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A Review on Palmprint Detection and Verification Using Digital Image Processing Algorithm

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ABSTRACT:
Palmprint recognition is a challenging problem, mainly due to low quality of the pattern, large nonlinear distortion between different impressions of the same palm and large image size, which makes feature extraction and matching computationally demanding. In this paper Palmprint recognition process consists of image acquisition, pre-processing, feature extraction, matching and result. One of the most important stages in these methods is pre-processing which contains some operations such as filtering, Region of Interest (ROI) extraction, and normalization. Palmprint is the very challenging and demanding.

KEYWORDS: Palmprint, ROI (region Of Interest), Filtering, Acquisition, Feature extraction.

1. INTRODUCTION:

Palmprint is one of the most reliable features in personal identification because of its stability and uniqueness [5].The inner surface of the palm normally contains three flexion creases, secondary creases and ridges. The flexion creases are also known principal lines and secondary creases are known as wrinkles [6].Many feature of a palmprint can be used to uniquely identify a person. Palmprint research employs either high or low resolution images. High resolution images are suitable for forensic applications such as criminal detection. Low resolution images are more suitable for civil and commercial applications such as access control. Palmprint is suggest to the principal lines, wrinkles and ridges appear on the palm, there are three principal lines on a typical palm, named as heart line, head line and life line, respectively [7]. More importantly, the details of these patterns are permanent. There are two popular approaches to palmprint recognition. The first approach is based on the Palmprint statistical features while the other on structural features.[8] Most of the preprocessing algorithms segment square regions for feature extraction but some of them segment circular and half elliptical regions. The square region is easier for handling translation variation, while the circular and half elliptical regions may be easier for handling rotation variation. This paper focuses on problem based on the preprocessing section which is important in providing high accuracy in pattern recognition. Many papers which have discussed about preprocessing and feature extraction, So we discuss and give more attention to an individual part of an preprocessing because until we can't get a proper ROI region, we will unable to get high accuracy further.

2. MATERIALS AND METHODS:

In that paper we have studied the several point of palm print images .also different types we used and survey for palm print paper The author have proposed that a pose-invariant hand shape recognition method based on the geometry of the fingers is proposed. Finally, score-level fusion based on a weighted sum is used to obtain matching results. To overcome the problems introduced, some studies had combined vascular patterns, and others used peg free contact methods to acquire hand images. A more hygienic and user-friendly contact-free image acquisition setup was developed. This new method is able to mitigate the impact of rings on finger extraction and improve both the accuracy and stability of feature extraction [1].

Yatam Laxmi Malathi Latha , Munaga V. N.K Prasad [2], have introduced the Palmprint authentication is a means of personal authentication that uses unique Palmprint features. Palmprint is obtained by just scanning the user's palm on the platform Of the scanner when scanning is performed. Proposed algorithm focuses on extraction of Dynamic Region Of Interest (ROI) from the palmprint image. A new technique to extract the ROI from a palmprint image is proposed.

They have introduces a high-resolution palmprint recognition system based on minutiae. A sequence of robust feature extraction steps allows to reliably detect minutiae; moreover, the matching algorithm is very efficient and robust to skin distortion, being based on a local matching strategy and an efficient and compact representation of the minutiae[3].

Feng Yuea, WangmengZuoa, DavidZhanga,b, KuanquanWanga [4], have proposed Coding-based methods are among the most promising palmprint recognition methods because of their small feature size, fast matching speed and high verification accuracy. The competitive coding scheme, one representative coding-based method, first convolves the palmprint image with a bank of Gabor filters with different orientations and then encodes the dominant orientation into its bitwise representation based on the statistical orientation distribution and the orientation separation characteristics, proposed a modified fuzzy C-means cluster algorithm to determine the orientation of each Gabor filter.

3. DISCUSSION/ANALYSIS:

In that paper features from high resolution images while in low resolution images they generally extract principal lines, wrinkles and texture. Initially palmprint research focused on high-resolution images but now almost all research is on low resolution images for civil and commercial applications. Preprocessing sets up a coordinate system to align palmprint images and to segment a part of palmprint image for feature extraction.

The palm lines are likely to have any orientations but the orientations of all palmprint lines are not uniformly distributed. State-of-the-art ones and they have merits of high accuracy, robustness to illumination variation and fast implementation capturing method is another important factor to be evaluated. So now new techniques survey for palmprint verification and detection Proposed method included as shown in figure.

Database Images Palmprint image in database will taken as standard database which will taken in proper environment. Preprocessing

Preprocessing is used to align different palmprint images and to segment the center for feature extraction. Most of the preprocessing algorithms employ the key points between fingers to set up a co-ordinate system.

Preprocessing involves five common steps:

1. Bi-narizing the palm images
2. Extracting the contour of hand and/or fingers
3. Detecting the key points
4. Establishing a co-ordination system
5. Extracting the central parts.

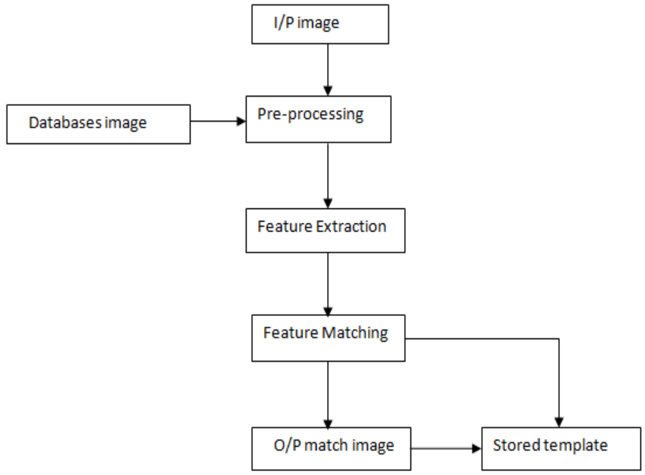

Fig: Block diagram of proposed work

A grayscale digital image or binary image is an image in which the value of each pixel is a single sample, that is, it carries only intensity information. Images of this sort, also known as black-and-white, are composed exclusively of shades of gray, varying from black at the weakest intensity to white at the strongest. The intensity of a pixel is expressed within a given range between a minimum and a maximum, inclusive. This range is represented in an abstract way as a range from 0 (total absence, black) and 1 (total presence, white), with any fractional values in between. Figure illustrates the key points and preprocessed image.

The first and second steps in all the preprocessing algorithms are similar. However, the third step has several different implementations including tangent, bisector and finger-based to detect the key points between fingers. The intersection of the line and the finger boundary is considered a key point. The middle finger approach uses a wavelet to detect the fingertip and the middle point in the finger bottom and construct a line passing through these two points. The multiple finger approach uses a wavelet and a set of predefined boundary points on the three fingers to construct three lines in the middle of the three fingers.

FEATURE EXTRACTION:

After ROI is obtained from pre processing, we extract important features from the image for recognition task. In particular, we use Multiscale local binary pattern (MLBP). The subspace projection technique is performed as a two-step process of constructing the subspace basis followed by projecting palm print images into the compressed subspace. New test images are then projected into the same subspace for image matching. It is computationally more efficient to perform image matching in subspaces as the dimensions have been reduced significantly.

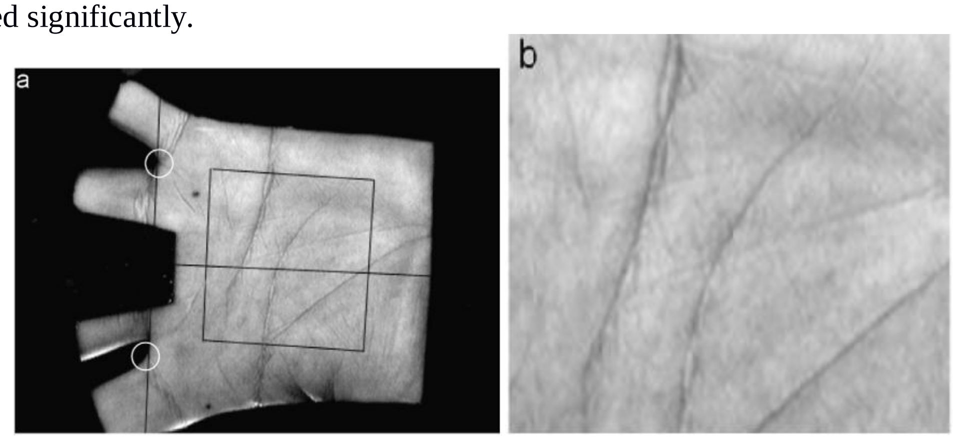

Fig. 2 Illustration of Pre-processing

Multiscale Local binary pattern (MLBP) is a nonparametric descriptor, which efficiently summarizes the local structures of images. MLBP was originally proposed for texture analysis, and has proved a simple yet powerful approach to describe local structures. It has been extensively exploited in many applications, for instance, face image analysis, image and video retrieval, environment modeling, visual inspection, motion analysis, biomedical and aerial image analysis and remote sensing. MLBP-based palmprint image analysis has been one of the most popular and successful applications in recent years. Facial image analysis is an active research topic in computer vision, with a wide range of important applications, e.g., human–computer interaction, biometric identification, surveillance and security, and computer animation. MLBP has been exploited for palmprint representation in different tasks and other related applications.
The original LBP operator labels the pixels of an image with decimal numbers, which are called LBPs or LBP codes that encode the local structure around each pixel. Each pixel is compared with its eight neighbors in a 3 × 3 neighborhood by subtracting the center pixel value; the resulting strictly negative values are encoded with 0, and the others with 1. For each given pixel, a binary number is obtained by concatenating all these binary values in a clockwise direction, which starts from the one of its top-left neighbor. The corresponding decimal value of the generated binary number is then used for labeling the given pixel. The derived binary numbers are referred to be the LBPs or LBP codes[9].

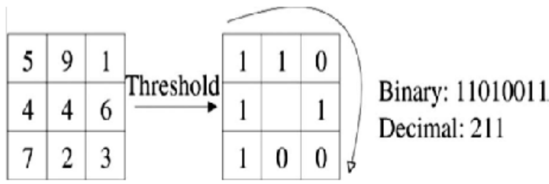

Fig. 3 –Local Binary Pattern

One limitation of the basic LBP operator is that its small 3 × 3 neighborhood cannot capture dominant features with large-scale structures [10]. To deal with the texture at different scales, the operator was later generalized to use neighborhoods of different sizes. A local neighborhood is defined as a set of sampling points evenly spaced on a circle, which is centered at the pixel to be labeled, and the sampling points that do not fall within the pixels are interpolated using bilinear interpolation, thus allowing for any radius and any number of sampling points in the neighborhood. Figure (3) shows some examples of the extended LBP (ELBP) operator, where the notation (P, R) denotes a neighborhood of P sampling points on a circle of radius of R [10].

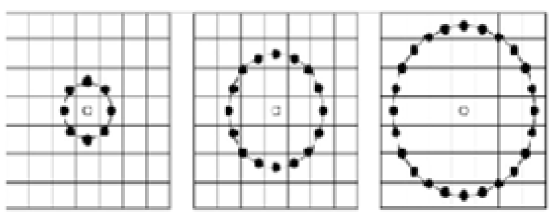

Fig. 4 - ELBP with (8, 1), (16, 2) and (24, 3) neighborhoods

Formally, given a pixel at (xc , yc), the resulting LBP can be expressed in decimal form as follows:

$$LBP_{P,R}(x_c, y_c) = \sum_{P=0}^{P-1} s(i_p - i_c)\, 2^P$$

Where ic and ip are, respectively, gray-level values of the central pixel and P surrounding pixels in the circle neighborhood with radius R, and function s(x) is defined as
$s(x) = 1$, if $x \geq 0$ 0, if $x < 0$.

From the aforementioned definition, the basic LBP operator is invariant to monotonic gray-scale transformations, which preserve pixel intensity order in the local neighborhoods. The histogram of LBP labels calculated over a region can be exploited as a texture descriptor.

The obtained binary string is then concatenated add compared with the stored template.

Feature Matching & Stored template

For every extracted Palm Print Image, feature has been extracted using feature extraction algorithm. So for detection of Forgery wrt to Input Test Palm Print Image, it will extract the feature from it and will match with Image in database image and verification is done. The minimum distance vector is calculated using Hamming distance and matching is performed. And lastly verified images are saved in stored template.

4. CONCLUSION:

Palmprint is the very important for several and commercial applications. In this paper we survey for different techniques using palmprint detection and recognition. Several works have been carried out by researchers on the concept of palmprint detection and verification searching. Palmprint is one of the most reliable physiological characteristics that can be used to distinguish between individuals. On the basis of these way that may have to say all techniques are good for palmprint verified and detected that their own advantages and disadvantages. In this paper, a various methods of palm print verification and detection using multiple database system. A comprehensive analysis of the experimental results

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