ALTERED FINGER PRINT ENHANCEMENT USING SIFT POINTS

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Abstract : **Fingerprint recognition used wide range of applications and used as a security issue in an effective way. The SIFT algorithm in take an input image and transform into group of local features and vectors and each vector is distinctive and invariant to scaling translation and rotation of the image. Collected features can be distinctive in different images and extended to match. SIFT algorithm mainly used for altered fingerprints.**

Keywords: **Biometrics, fake finger prints ,altered finger prints ,SIFT keypoints and mathematical equations.**

I.INTRODUCTION

Fingerprint is the combination of ridges and valleys. World wide it is used and strong evidences for identification. It is oldest and running identification tool. Different methods are used for satisfy the applications to full fill improving the demand for security.

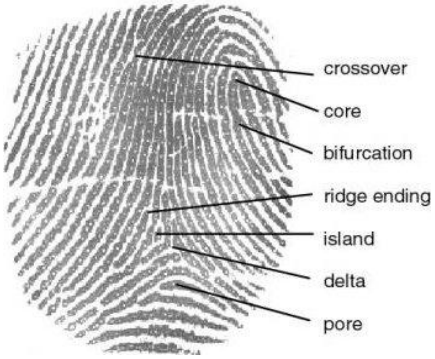

Fig 1 shows the fingerprint image taken by optical sensor.

Delta and core are the global features and land mark locations consistent across impressions of the same person. Altered finger prints are used the goal of being falsely Rejected by the system. Identifying weakness finger print pattern is the big problem. Finger print pattern changed by different mechanical factor such as knives, razor, thermal factors, acid and surgery etc., First software solution given by Feng et al 2009. The latest work Yoon et al 2012 b is used to find the matching altered finger prints.

II. LITERATURE SURVEY

Wang Yuan develops the real time finger print recognition system and it is applicable for today embedding applications. Wei cui proposed detection of edges and characters. According to characters of the edge compare the characters of the image. But it is not suitable for noise interference. Shunshan LI develops the image enhancement technique for rcognition.it involves Gabor filtering process and refined Gabor filtering process. This method does not result any spurious ridge. And advantage is increase the performance of the image.S.MIL'STEIN developed for partial and full fingerprints. Includes SFTA and LSA provides efficient recognition technique. Disadvantage is lack of pre-classification recognition technique. Deepak Kumar Karna developed cross correlation based fingerprint matching, disadvantage is not sufficient for recognising low quality fingerprint images. David G.Lowe developed scale invariant keypoints by distinctive image. Hough transforms and nearest neighbour algorithm, least squares are used.

III.BACKGROUND AND EXISTING SYSTEM

Commonly used minutiae method for fingerprint recognition. Minutiae technique improves market share ones and also it consumes very less energy and time efficient

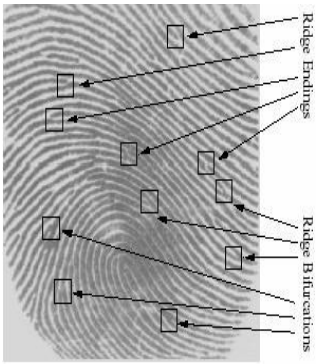

Fig 3.1 shows minutiae in image

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Figure3.1 shows minutiae keypoints 2012 Yoon et al proposed new method based on minutiae and orientation. The minutiae methods successfully in the altered fingerprints but in altered fingerprint are along the scars they appear more number and many of them being spurious.

IV. PROPOSED SYSTEM

David G.Lowe proposed scale invariant feature transform .this operation performs on different views of the image. It contains four stages pre-processing, scale space extrema detection, keypoint localization, orientation assignment, keypoint descriptor.

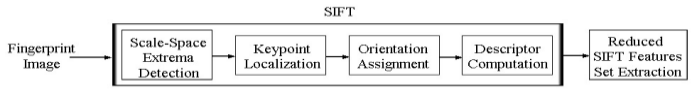

fig4.1 shows flow chart of the proposed system using SIFT operator

1. Fingerprint image: first should be converting gray scale image and apply Gaussian smoothing. Apply Gaussian smoothing to the 32 bit image because of reduce the noise.

2. Scale space extrema detection: Koenderink and Lindeberg described this method scale space image is obtained by te convolution of the input image with variable scale Gaussian function.

Gaussian pyramid

$L(x.\ y, \sigma) = G(x, y, \sigma) * I(x, y)$

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I(x, y) is the input image,* is the convolution operation with respect to x and y, G(x ,y, σ) is the variable scale Gaussian kernel.

At this stage interesting points are extracted and invariant to orientation and scale by using Difference Of Gaussian function $\sigma = \sqrt{2}$ form the input image A. Sigma value increased and form smoothed image B .DOG images are generated by two nearby scales and which are separated by constant multiplicative factor k. another way subtract the image B from image A. after each octave down sampled by a factor 2 and the process is repeat until the pyramid was build.

DOG=image B-image A. S of intervals so $k=2^{1/s}$. Therefore S+3 images in stack for each octave. Fig 4.2 shows how to form octaves bottom :left of the Gaussian pyramid and neighbouring images separated by constant scale factor. DOG pyramid formed by subtracted these images showing on right side.

Creating the DOG.$D(x, y\ \sigma) = (G(x\ y, k\ \sigma) - G(x, y, \sigma)) * I(x, y)$

$D(x, y, \sigma) = L(x.y.k\ \sigma) - L(x\ y, \sigma)$.

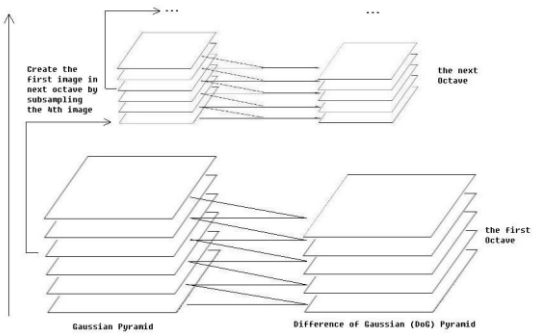

Fig 4.2 Gaussian pyramid and DOG.

3. Accurate keypoint localization: at this stage extreme points that are appearing on the edges of the image are removed. Taylor expansion of the scale space function D(x ,y ,σ) is used. Unstable extremum with low contrast removed. Hessian matrix is constructed for the rejection of edge responses:

4. Orientation assignment: Based on the local properties of the image an orientation is assigned to each keypoint. Magnitude of the keypoint:

$$m(x, y) = \sqrt{(L(x+1, y) - L(x-1, y)) + L(x, y+1) - L(x, y-1))}$$

and orientation of the keypoint:

$$\theta(x, y) = \tan^{-1}\left(\frac{L(x, y+1) - L(x.y-1)}{L(x+1, y) - L(x-1, y)}\right)$$

5. Computation of the keypoint descriptor: the magnitude and orientation of the keypoints are calculated by Gaussian window and put into 4X4 sample regions. All the points are rotates with respect the dominant point of the local extremum so the descriptor invariant rotation.

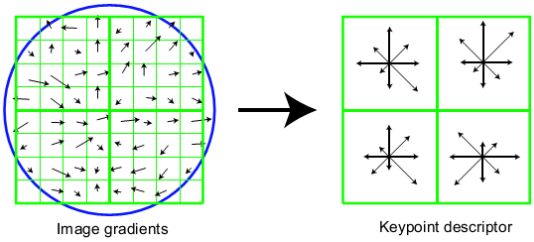

Fig 4.3 shows keypoint descriptor formation.

In fig 4.3 left sides apply Gaussian window and applied orientation histogram. Right: each histogram shows 8 directions indicate by arrows from 4X4 subregions. Length of each arrow with respect to the sum of gradient magnitudes near that the direction with region

The descriptor presented by a vector which involves the values of all orientation histogram equally dividing 360 degree of a circle into 8 parts. The characteristics' vector of keypoint as a size of 128(4X4X8) and is neutralized in order to get invariance against the effects of projection change

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6. Reduced SIFT features set extraction: in this step reduce the SIFT keypoints and reduce the unsaturated points in the image removed by the ratio between Eigen values of the Hessian

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matrix. By changing threshold value get the reduced SIFT points and give accurate value.

V. EXPERIMENTAL RESULTS OF THE PROPOSED SYSTEM.

Takes input image and show how octaves are formed and differences of the images.

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fig 5 fingerprint image

fig 5.(a)

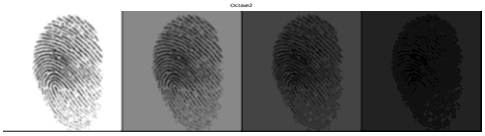

fig 5.(b)

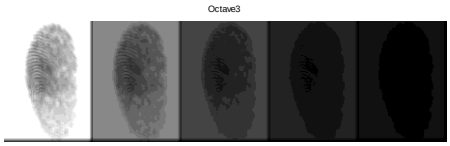

Fig 5.(c)

Fig 5.(d) 5.(e)

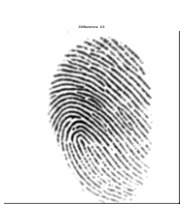

fig 5.(f) fig 5.(g)

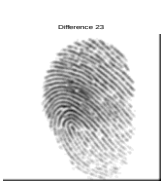

fig 5.(h) fig 5.(i)

fig 5.(j)

Fig 5.(k) fig. 5.(l)

Fig 5.(m)

Fig 5 shows the fingerprint image taken by optical sensor and 5.(a),5.(b),5.(c) are the formation of octaves 1,2 and 3 then 5.(d),5.(e) and 5.(f) are differences of the image(11,12,13). 5.(g),5.(h),5.(i) are the differences of images 21,22,23 ,f.ig5.(j),5.(k),5.(l) are the differences of the images 31,32,32 and finally fig 5.(m) shows the skeleton of the image 5,and give accurate keypoint to verify.

VI. APPLICATION AREAS

Numerous application based on scale Invariant Feature Transform relates to image histograms respective fields like research operations image based recognition and matching with many application areas in real world age between different data.

(a) Multiview matching: Best matching method used between different angles of a 3-D object .These are combined together in multiview geometry 3-D models are constructed. Similar methods are also used based on object recognition and other views of the same object multiple overlapping images.

(b) Object recognition: recognition using SIFT:

Operator performed based on the local features of the imge. In real world scenarios growing area of research has been

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developed called group of words and related methods. Some of the specific areas of the object recognition methods are used in visual search in image database, human computer interaction based on visual input and biometrics.

(c) Object category classification: this category involves unnoticed objects into object categories turn to be harder problems and recognition follows the category classification.

(d)Robotics: robotics are used everywhere. For robot that becomes natural environment and images are related to SIFT features and image descriptors uses for tasks such as(i) set of known references with respect to localizing robot.(ii) establishing and recognize the geometric relation objects for robot manipulation.

VII. EXTENSIONS

(a)PCASIFT

Ke and Sukthankar (2004) proposed an different approach for defining local image descriptors. Principal Component Analysis (PCA) given specific interest point and the corresponding gradient map is computed. Local image descriptors are matched by minimising the Euclidian distance. According to experimental results PCA-SIFT is faster and more distinctive.

(b)Colour SIFT

Different methods are used to convert to gray level to colour image. Bosch et a l.(2006) computed to HSV colour.

Van de sande et al (2010) performs study of the invariance properties of different colour representations based on distinctive types of illumination transformations. Experimentally concludes opponent SIFT descriptor based on colour leads high performance and solves the problem of object category classification.

VII. IMPLEMENTATIONS

Efficient real time process, parallel implementations of SIFTS developed for graphical processor unit's also field-programmable gate arrays.

For off line process, publically available implementations such asopensource,Linux,Windowsbinaries.

IX. CONCLUSION

Lowe's proposed the SIFT method and provides very effective in many applications. SIFT features easy to extract and invariant to scaling, rotation, transformation of the image and image noise. These efforts are going to big and implement SIFT features in more applications. Advanced algorithms based on SIFT gives best results in iris recognition, ear recognition, face recognition, voice recognition. SIFT keypoints helpful in the detection of altered fingerprints by mechanical, thermal factors. Because of SIFT keypoints benefit for security issues, boarder security issues.

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