

CREDIT CARD FRAUDS DETECTION USING IRIS BIOMETRICS TECHNIQUE

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ABSTRACT

A new architecture based on Iris Biometric Technique is a very recent concept and it is very useful for decrease Credit Card Frauds over Internet. . This technique is use for the security purpose. The non-intrusive property of iris recognition leads to several problems to the images of natural-open eyes and it is hard to increase the accuracy of iris recognition because of these problems. In order to ensure the non-intrusive property as well as achieve an iris recognition which has high accuracy simultaneously, this paper presents a novel iris recognition method based on the natural-open eyes. Firstly, makes pre-process to iris image, ensures the effective iris area adaptively. Secondly, finds all iris feature points by directional information, length information, and width information of texture, the neighboring gray information and relativity in the effective iris area. Thirdly, makes codes to feature points and figures the iris pattern by iris codes. Finally, sorts the different iris patterns by auto accommodated pattern matching method and gives the recognition results. Many experiments show the recognition rates of this method can reach 99.687% that can meet the demand of iris recognition. As compare to other methods proposed mostly this method is used for iris recognition.

Keyword - Iris Localization, Iris Normalization, Feature Extraction, Unwrapped Iris Image, Iris Matching

I. INTRODUCTION

As an important and distinct characteristic for status, the Iris has many advantages such as uniqueness, stability, may gather and so on. Non-contacting biometrics is the inevitable trend for the research and the development of status identification. The error rate of iris recognition is the lowest in all the biometrics according to the statistics [1]. Daugman [2-4] presented an algorithm that needs to process the two dimensional information of the texture, and increases feature extraction time; Wildes[5,6] used the Gauss-Laplace filter to decompose the iris image under the different resolution, and carried on the correlation comparison for the corresponding images, the computation is huge; Boles and Boashash [7] proposed a novel iris recognition algorithm based on zero crossing detection of the wavelet transform, this method has only obtained the limited results in the small samples, and this algorithm is sensitive to the grey value changes, thus recognition rate is lower.

This paper presents a novel iris recognition method based on the natural-open eyes. Firstly, it makes pre-process to iris image, ensures the effective iris area adaptively. Secondly, it finds all iris feature points by directional

information, length information, and width information of texture, the neighboring gray information and relativity in the effective iris area. Thirdly, it makes codes to feature points and figures the iris pattern by iris codes. Finally, it sorts the different iris patterns by auto accommodated pattern matching method and gives the recognition results.

II. PRINCIPLES OF THE PROJECT

Biometrics is the science of automated recognition of persons based on one or multiple physical or behavioural characteristics. Among several biometrics, iris biometrics have gained lots of attention recently because it is known to be one of the best biometrics. Also, iris patterns possess a high degree of randomness and uniqueness even between monozygotic twins and remain constantly stable throughout human's life. Additionally, encoding and matching are known to be reliable and fast. One of the most crucial steps in building an iris security system is iris segmentation in the presence of noises such as varying pupil sizes, shadows, specular reflections and highlights. The step definitely affects the performance of the iris security system since the iris code is generated from the iris pattern and the pattern is affected by iris segmentation

III. RELATED WORK

When we carry on the recognition experiment, we weigh the algorithm with false acceptance rate(FAR), false rejection rate(FRR), equal error rate(EER), and correct recognition rate(CRR). Simultaneously we inspect the algorithm with the execution time, including feature extraction time, match time. We use the CASIA in the iris database [9] 567 images, including 81 different irises of eyes, each eye had 7 8-bit images, the resolution is 320×280. When the size of block is 3*4, the experimental result is best. The threshold of match distance is 0.22922, CRR=99.687%, FAR=0.313051%, FRR=0.293945%, namely the correct recognition results are 159959 times, the false rejection results are 5 times, the false acceptance results are 497 times. We carry on the duplicated experiments for two previous mentioned methods in the same image samples, the experimental results are listed as follows

Table 1: The accurate recognition rate of difference algorithm The CRR of this article under the threshold value is slightly lower than the Daugman but is higher than boles algorithm.

Method	CRR (%)	EER (%)	Feature extraction time (ms)	Match time (ms)	Total Time (ms)
Daugman	100	0.08	682.5	4.3	686.8
Boles	92.64	8.23	170.3	11.0	181.3
Proposed	99.687	0.303	8.3	7.2	15.5

3.1 Proposed System

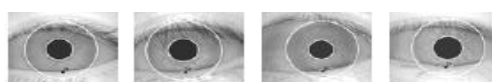


Figure 2. The resultant images of iris location and fitting the contour of the lower eyelid

Usually an iris image impossibly contains the iris merely, there are also other parts of the eye Such as the eyelid, the eyelash. This point may be seen clearly from Figure 1. The interior Boundary of iris can change, and make the texture of iris distort. In order to realize exactly matching, it must eliminate these factors through the image pre-processing. Iris image Pre-processing includes iris localization, eyelid fitting, eyelash detection and normalization.

3.2 Iris localization

Firstly, it finds the sketchy pupil center through the gray projection and the pupil center detection operator; Secondly ,finds four iris inner boundary points by the direction edge detection operator and the voting mechanism beginning from the sketchy pupil center, and locates the iris inner boundary according to these four points; Finally finds four iris outer boundary points by the direction edge detection operator and the voting mechanism beginning from the center of pupil, and locates the iris outer boundary according to these four points. Localization accuracy rate of this method is high, the speed is quick. The detail contents can be seen from literature.

3.3 Fitting lower lid

Firstly it uses Canny operator to extraction edge information of iris image, then uses the parabolic equation as formula (1) to fit the lower eyelid: $y = a(x - b)^2 + c$ (1) a is the parabola curvature; b, c are the horizontal and vertical coordinates of parabola apex respectively. Through establishing different a, b, and c it may fit the lower eyelid well, thus it can eliminates influence of the lower eyelid for the effective iris region. It finds the parabola apex. The resultant images of Figure 1 are shown in Figure 2.

3.4 Eyelash detection

Firstly, it makes sure the search area. The parameters of inner boundary and outer boundary are and respectively. It chooses two rectangles of the left and right sides of the pupil as the possible area covered by the eyelash . The four vertexes of right area are (x_r, y_r) , $(x_r + IWidth, y_r)$, $(x_r, y_r + IHeight)$, $(x_r + IWidth, y_r + IHeight)$. The four vertexes of left area are (x_l, y_l) , $(x_l + IWidth, y_l)$, $(x_l, y_l + IHeight)$, $(x_l + IWidth, y_l + IHeight)$. Because the gray of eyelash is low, so a template of detection eyelash is designed, its shape is shown in Figure3. Each sub-template X_1 X_2 may compose by a single pixel or multiple pixels. If a sub-template is composed by a single pixel, this pixel corresponds the center of the sub template; if a sub-template is composed by $N(N \geq 2)$ pixels $\{x_1, \dots, x_N\}$, the center pixel locates at $n = \text{ceil}(N/2)$ and a $1 \times N$ a_n is the center pixel of the corresponding sub-template. It looks the center of X as the current point and sums the gray difference with X_1, X_2 respectively, if two difference is less than 0, the current point is taken as the candidate eyelash point. It searches in two rectangles and finds all candidate eyelash points according with conditions. Then it carries on thinning to the image that can ensure the directions, curvature and connectivity of eyelash, show the shape of eyelash well and delete some non-eyelash area. The gray of all candidate eyelash points are set 0, the gray of other points are set

255, so it gets the binary eyelash image. Figure 3 Eyelash detection template The found candidate eyelash points include true eyelash and false eyelash, so it needs to eliminate these false eyelash. It includes two steps:(1)because eyelash mainly tends to vertical direction and has certain length, it can use the template shown in Figure 4. According to the length information and direction information of the eyelash it eliminates some false eyelash points. In Figure 4 point A is the current candidate eyelash point, if one of these points B L locating at the next line of point A is candidate eyelash point, the corresponding length of eyelash adds 1. It makes recursion for this operation until it reaches the bottom of eyelash. If the length of the curve is longer than T, it is regarded as eyelash and kept, otherwise the curve is eliminated. (2)Because the beginning point of eyelash is located near upper eyelid, the beginning point of the kept curve does not locate near the upper eyelid, the curve is eliminated too.

3.5 Feature Extraction and code

An iris image contains much detail texture, the texture is composed by many shape blocks such as strip and speckle, the gray differences are big and distribute unevenly, these blocks with irregular shape can be as distinguish characteristics for iris recognition.

3.6 Iris matching

In the collective and effective area, we make match to the entering iris and registering iris. When we compare with two iris codes, because the anterior normalized operation cannot solve the revolving invariable problem, we need to carry on certain revolving match for registering iris and entering iris. The revolving can be compensated even the corresponding code of the registering iris and the entering iris can not correspond completely. This article solves the revolving invariable problem in the normalized image, this may transform the revolving operation in the annular iris to the translation operation in the rectangular iris. The concrete method is as follows: when it compares with two iris codes, maintains the code of the registering iris motionless, and the code of the entering iris is translated several pixels to left or right along horizontal direction (because the angles of rotation of image is not big, translation pixels are small), it calculates a match value with the registering iris code after translating one pixel, after the translation ends, we keep the maximum of all the match values as the final match value of the registering iris and the entering iris. Formula is given below

$$Md_{3 \times 3} = \max_{\substack{(p=-2,-1,0,1,2) \\ (q=-2,-1,0,1,2)}} \left\{ \sum_{k=1}^{K-\text{ceil}((x, Match - x_1, Match) / N) - 1} \sum_{m=0}^{N - \text{ceil}((x_2, Match) / M) - 1} \sum_{n=0}^{M - 1} [Registercode_k(m, n) \& Enrollcode_k(m + p, n + q)] \right\} \quad (4)$$

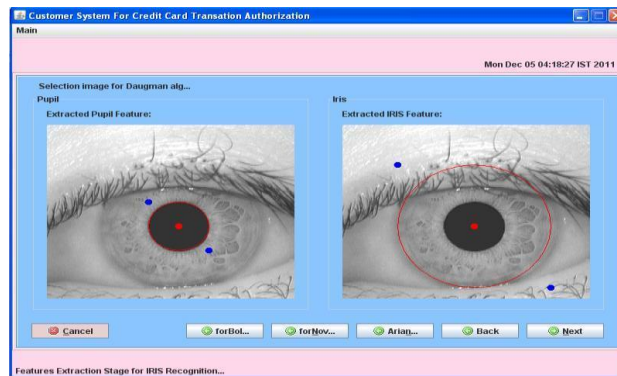
The final match distance Md is as following:

$$Md = Md_{3 \times 3} / (\text{ceil}((x, Match - x_1, Match) / N) \times \text{ceil}((x_2, Match) / M)) \quad (5)$$

IV. RESULT AND DISCUSSION

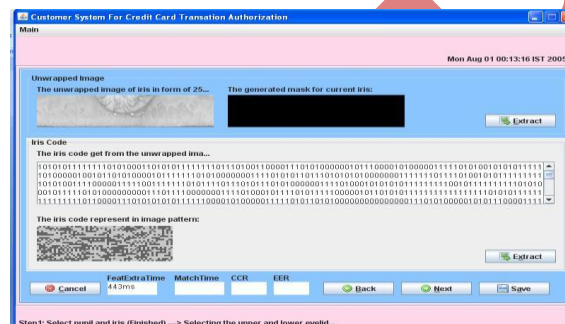
Daugman algorithm

Select image for daugman algorithm.



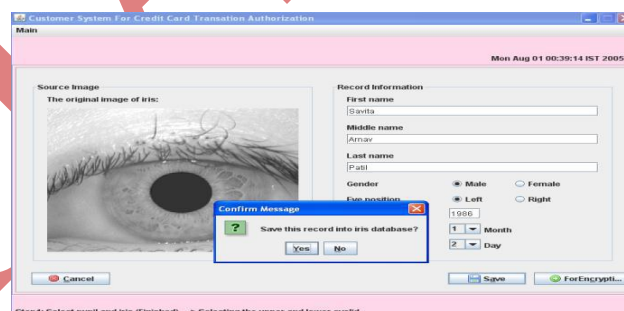
Iris image Unwrapping

Here in the screen the unwrapped iris image, mask for current iris, iris code get from the unwrapped image and also shown iris code represent image pattern.



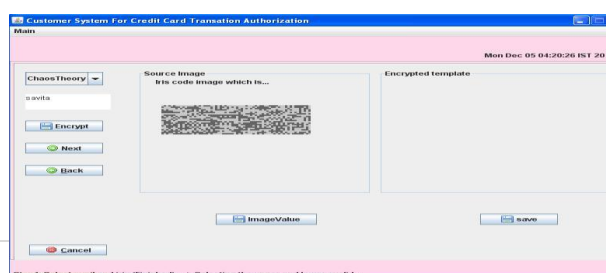
Save Information

Here save the all information which fill in the screen to the database.



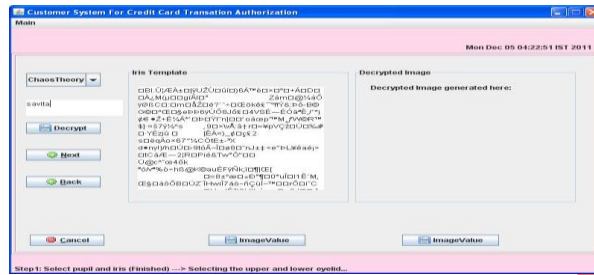
Encryption

This screen is for the encryption .here source image is encrypt



Decryption

This screen is for the decryption .Here decrypt encrypted image.



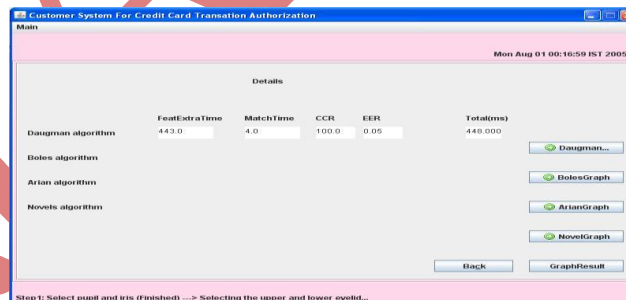
If record saved in the database then matching process is successfully done then shows the following Message Authentication successfully, images are not matched and give different process values.

Results of matching

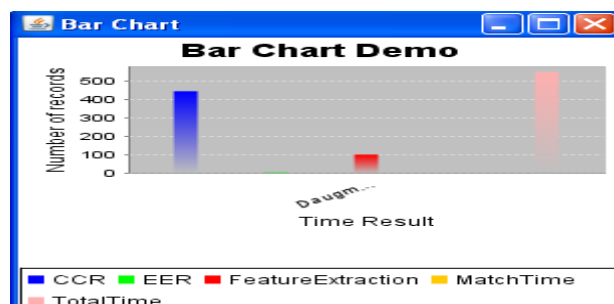


Details

Here for daugman algorithm add the details.

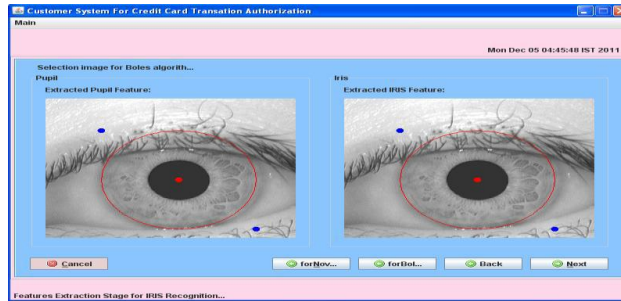


Graph for Daugman



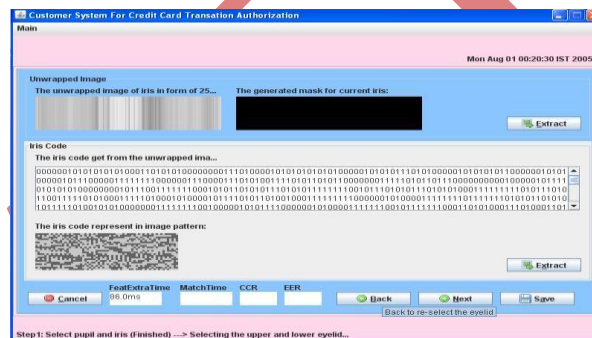
Boles algorithm

Select image for boles algorithm.



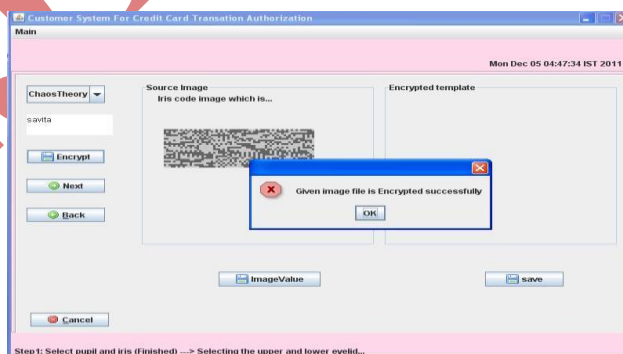
Iris image Unwrapping

Here in the screen the unwrapped iris image, mask for current iris, iris code get from the unwrapped image and also shown iris code represent image pattern



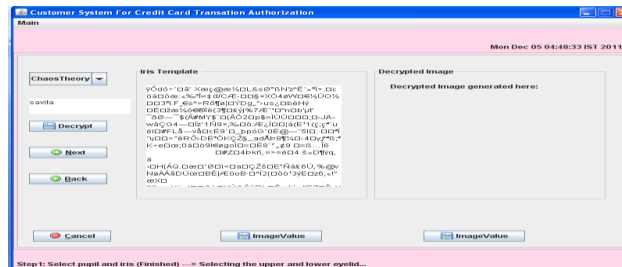
Encrypt

This screen is for the encryption .here source image is encrypt



Decryption

This screen is for the decryption .Here decrypt encrypted image.



Details

Here for Boles algorithm add the details.

	FeatExtraTime	MatchTime	CCR	EER	Total(ms)
Daugman algorithm	443.0	4.0	100.0	0.05	448.000
Boles algorithm	86.0	9.0	67.5	7.1	95.746
Arian algorithm					
Novels algorithm					

Graph for Boles



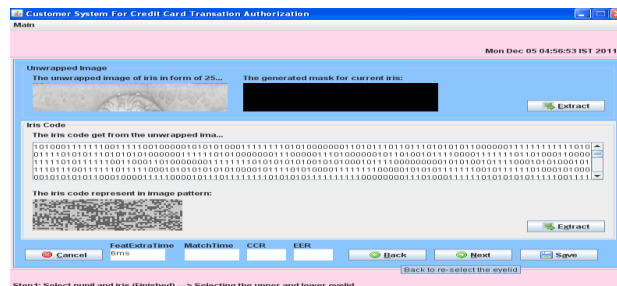
Novels algorithm

Select image for Novels algorithm.



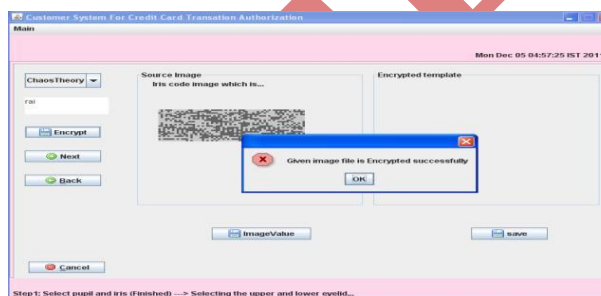
Iris image Unwrapping

Here in the screen the unwrapped iris image, mask for current iris, iris code get from the unwrapped image and also shown iris code represent image pattern



Encryption

This screen is for the encryption .here source image is encrypt and give the message encryption successfully

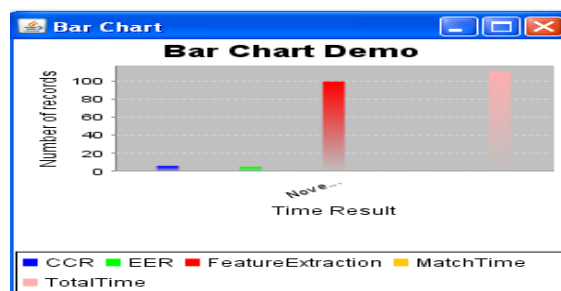


Details

Here for Novels algorithm add the details.

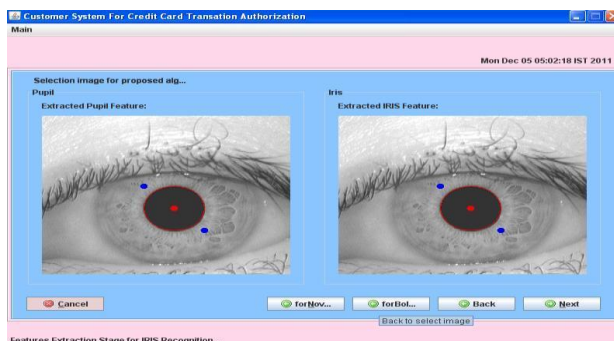
	FeatExtraTime	MatchTime	CCR	EER	TotalTime
Daugman algorithm	443.0	4.0	100.0	0.05	448.000
Boles algorithm	85.0	9.0	67.5	7.1	95.740
Arani algorithm	6.0	5.0	90.000	0.201	11.9990E
Novels algorithm					

Graph for Novel



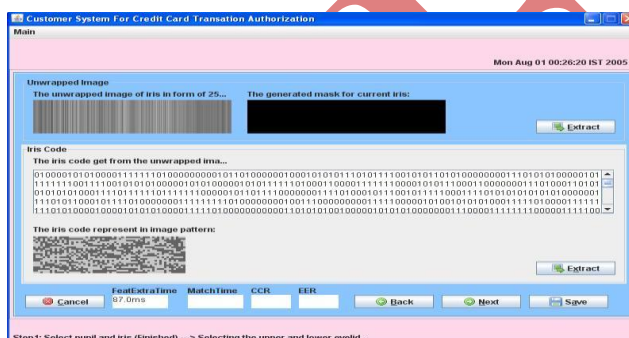
Arian algorithm

Select image for Arian algorithm



Unwrapped Iris Image

Here in the screen the unwrapped iris image, mask for current iris, iris code get from the unwrapped image and also shown iris code represent image pattern

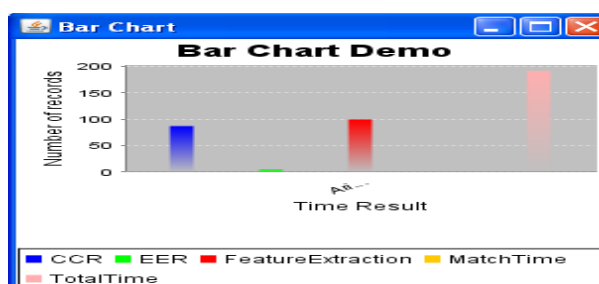


Details

Here for Arian algorithm add the details.

	FeatExtraTime	MatchTime	CCR	EER	TotalTime
Daugman algorithm	443.0	4.0	100.0	0.05	448.000
Botes algorithm	86.0	9.0	67.5	7.1	95.748
Arian algorithm	97.0	5.0	99.694	0.273	92.999
Novels algorithm	6.0	5.0	99.605	0.281	11.9996

Graph of Arian



Result Graph

For All four means Daugman, Boles, Novels and Arian graph result shown in below graph.



V. CONCLUSION

Proposed iris recognition method find the iris characteristic point in a short time, the recognition rate is high, and the recognition speed is guaranteed. Automatic iris recognition has been studied for more than a decade. Many recognition techniques have been developed and some commercialized systems are available now. In this it inner pupil part and outer iris part in the iris images. Experimental results show that the proposed localization algorithm is efficient and improves the accuracy of iris recognition. Our method achieves an accuracy of 99%.it also runs faster than other. This method is particularly suitable for implementing high-accuracy iris verification /identification systems, we tested the iris recognition system on CASIA iris images database.

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