is a new identification technique which is widely used during these days; because face veins are unique for each person but finger veins, hand veins, palm vein, heart veins might match with other persons. Due to these reasons, face vein based identification system are used. The face vein images are captured by thermal cameras from optical image. After obtaining the thermal image, extraction feature method is used for obtaining the veins image of a person. The local binary pattern (PLLBP) and Gabor filter are used for recognizing

the face and finger prints. The LBP is easily affected by image noise. The Gabor method based upon filters which are not much effective in vein recognition image representation. The veins images exist only in living human body. In each uni-modal, the feature extraction and feature matching algorithm for identifying the individuals was firstly described on the basis of face veins, hand veins, finger veins and palm veins images which are not easily modified. The multispectral palm print image is generated from palm veins of a person, then it is compared with other person's palm veins images for identifying the individuals. Veins based identification systems are the part of physiological feature based systems because extracted veins represents physiological features of a person.

Advantages and disadvantages -

1) Internal nature - Vein patterns are inside the skin and can not be seen by naked eye, therefore damaged skin will not reduce the chance of finding views behind the skin. Furthermore dry, wet or dirty hands would not affect the system.
2) Duplicate - protection: Views patterns are difficult to copy.
3) Hygienic readers - In contract to fingerprint systems, readers are believed to be free of germs because users do not touch the remors.
4) Usability - These systems are very easy to use.

Indes Terms -
Face veins, Finger veins, Hand veins, Heart veins, Multi-veins, Palatal veins, Palm veins.it can be understand by the help of following images -

Head vein image

Face vein image

Palatal vein image

Heart vein image

finger vein image

Palm vein image

II. CONCLUSION AND FUTURE WORK
We can not identify the uniqueness of a person easily so it is very difficult task for us but by the help of this technique we can easily identify on the basis of their physiological and behavioural features . Vein recognition system is the most popular among all the biometrics system . Vein recognition system is highly secure because the vein pattern is complex and it is underneath the skin which make the intruders unable to access the information. Hence, several methods and techniques was proposed on this vein recognition research. However, there are still have unsolved issue on this research such as the accuracy and the contactless design issues. It bring to the future work or the gap that researchers can focus on research on those topic to solve those issues.