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SURVEY OF DIFFERENT SEGMENTATION METHOD FOR LOW QUALITY FINGERPRINT IMAGES

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Abstract

In Computer Vision , Segmentation Refers to the Process of Portioning a Image into Multiple Segments(Sets of Pixels).The goal of Segmentation is to Simplify and change the Representation of an Image into Something that is More Meaningful and Easier to Analyze. Fingerprint Segmentation is an important step in Automatic Fingerprint Identification System. The task of a fingerprint Segmentation Algorithm is to Decide Which Part of the Image belongs to the fore-ground, Originating from the Contact of a fingertip With the Sensor, and Which Part to the Background, Which is the Noisy area at the border of the Image. In this Paper, We are Study Different Algorithm for the Segmentation of fingerprints is Presented and study the new method SVM (support vector machine) Classifier for fingerprint Image Classification.

Index Terms: *Segmentation, Classification, DIP, Sensor, SVM.*

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1. INTRODUCTION

In an increasingly digitized world the reliable personal authentication has become an important human computer interface activity. National security, e-commerce and access to computer networks are now very common where establishing a person's identity has become vital. Existing security measures rely on knowledge-based approaches like passwords or token-based approaches such as swipe cards and passports to control access to physical and virtual spaces, but there methods are not very secure. Tokens such as badges and access cards may be duplicated or stolen. Passwords and personal identification number (PIN) numbers may be stolen electronically. Furthermore, they cannot differentiate between authorized user and a person having access to the tokens or knowledge. Biometrics such as fingerprint, face and voice print offers means of reliable personal authentication that can address these problems and is gaining citizen and government acceptance.

2. FINGERPRINTS

Fingerprint is fully created at about seven months of fetes development and it is unique and unchangeable during individual's cuts or injuries. Fingerprint consists of a sequence of ridges and valleys on the surface of the finger. In image point of view, ridges are actually the dark part in the image except the presence of different kind of noise, whereas valleys are the bright part. Frequently, ridges and valleys go in parallel but sometimes they bifurcate or terminate. Bifurcation is present when the ridge suddenly split into two ridges and termination exists when t fact, bifurcation and termination represent some of important minutiae points. Minutiae mean small details that can determine important local features in the fingerprint.

2.1 Minutiae types are the following

Ending or termination, Bifurcation, Lake, Point or island, Spur, crossover

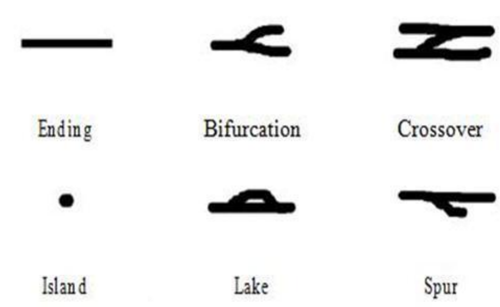


Figure- 2.1: Common minutiae types

Effective Segmentation can not only reduce the time of subsequent processing, but also improve the reliability of feature extraction considerably**[1]**Even Through This Subject does not fit the Usual Category of Books Reviewed, It is Still a Very Interesting Subject area, Especially With the Many new Security Measures that will Eventually Affect everyone. Fingerprint Recognition has been traditionally a way to identify a Person and has been used in the forensics commonly for 100 years. Today, New Security Measures are Being Implemented, for example – To prevent Identify fraud in Computer Network logon, ATM Machines and Web Access Applications. One of the Most Common and Widely Accepted forms of Biometric Identification is the fingerprint.

3. SEGMENTATION

Segmentation subdivides an image into its constituent regions or objects. The level to which the subdivision is carried depends on the problem being solved.

Image segmentation algorithms generally are based on one of two basic properties of intensity values: discontinuity and similarity. In the first category, the approach is to partition an image based on abrupt changes in intensity, such as edges in an image into regions that are similar according to set of predefined criteria. Growing, and region splitting and merging are examples of methods in this category**.**

3.1 Region Growing

As its name implies, region growing is a procedure that groups pixels or sub regions into larger regions based on predefined criteria. the basic approach is to start with a set of "speed" points and from these grow regions by appending to each seed those neighboring pixels that have properties similar to the seed(such as specific ranges of gray level of color).selecting a set of one or more starting points often can be based on the nature of the problem. When a priori information is not available, the procedure is to compute at every pixel the same set of properties that ultimately will be used to assign pixels to regions during the growing process. If the results of these computations show clusters of values, the pixels whose properties place them near the cento ride of these clusters can be used as seeds [19].

3.2 Region splitting and merging

The procedure just discussed grows regions from a set of seed points. An alternative is to subdivide an image initially into a set of arbitrary, disjointed regions and then merge and/or split the regions in an attempt to satisfy the conditions. a split and merge algorithm that iteratively works toward satisfying these constraints is developed next.

let R represent the entire image region and select a predicate p. one approach for segmenting R is to subdivide it successively into smaller and smaller quadrant regions so that, for any region R_i , $P(R_i)$ =TRUE. We start with the entire region. if P(R) = FALSE, we divide the image into quadrants. if p is FALSE for any quadrant, we subdivide that quadrant into sub quadrant, and so on. this particular splitting technique has a convenient representation in the form of a so-called quad tree. Note that the root of the tree corresponds to the entire image and that each node corresponds to a subdivision. In this case, only R_4 was subdivided further [19].

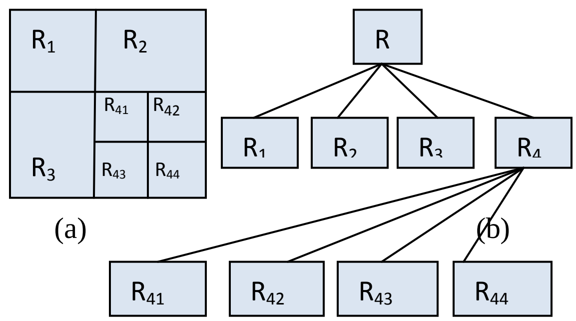


Fig-3.2: (a) Partitioned image (b) quad tree

The preceding discussion may be summarized by the following procedure, in which at any step we
1. Split into four disjoint quadrants any region R_i for which $P(R_i)$ =FALSE.
2. Merge any adjacent regions R_j and R_k for which $P(R_j U R_k)$=TRUE.
3. Stop when no further merging or splitting possible.

3.3 Morphological Watersheds

We have discussed segmentation based on three principal concepts: (detection of discontinuities,(b) thresholding, and (c) region processing. each of these approaches was found to have advantages(for example, speed in the case of global thresholding) and disadvantages (for example, the need for post processing, such as edge linking, in methods based on detecting discontinuities in gray levels).in this section we discuss an approach based on the concept of so-called morphological watersheds. as will become evident in the following discussion, segmentation by watersheds embodies many of the concepts of the other three approaches and ,as such ,often produces many of the concept of so-called morphological watersheds. as will become evident in the following discussion, segmentation by watersheds. embodies many of the concepts of the other three approaches and, as such , often produces more stable segmentation results, including continuous segmentation boundaries. this approach also provides a simple framework for incorporating knowledge-based constraints in the segmentation process. the concept of watersheds is based on visualization an image in three dimension: two spatial coordinates versus gray levels.

In such a "topographic" interpretation, we consider three types of points (a) points belonging to a regional minimum; (b) points at which a drop of water, if placed at the location of any of those points would fall with certainty to a single minimum: and (c) points at which water would be equally likely to fall to more than one such minimum. For a particular regional minimum, the set of points satisfying condition (b) is called the catchment basin or watershed of the minimum. The points satisfying condition(c) from crest lines on topographic surface and are termed divide lines or watershed lines.

3.4 Thresholding

Image thresholding enjoys a central position in applications of image segmentation [18].

The main idea in threshold methods is to select a threshold T that can separate objects from the background. This threshold can be specified according to the intensity histogram. Histogram of an image displays the gray-level values versus the number of pixels at that value. Any pixel with gray level $f(x, y) > T$ is assigned as a foreground; otherwise the pixel is assigned as background see formula.

$$G(x,y) = 255 \; If \; f\,(x,y) > T$$

$$G(x,y) = 0 \; If \; f\,(x,y) \text{ £ } T$$

For fingerprint images, the histogram shows the contrast of the image and the distribution of the gray level. As shown below in **figure** the image is a bright image and no obvious gray level point can be as thresholding point. Because of the nature of fingerprint images, this algorithm cannot apply a simple thresholding technique.

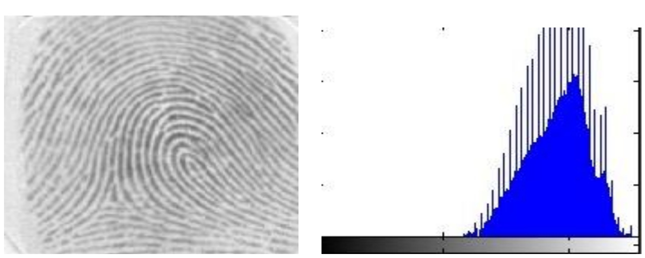


Figure- 3.4: Histogram for bright fingerprint

4. DIFFERENT SEGMENTATION TECHNIQUES OF FINGERPRINT IMAGE.

4.1 Low Quality Fingerprint Images

This is a new algorithm to segment fingerprint Images [9]. These algorithm uses four features the global mean, the local mean, variance and coherence of the image to achieve the fingerprint segmentation. Based on these features a rule features a rule based system is built to segment the Image.

The proposed algorithm is implemented in three stages; pre – processing, segmentation and post processing. Gaussian filter and histogram equalization are applied in the pre-processing stage. Segmentation is applied using the local features. Finally, fill the gaps algorithm and a modified version of otsu threshold in the post-processing stage. Segmentation stage.

4.1.1 Feature for fingerprint segmentation

Fingerprint features must reflect both the gray level of fingerprint and the direction of ridge lines. However the complicated construction of fingerprint pattern and the Imbalance in the contrast, require local feature Instead of the global features for gray-level based methods while coherence is the feature for direction based method. The combination for these features in one algorithm show efficiently the distribution of the pixels for ridges and valleys in the image. Coherence feature indicates the strength of the local window gradients centered on the processed point along the same dominate orientation.

Local mean, local variance and local coherence [7] are calculated as following

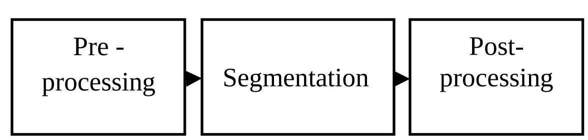
$$mean = \frac{1}{w2} \sum_{w} I, \; Variance = \frac{1}{w2} \sum_{w} (Imean)2$$

Where I is Intensity and w is the window size Centered on the processed pixels.

$$coh = \sqrt{(gxx - gyy)2 + 4(gxy)}2 \, / \, (gxx + gyy)$$

$$gxx = \sum_{w} Gx2 \, , \; gyy = \sum_{w} Gy2 \, , \;\; gXy = \sum_{w} GxGy$$

Where Gx and Gy are corresponding horizontal and vertical gradient components which are given by sobel operators.



4.1.2 Pre-processing

Fingerprint image with low contrast, false traces ridges or noisy complex background cannot be segmented correctly. Therefore it is required to enhance the image. Gaussian filter used in this method and histogram equalization. Gaussian filter used to smooth the image and hence background areas. This step together with split and merge technique, with is applied in the next stage, will collect pixels with similar gray levels into big areas. Histogram equalization is invoked in this stage too. When the global mean of the image under consideration is higher than a certain threshold, which mean a bright Image, histogram equalization is used to enhance the image by reduce the brightness of the image.

4.1.3 Segmentation

In this stage, Split and merge technique is applied to collect similar background areas after the smoothing process. in order to separate the foreground from the background, the image is divided into a number of non-overlapping sub –images of size 10X10 pixels and the local mean, local variance and local coherence are computed for each sub-image. The global mean together with the three a fore mentioned parameters are used to build a rule based system to segment the foreground and background of the image under consideration. The result of this rule based system is to decide whether a certain block is a foreground or a background.

4.1.4 Post processing

The segmentation fingerprint image may contain isolated background blocks which are surrounded by foreground blocks. Obviously these background blocks are foreground in the original image. A simple post processing technique is proposed to eliminate the presence of these isolated blocks.

4.2 New Modified Gradient Based Technique

The objective of Fingerprint segmentation is to extract the region of Interest **(ROI)** which contains the Desired fingerprint Impression. Present a Modified Gradient Based Method to Extract ROI. The distinct feature of these technique is that it gives high Accurate Segmentation percentage for fingerprint Image Even in case of low quality fingerprint Images.

4.2.1 (A) Mean and Variance Based Method

Mean and Variance based method can significantly reduce the number of basic image entities. And due to the good discontinuity preserving filtering characteristic, the salient features of the overall image are retained **[1].**

Steps for mean and variance based method **[1]** are summarized as follows

1. Divide the input image I(I,j) into non-overlapping blocks with size wxw.
2. Compute the mean value M(I) for each block using equation

$$M(I) - \frac{1}{W2} \sum_{i=w/2}^{w/2} \sum_{j=w/2}^{w/2} I(i,j) \quad \textbf{(1)}$$

3. Use the mean value computed **in** step 2 to compute **the** standard deviation value std (I) from equation 2.

$$Std(I) = \frac{1}{W^2} \sum_{i=w/2}^{w/2} \sum_{j=-w/2}^{w/2} (I(I,j) - M(I))2 \quad \textbf{(2)}$$

4. Select Empirically a Threshold Value Working on Different Images. If the **(1)** is Greater than Threshold Value, the Block is Consider as foreground otherwise it Belongs to Background.

4.2.2 b. Direction based Methods

This Method is Mainly Based on the Coherence of Direction. A fingerprint consists of Parallel line Structures the Coherence will be Considerable higher in the foreground than in the Background [4]
The Steps for Direction Based Method [4],[5] are Summarized as Follows;
1. Dived the Input image $I(i,j)$ into Non- Overlapping Blocks with Size wxw.
2.Use 3x3 Sobel Vertical and Horizontal Marks Defined in Equalization 3 and 4 Respectively to Compute the Gradient dx (I,j) and dy(I,j) And at Each Pixel(I,j) which is the Center of the Block.

$$\text{Sobel Vertical} = \begin{pmatrix} -2 & 0 & 1 \\ 0 & 0 & 0 \\ -1 & 0 & 1 \end{pmatrix} \quad \textbf{(3)}$$

$$\text{Sobel Horizontal} = \begin{pmatrix} 1 & -2 & 1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{pmatrix} \quad \textbf{(4)}$$

3. Estimate the local Orientation using equation 5, 6 and 7 **[6]**

$$V_x(i,j) = \sum_{U=i-w/2}^{i+w/2} \sum_{v=j-w/2}^{j+w/2} (dx(u,v))(dy(u,v)) \quad \textbf{(5)}$$

$$Vy(i,j) = \sum_{U=i-w/2}^{i+w/2} \sum_{v=j-w/2}^{j+w/2} dx2(u,v) - dy2(u,v) \quad \textbf{(6)}$$

$$Vz(i,j) = \sum_{U=i-w/2}^{i+w/2} \sum_{v=j-w/2}^{j+w/2} (dx(u,v) + dy(u,v))2 \quad \textbf{(7)}$$

4. Calculate Background Certainly and Orientation field using equation 8.

$$coh = \sqrt{\frac{(Vx2\ (I,j) + Vy2\ (I,j))}{w2 * Vz}} \quad \textbf{(8)}$$

5. Select empirically a threshold value working on different images. If the coherence is greater than threshold value, the block is considered as foreground otherwise it belongs to background.

4.3 Modified Gradient Based Method

1. Divide the input image I(I,j) into non-overlapping blocks with size wxw in over case w=8.
2. Use histogram equalization to enhance the contrast between the background and foreground.
3. Use a 3x3 median filter to reduce the noise in background of the image [5]
4. Computer the gradients
5. Compute the mean values Mx and my for x and y component of the gradient using equation 9 and 10 respectively.

$$Mx = \frac{1}{w2} \sum_{i=w/2}^{w/2} \sum_{j=-w/2}^{w/2} dx(I,j) \quad \textbf{(9)}$$

$$My = \frac{1}{w2} \sum_{i=w/2}^{w/2} \sum_{j=-w/2}^{w/2} dy(I,j) \quad \textbf{(10)}$$

6. Compute standard deviation for both mx and my using equation 11 and 12.

$$stdx = \sqrt{\frac{1}{w2} \sum_{i=-w/2}^{w/2} \sum_{j=-w/2}^{w/2} (dx\ (i,j) - mx(I))2} \quad \textbf{(11)}$$

$$stdy = \sqrt{\frac{1}{w2} \sum_{i=-w/2}^{w/2} \sum_{j=-w/2}^{w/2} (dy\ (i,j) - my(I))2} \quad \textbf{(12)}$$

7. Computer the gradient deviation using equation 13.

$$grd\ dev = stdx + stdy$$

8. Select a threshold values empirically. If grd dev is greater than threshold value the block is considered as foreground otherwise it belongs to background.

4.4 In linear Hybrid Classifier for fingerprint Segmentation Method

A Hybrid algorithm based on linear classifiers for the segmentation of fingerprints is presented. The propose algorithm uses a Block-wise classifier to separate foreground and background blocks in the main and employ a pixel wise classifier to deal with pixels accurately. In order to evaluate the performance of the new methods based on other classifiers.

A captured fingerprint image usually consists of two components, which one is called the foreground and the background **[2]** .the foreground is the component that originated from the contact of a fingertip with the sensor. the noisy area at the borders of the image is called the background[3]

4.4.1 Block-wise segmentation

Block-wise segmentation includes foreground and background blocks to reduce computational consumption in subsequent procedure and avoid introducing false segmentation within small region. The fingerprint image portioned into blocks of 16*16 pixels. Two features block mean information and block variance information, are used in block-wise segmentation. For most fingerprint sensors, the ridge-valley structures can be approximated by black and white lines, while the background, where the finger does not touch the sensor is rather white. This means that the mean gray value in the foreground is in general lower, that is, darker gray, than it is in the background.

$$Mean(m,n) = \frac{1}{16\times16} \sum_{i=0}^{15} \sum_{j=0}^{15} I(i+16m, j+16n)$$

In general, the variance of the ridge-valley structures in the foreground is higher than the variance of the noise in the background. The block variance for each block is given by:

$$\text{Variance}(m,n) = \frac{1}{16\times16} \sum_{i=0}^{15} \sum_{j=0}^{15} \{I(i+16m, j+16n) - mean(m,n)\}^2$$

Each of blocks is assigned into three sets, foreground, background and pending blocks set, respectively. Using class w_1 for the foreground block, class w_0 for the background block, class w_2 for the pending block, and w for the assigned class, the following decision function is applied;

$$\omega = \begin{cases} \omega 0 & mean(m,n) < T1, variance(m,n) < T2 \\ \omega 1 & mean(m,n) > T3, variance(m,n) > T4 \\ \omega 2 & otherwise \end{cases}$$

Where $T1, T2, T3$ and $T4$ are threshold values.

4.4.2 Pixel-wise segmentation

Pixel-wise segmentation identifies and removes non-ridge pixels from the pending blocks. In this procedure, Coherence, Mean, and variance and selected as the pixel features. The coherence gives a measure how well the gradients are pointing in the same direction. In a window W around a pixel, the coherence is defined as

$$Coh = \frac{l \sum w(Gs,x,Gs,y)l}{\sum wl(Gs,x,Gs,y)l} = \frac{\sqrt{(Gxx - Gyy)2 + 4G2xy}}{Gxx + Gyy}$$

Where $(G_{s,x},G_{s,y})$ is the squared gradient,

$$Gxx = \sum_W G2x \quad , \quad Gyy = \sum_w G2y \quad , Gxy = \sum_w Gx\, Gy$$

And (GX, GY) *is* the local gradient.

The average gray value measures how gray the pixel is. Using I as the intensity of the image, the local mean for each pixel is given by;

$$Mean = \sum_w I$$

The variance measures the gray variance around the local area. The variance is for each pixel is given by;

$$Var = \sum_w (1 - Mean)2$$

The Coherence, Mean and variance feature values are normalized in the [0, 1] range. The proposed pixel-wise segmentation is based on [8]. The algorithm presented in [8] uses a linear classifier which is called label box to enhance the performance of fingerprint image segmentation. The classifier uses three pixel features, being the coherence, the mean and the variance. The parameter modal is established using sample space at first. Then the type(background and foreground) of each pixel is pending blocks is decided by the parameters model and features.

4.5 A Modified Otsu Image Segment Method

Image segmentation by thresholding is a usual way in image processing and analysis. With some measures of difference between images, some new methods for image thresh- old selection is put forward based on the principle.

That the difference between two parts from an good thresholding segmentation should be big and the differences between original image and two parts are both big. The **OTSU** algorithm (Maximization of interclass variance) is one of the superior threshold selection methods. Otsu's method of image segmentation selects an optimum threshold by maxi- mizing the between-class variance in a gray image. Under studying the principle of Otsu method, we found it still deals directly with the gray-level histogram by parametric techniques, and histogram is approximated in the least square sense by a sum of Gaussian distributions. However, the low-bandwidth Gaussian randomized procedure will be a more excellent model because of the low-bandwidth fre- quency response of the image transmission and acquisition system. In this case, the object and the background in image obey Rayleigh distributions; an improved threshold image segmentation algorithm based on the Otsu method is developed. The new improved algorithm takes into account that the object and the background in image obey Rayleigh distributions, and the maximum between-cluster variance is modified based on the model. From the experiment, the results show that the new improved algorithm has these ad- vantages such as high segmentation precision and fast computation speed.

The basic idea of automatic thresholding is to automatically select an optimal gray-level threshold value for separating objects of interest in an image from the back the ground based on their gray-level distribution. While humans can easily differentiable an object from complex back ground, and image thresholding is a difficult task for separate them. The gray-level histogram of an image is usually considered as efficient tools for development of image thresholding algorithms. The main objective is to deter- mine a threshold for bi-level thresholding or several thresh- olds for multi-level thresholding for image segmentations. Several algorithms of multi-level thresholding have been proposed in literature that included the works of Kapur et al [10], Otsu [11] and fast Ostu's implementation [12]. Among thetremendous amount of image thresholding tech- niques, entropy-based approaches have drawn many atten- tions. Yin [13] proposed a new method that adopts the particle swann optimization to select the thresholds based on the minimum cross-entropy. Madhubanti et al.

Uses the hybrid cooperative comprehensive learning PSO algorithm based on maximum entropy criterion [14].

Let the pixels of a given picture be represented in L gray levels $[1; 2; \ldots; L]$. The number of pixels at level i is denoted by ni and the total number of pixels by $N = nl + n2 + \ldots; + nL. ln$ order to simplify the discussion, probability distribution:

$$Pi = \frac{ni}{N}, \quad Pi >= 0, \quad \sum_{i=1}^{L} Pi = 1$$

4.5.1 A Modified OTSU Image Segmentation Method Based on the Rayleigh Model

A. Image Distribution the Gaussian probability distribution is perhaps the most used distribution in all of science [15]. Sometimes it is called normal distribution and described as:

$$f(x) = \frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{(x-\eta)^2}{2\sigma^2}}$$

η =mean of distribution (also at the same place as mode and median), σ^2 =variance of distribution, x is a continuous variable

$$(-\infty <= x <= \infty)$$

In many cases, the Gaussian distributions turn out to be a meager approximation of the real modes. The images could be described as low-bandwidth Gaussian procedure through the transmission system. So images could be considered as the Rayleigh distributions.
We obtain the well known Rayleigh model for the
Amplitude distribution:
An image, as a Gaussian procedure, supplies into a low bandwidth linearly system, then the output will obey Rayleigh distributions, and the parameters of these two models satisfy the following equations:

$$\lambda 2 = \frac{\mu 2 + \sigma 2}{2}$$

Where η and σ are mean and variance of Gaussian procedure, λ is parameter of Rayleigh model

4.5.2. Improvement of Otsu Algorithm

In order to evaluate the "goodness" of the threshold, I propose the following discriminate criterion measures (or measures of class separability) used

$$\lambda_B = \omega_O(\lambda_O - \lambda_T) + \omega_1(\lambda_1 - \lambda_T) = \omega_O \omega_1(\lambda_1 - \lambda_O)^2$$

Where

$$\lambda 2T = \frac{\mu 2T + \sigma 2T}{2}$$

And

$$\lambda 2o = \frac{\mu 2o + \sigma 2o}{2}$$

$$\lambda 21 = \frac{\mu 21 + \sigma 21}{2}$$

5. PROPOSED METHOD

In this paper we are survey the different segmented method for low quality fingerprint image and applying the new method SVM Classifier for classify the low quality finger image. There are number of steps of proposed method.

(1) Read scan finger image imread function using for pre-processing finger image.

(2) After reading a image using Gaussian filter for the processing of low frequency data.

(3) After the filtration process calculate the mean of fingerprint image and generate threshold value for the matching for lower data and higher data.

(4) After step (3) we perform region segmentation of pre-processing image on the given threshold value.

(5) After gating the value of segmentation of region a fingerprint image and calculate coherence and variance.

(6) Combining the value of mean, variance and coherence generate the parameter value α is basically a vector.

(7) In the process of α a low image converted into binary image just like (0,1).

(8) Apply SVM linear Classifier instead of rule based technique for partition of value for low to high.

(9) After getting the value α is generate class of image for the classification.

(10) Class of image recognize the improve low segmented fingerprint and getting very good accuracy ratio.

(11) Exit.

5.1 Flow chart of proposed method

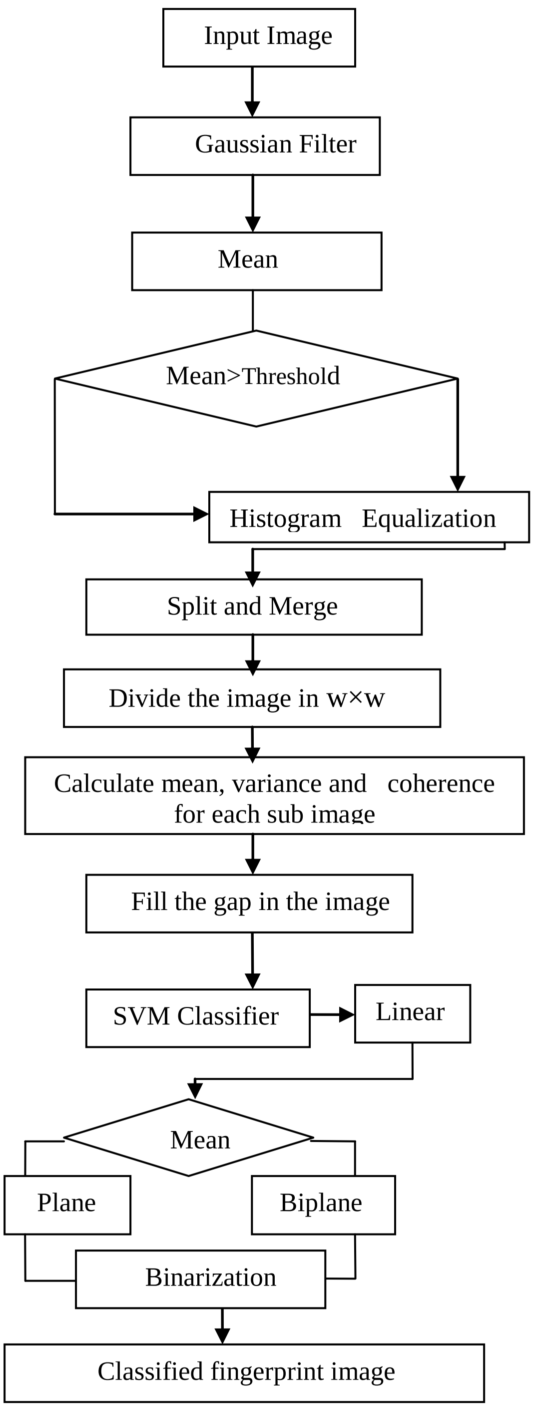


Fig. 5.1: The proposed algorithm

5.2 SVM Classifier

We are using the new technique for Fingerprint Image Classification is Support Vector Machine .fingerprint classification is Important for different practical applications. an accurate and consistent classification can greatly reduce fingerprint matching time for large database.

A support vector machine (SVM) is a concept in computer science for a set of related supervised learning methods that analyze data recognize pattern, used for classification and regression analysis. The standards SVM takes a set of input data and predicts, for each given input data [16] and predicts, for each given input, which of two possible classes the input is a member of which makes the SVM a non-probabilistic binary linear classifier. Given a set of training examples, each marked as belonging to one of two categories, a sum model is a representation of the examples as point in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible. New examples are then mapped into that same space and predicted to belong to a category based on which side of the gap they belong.

6. CONCLUSION

In this paper we are study different methods for fingerprint segmentation and classification these are all above methods are good for improving the quality of low fingerprint images, and we are presenting a new method for classification of low quality fingerprint images, we are survey different methods for segmentation of fingerprint images.

This method better than the all above methods and find the better results using these method.

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