Computer Aided Touchless Palmprint Recognition Using SIFT

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Abstract* : *Palmprint identification has established to be one of the in style and promising biometric modalities for rhetorical and business applications. In recent years the Touchless system emerged as a viable choice to address healthful problems and improve the user acceptance. The presence of important variations in scale, rotation, occlusion and translation in the Touchless palpitation images requires the extraction of characteristics that are tolerant of such changes. Therefore, the use of traditional handheld extraction methods in Touchless image schemes remains a hot topic of research and therefore, all the most popular methods for extracting the handheld function may not be useful in Touchless frames. In this document, we systematically perform the feature extraction method using SIFT related to the recognition of palpable Touchless impressions and present the performance evaluation of images in real time. Our experimental results in more than 15 real-time handheld images. It suggests that the transformation characteristics of scaling invariant features (SIFT) have significantly better performance for Touchless handheld imaging compared to other approaches previously employed in conventional handheld imaging. The accuracy achieved shows a good performance of these characteristics.

Keywords : Biometrics,Palmpriimaging,SIFT,Matlab basics,Feature extraction.

I. INTRODUCTION

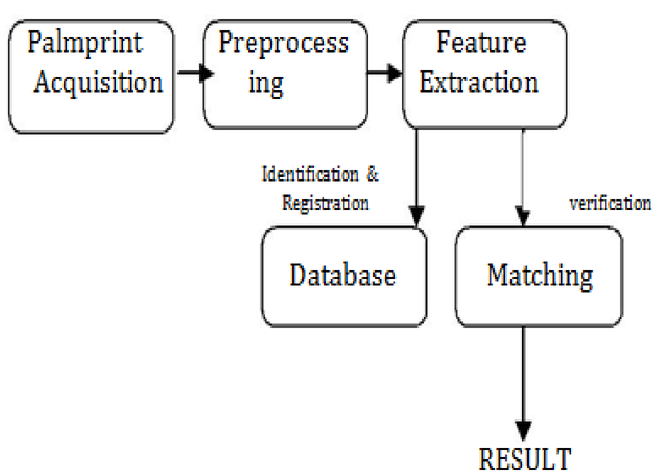
Hand-based biometric authentication systems have gained a lot of attention since the last decade. Identity authentication based on hand geometry such as DNA, fingerprints, venous patterns and knuckles are among other biometric data apart from the handheld impression, however square measure later thought of higher and a lot of economists. It required sensors and did not require much in security applications such as home security systems, IT systems, restricted access control, etc. Hand-based systems range from earlier systems based on drive pins for non-stick systems. To handle hygiene problems and improve user acceptance, contactless systems have emerged as a viable possibility.Handheld functionality is one of the appropriate personal authentication systems for network-based applications. The authentication system consists of registration and verification phases. Upon registration, training samples are collected and processed by processing, extracting features and modeling modules to generate masking templates. In the verification, a query sample is also processed by preprocessing and the feature extraction method and then it is combined with reference models to decide whether it is a sample or not. A configuration system consisting of a palm print-based authentication system can work with a multi-use camera in uncontrolled circumstances, such as mounting on a laptop, a mobile device. These systems have great value and features can be extracted with less computational effort.Not like previous biometric systems, it doesn't need instrumentation and has achieved a higher precision value equivalent to the fingerprint. We use the SIFT method, the invariable function of scale transforms (or SIFT) is an associate formula in artificial vision to find and describe the local characteristics of the images. Applications embody seeing, robotic mapping and navigation, image handicraft, 3D modeling, gesture recognition, video chase and matching the motion. You can extract attention-grabbing points from the thing to produce a "functionality" Applications embody visual perception, robotic mapping and navigation, image handicraft, 3D modeling, gesture recognition, video trailing and motion correspondence. For any object in a picture, you'll be able to extract attention-grabbing points on the thing to produce a "function not solely detected, however additionally characterized by values to acknowledge (match) these areas or points of interest in different pictures of constant scene object. Has had significant success within the community vision.

II. OUR WORK

In this document, we investigate the method of extracting characteristics using the characteristics of SIFT. We have implemented the SIFT algorithm, which aims to have a series of images and find the best match with a single image that remains as a "template image". SIFT offers matches and exchange scores, where the "matches" represent the same descriptors found within the 2 images and the "scores" determined by the surveyor's methodology, tend to evaluate the best correspondence between all the images with the image of the model, when there is an exact correspondence between two images, the "score" seems to be zero, since the position of the descriptors in the two images is the same, we find the best match or the second best match with the model that uses the "scores". This approach has been adopted to address the wide variety within the contactless image class.

III. SYSTEM DESIGN

A manual fingerprint recognition system usually consists of four parts: manual scanner, preprocessing, feature extraction and association. The Palmprint scanner is for collecting portable print images. Pre-processing consists in configuring a coordinate system to align the images of the palm of the hand and segment a part of the palm image to extract the characteristics. The extraction of the characteristics is to obtain effective characteristics of the pre-treated palms. Finally, a matchmaker compares two characteristics of the palm of the hand.



Preprocessing

Preprocessing is used to adjust the different images on the handheld and to divide the vocal parts to include extraction. Most preprocessing calculations use the key between the fingers that make up an organization's framework. The preprocessing includes in principle five basic improvements,

- Read a photo
- Feature extraction
- Extract the shape of a hand and, in addition, the fingers
- Detect the main keys
- Establish a coordination framework
- Matching current work image with database image to separate the separation between two key points.

IV. FEATURE EXTRACTION USING (SIFT)

ALGORITHM:

1. **Detection of scale extrema points**: In this first phase, the key points were found in SIFT. The key points are such that they are invariant to change scale and several views of the same object. In order to achieve said scale space of an image, the image $I(x, y)$ and the defocusing of the Gaussian defocus $G(x, y, k\sigma)$ are convolved at different scales and, therefore, the difference is taken in consequence of the blurred Gaussian image for the efficient detection of stable key points. The convolution of the input image with the Gaussian blur on the scale, that is, the Gaussian difference (DoG) at multiple scales is calculated by subtracting two adjacent image scales separated by a constant multiplicative factor k?

$$D(x, y, \sigma) = L(x, y, k_i\sigma) - L(x, y, k_j\sigma)$$

2. **Location of the key points**: on the stage many candidates unstable points that have a low contrast / are misaligned at the edges. In this phase they are eliminated. To do this, we first have to find the interpolated positions of the extremes using the expansion of the Taylor series of the spatial scale function. Interpolation is possible using the expansion

of the Taylor series of the spatial scale function DoG, with the candidate key point as the origin. This expansion of Taylor is given by:

$$D(\mathrm{x}) = D + \frac{\partial D^T}{\partial \mathrm{x}}\mathrm{x} + \frac{1}{2}\mathrm{x}^{\mathrm{T}}\frac{\partial^2 D}{\partial \mathrm{x}^2}\mathrm{x}$$

Where D and its derivatives are evaluated at the candidate key point and $\mathbf{x} = (x, y, \sigma)$ represent the displacement from this point.

3. **The key point of low contrast is discarded:** In the previous method, there are key points of low contrast, which are eliminated in this stage. To discard low-contrast key points, the value of Taylor's second-order expansion D (x) is calculated in the displacement. If this value is less than 0.03, the candidate key point is discarded. Otherwise, it is maintained, with the final position y + x and the scale, where y is the original position of the key point on the scale.

4. **Eliminate edge responses:** Even if the candidate key point is not robust enough for small amounts of noise, the DOG function has strong responses along the edges. Therefore, to improve stability, key points with ill-defined positions but with high-level responses are eliminated.

5. **Assignment of orientation:** In this step, each key point is assigned with one or more orientations according to the gradient directions of the local image. With this step, the rotational invariance is achieved when the key point descriptor is represented in relation to this orientation and then the invariance to the rotation image is achieved. The magnitude and direction calculations for the gradient are made for each pixel in a neighboring region around the key point in the Gaussian image L. blurred.

6. **Descriptor of key points:** the previous steps have identified positions of key points in specific scales and assigned orientations. This ensured the invariance of the position, scale and rotation of the image. Now we want to calculate a descriptor vector for each key point so that the descriptor is highly distinctive and partially invariant with respect to the remaining change

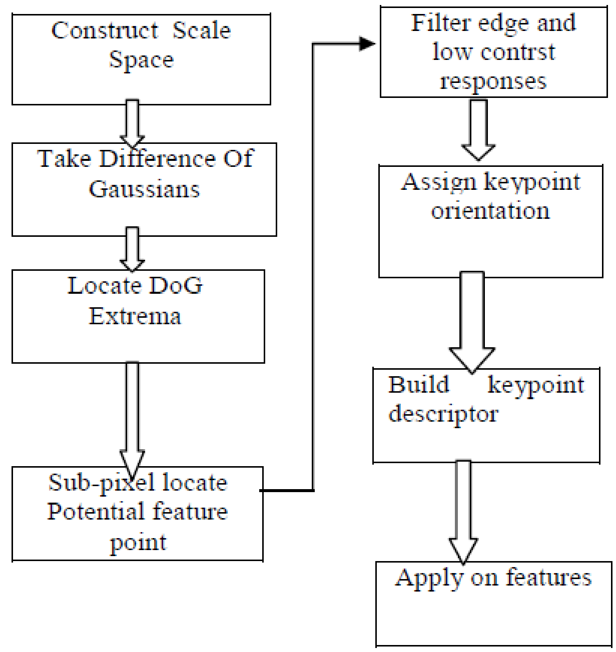


Fig.6:Steps of SIFT Algorithm

Matlab Simulation:

Our simulation required:

a) Resize image captured by mobile phone

b) SIFT algorithm

c) Databse with real palm images

d) Matlab 2010B installed in PC

TABLE 1-Related work on touchless palmprint recognition

Image name	Recognition Result	Type	Processing Time(s)
Im1	Recognized	True Positive	7.42
Im2	Not Recognized	False Negative	6.55
Im3	Recognized	True Positive	6.45
Im4	Not Recognized	True negative	7.73
Im5	Not Recognized	True negative	7.38
Im6	Not Recognized	True negative	7.10
Im7	Recognized	True Positive	7.15
Im8	Recognized	True Positive	7.01
Im9	Recognized	True Positive	6.58
Im10	Recognized	True Positive	7.28
Im11	Recognized	True Positive	8.72
Im12	Recognized	True Positive	6.57
Im13	Recognized	True Positive	7.11
Im14	Recognized	True Positive	6.55
Im15	Recognized	True Positive	6.70
Im16	Recognized	True Positive	7.71

Accuracy:

TP= 12

TN= 3

FP=0

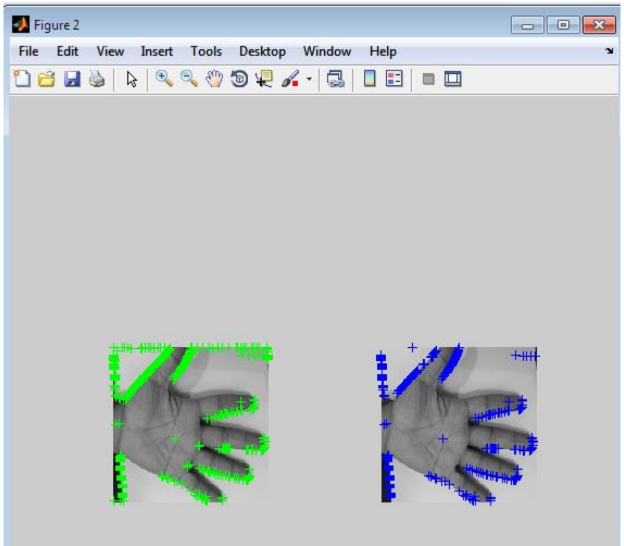
FN=1

Accuracy= TP+TN/(TP+TN+FP+FN)*100%

=(15/16)*100

= 93.75

Simulation Result



Analysis:

In this experiment using SIFT,about 16real palmimages were stored in database and current image are matchedwith database images.This figure shows the maximum matching and occurance of highPerformance.

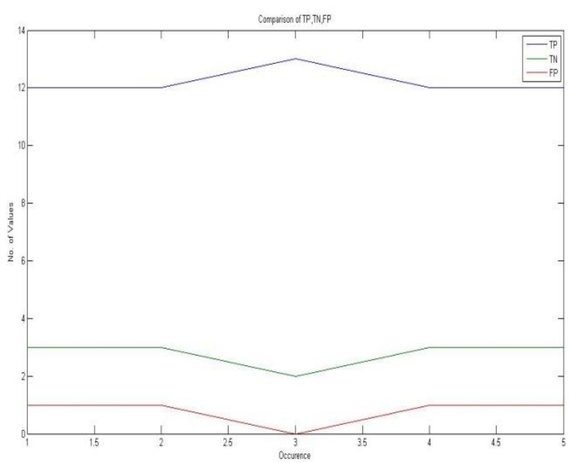


Fig.9:Performance graph using SIFT method

Fig: shows the following parameters

TP:true positive

TN:true negative

FP:false positive

V.CONCLUTION:

In this research work, realtime palmprint bases recognition system has been envisaged. The Palmprint are classified and features are extracted. Scale Invariant feature transform method has been used to extract regions from the palmprint images taken from camera images. It is advancement from the the previous work in the sense that previous reserach work researches have used existing databases of palmprint images rather than realtime images to implement and evaluate their algorithm while in this research work actual images of palmprint are taken.16 different palmprint images are taken of 16 subjects and algorithm is evaluated for accuracy and sensitivity of the algorithm which shows good results.

VI. FUTURE WORK:

- Need to perform additional experiments to use the color information available in your handheld images, to dynamically take advantage of a larger footprint area or to develop algorithms that can detect (even correct) cosmetics, injuries or palm text to enable Greater precision.
- Additional work is needed to evaluate the accuracy of correspondence in a more demanding way correspondence protocols, i.e,combination of left and right palm.

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