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IRIS RECOGNITION BASED ON IRIS CRYPTS

Asst.Prof. N.Deepa*, V.Priyanka student, J.Pradeepa student.
B.E CSE,G.K.M college of engineering and technology,perungalathur,Chennai-600 063,India.

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ABSTRACT

Iris is a biometric trait used for human recognition in various applications. There is a lack of human friendly techniques for iris comparison. Therefore it has not been reported in forensics applications. We need to capture iris of human and similarities between the irises is captured. Recently Human-in-the-loop system has been developed based on matching and detection of iris crypts. Our detection is able to capture crypts of various sizes and able to identify any kind of topological changes. Presently iris recognition exists in Aadhar card projects. The proposed system of this model is to provide more accuracy in detecting rate and to implement in student verifications appearing for high level government oriented Examinations.

KEYWORDS:Iris recognition,forensics,crypts,human in the loop

INTRODUCTION

With an increasing emphasis in security, the need for automated personal identification system based on biometrics has increased. This is because traditional identification systems based on cards or passwords can be broken by stealing cards and forgetting passwords. So, there is a need for identification systems identify humans without depending on what person possess or what person remember. Biometrics can be divided into two main classes: physiological and behavioral. The physiological class is related to the shape of the body including fingerprint, face recognition, palm print, hand geometry, and iris recognition. The behavioral class is related to the behavior of a person and includes typing rhythm and voice..

Recently, iris recognition is becoming one of the most crucial biometrics used in recognition when imaging can be done at distances of less than two meters. This importance is due to its high reliability for personal identification. Human iris has great mathematical benefit that its pattern variability among different persons is enormous, because iris patterns possess a high degree of randomness. In addition, iris is very stable over time. Since the concept of automated iris recognition was proposed in 1987, many researchers worked in this rang and proposed many powerful algorithms. These algorithms were based on the texture variations of the iris and can be divided into many approaches, phase-based methods, texture analysis, and intensity variations..

Most systems in use today need explicit user cooperation, requiring that the user is positioned correctly to acquire a quality image. These systems provide auditory feedback to the user to ensure that they are properly positioned for image acquisition. In the United Kingdom, the Iris Recognition Immigration System (IRIS) is a voluntary system that allows travelers to pass through border control stations at several airports quickly, validating their identify using automated barriers‖. CANPASS in Canada is a similar program to allow frequent travelers to quickly move through security check at airports.

Fig:1 Structure of Iris

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Image Acquisition

The image acquired from a unknown human subject is often called a probe image, and the images enrolled in the system dataset are often called gallery images. A collection of probe images or gallery images are termed as probe set or a gallery set.Most commercial iris recognition systems use near-infrared (NIR) illumination instead of visible light in image acquisition. NIR illumination, in the 700 to 900 nm range of wavelengths, is worn for unobtrusive imaging at distances of up to 1 m.Daugman perceived that NIR illumination is superior in iris image acquisition because its intensity can be controlled, but it is not perceived by humans and is protected for the eyes. In NIR wavelengths, deeper and somewhat more slowly modulated stromal features dominate the iris texture pattern, and even darkly pigmented irises disclose rich and complex features.The image acquisition typically has constrained conditions. Most concerned iris cameras, including the LG4000 used in the work can prompt users with visual and/or auditory feedback to position the eye so that it can be well focused and sufficiently sized in the image

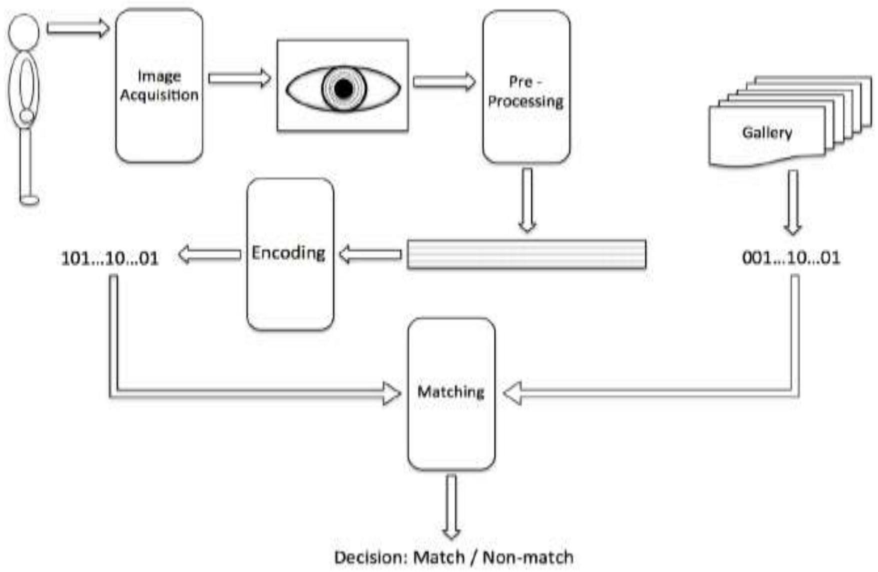
Pre-processing

The image pre-processing involves segmentation and normalization. The segmentation localizes the iris region that lies in between the boundaries of the pupil and limbus. The segmented region is mapped to a rectangular region of consistent size in normalization. This resized rectangular iris strip is known as normalized iris image.Daugman's system models the pupil and limbus boundaries as two circles. They are represented by the three parameters (xo, yo, r), where (xo, yo) and r are the center and radius respectively. All testing images used in this dissertation are pre-processed into normalized iris images(size 64 ⇥ 512).The occluded areas and highlight spots are masked by solid yellow. A 'mask' is also stored for each normalized iris image to save the highlight information.Binary image with ones representing good pixels and zeros representing pixels with no iris texture available because of intensity saturation.

Encoding

The encoding stage translates the textural features in the normalized iris intensity image into some form of feature representation referred to as feature templates. The most crucial current iris recognition technique was proposed by Daugman . Daugman suggested using 2-D Gabor filter to extract texture informationThe grey-scale normalized image was convolved with 2-D Gabor filters, and each filter's phase response was quantized into a pair of bits in the texture representation. The two-bit codes from all filters were concatenated into a 256 byte (2048 bit) binary iris code. The term "iris code" was first introduced in to refer to a binary code sequence1 as iris feature templates. The iris recognition systems using Daugman's algorithm were reported to find no false identity matches in about 20 billion cross-comparisons between deferent eyes.

System Architecture



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EXITING SYSTEM

The iris is a complex pattern which contains many distinctive features such as arching ligaments, furrows, ridges, crypts, rings, corona, freckles and a zigzag collarette. Each iris is unique and even irises of identical twins are different. Furthermore, the iris is more easily imaged than retina; it is extremely difficult to surgically tamper iris texture information and it is possible to detect artificial irises. Although the early iris based identification systems required considerable user participation and were expensive, efforts are underway to build more user-friendly and cost-effective versions. To obtain a good image of the iris, identification systems typically illuminate the iris with near infrared light, which can be observed by most cameras yet is not detectable by humans. The available results of both accuracy and speed of iris-based identification are highly encouraging and point to the feasibility of large-scale recognition using iris information. Due to this and to the above described characteristics, it is common to consider iris as one of the best biometric traits, although this evaluation is dependent on the specific purpose. However, the iris is still under assessment as a biometric trait in law enforcement applications. One reason that hinders the forensic deployment of iris is that iris recognition results are not easily interpretable to examiners.

PROPOSED SYSTEM

Our approach consists of two main steps: (a) detecting crypts and (b) matching crypts. The input is normalized iris images (of 64 × 512 pixels). Many algorithms and software packages can be used for this purpose.A dissimilarity score will be output for each pair of iris images under comparison.

A.Feature Extraction

The network will gain the 960 real values as a 960-pixel input.It will then be required to identify the eye by responding with a output vector. The output vectors represent a eye or non-eye. To operate correctly the network should respond with a one if eye is presented to the network or output vector should be zero . In addition, the network should be able to handle non-eye.The network will not receive a perfect image of eye which represented by vector as input.

Architecture of neural network

The neural network needs 960 (p1,p2,p3,…..pm) inputs and output layer to identify the eyes. The network is a two-layer log-sigmoid network.The log-sigmoid transfer function was picked because its output range (0 to 1) is perfect for learning to output Boolean values.The hidden layer has 200 neurons . This number was picked by guesswork and experience. If the network acquires trouble learning, then neurons can be added to this layer. The network is trained to output one for correct detection and zero for non-eye detection. However, non-eye input images present in the network not creating perfect 1's and 0's.

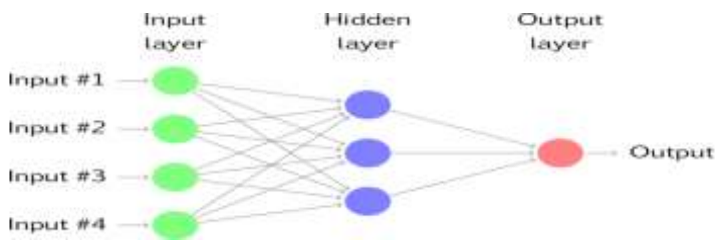


Fig 2: Neural Network Architecture

B .feature matching

The CRC code is calculated using the generator polynomial. The selection of the generator polynomial is the crucial part of implementing the algorithm. CRC32 is a type of function that takes as input a data word of any length, and produces as output a value of a certain space, commonly a 32 bit integer.The CRC considers a collection of data as the coefficients to a polynomial, and then divides it by a fixed, predetermined generator polynomial. The coefficients of the result of the division are recorded as the redundant data bits. This modular arithmetic accepts an efficient implementation of a form of division that is speed and sufficient for the purposes of calculating the distance between the iris codes.

The CRC-32 is used as the polynomial generator as it is used for the matching process. The CRC-32 process reads each iris image from the beginning to the end, and determines a unique number from the file's contents. This number is used to compare this iris image with the database image to determine if they are identical. This method calculates a long integer from the file and is generally considered to be very accurate. This procedure must be implemented for both the database and acquired image if the difference between two irises is less than or equal to 0.5 then, a match is found otherwise, both images are not equal.Usually the difference must be zero if the two irises are same, but due to noise, the difference can be considered up to less than or equal to 0.5. Also, the CRC-32 is defined by an IEEE standards committee (IEEE-802)

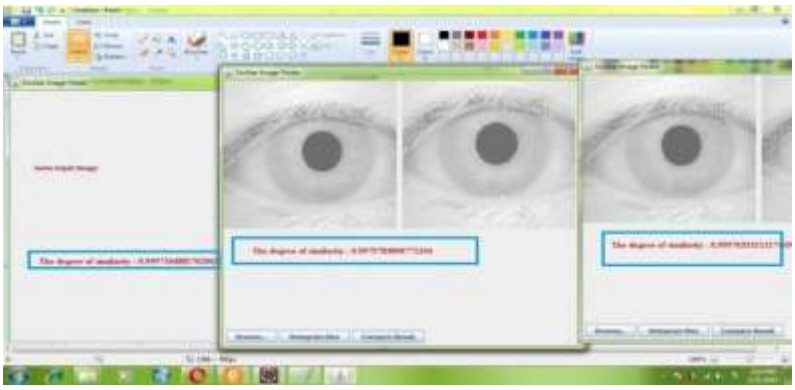
$x32 + x26 + x23 + x22+ x16 +x12 +x11 +x10 +x8 +x7 +x5 +x4 +x2 +x+1$

CONCLUSION AND FUTURE WORK

We present a new approach for detecting and matching iris crypts for the human-in-the-loop iris biometric system. Our proposed approach produces promising results on all the three tested datasets, in-house dataset, CASIA-iris-interval. our approach improves the iris recognition performance by at least 22% on the rank one hit rate in the context of human identification and by at least 51% on the equal error rate in terms of subject verification.

Note that the three datasets under evaluation were collected using different facilities among different population groups. Also, the parameters used in our approach were trained on another small set of homemade data. The generality and effectiveness of our approach on diverse image data can be demonstrated. Furthermore, as far as we know, this work is so far the only evaluation of a human-interpretable iris feature matching approach using public datasets (ICE2005 and CASIA-Iris-Interval), which offers a direct comparison with traditional approaches such as Daugman's framework.

To further increase the reliability of the human-in-theloop iris biometric system, incorporating a quality measure for images enrolled in the system would be beneficial. This would allow to evaluate whether the quality of each acquired image is good enough for visual feature matching. Based on our observations and trial studies, our approach is robust.



REFERENCES

1. J. Daugman, "How iris recognition works," IEEE Trans. Circuits Syst. Video Technol., vol. 14, no. 1, pp. 21–30,Jan,2004
2. J. Daugman, "Probing the uniqueness and randomness of IrisCodes: Results from 200 billion iris pair comparisons,"Proc.IEEE,vol.94,no.11,pp.1927–1935,Nov.2006
3. Unique Identification Authority of India. [Online]. Available: http://uidai.gov.in, accessed Nov. 1, 2015.
4. K. R. Nobel, "The state of the art in algorithms, fast identification solutions and forensic applications," MorphoTrust,USA,Billerica,MA,USA,Tech.Rep.,Jan.2013.
5. P. E. Peterson et al., "Latent prints: A perspective on the state of the science," Forensic Sci. Commun., vol. 11,no.4,pp.1–9,2009.
6. C. Champod, "Edmond Locard—Numerical standards and 'probable' identifications," J. Forensic Identificat.,vol.45,no.2,pp.136–163,1995.

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7. K. McGinn, S. Tarin, and K. W. Bowyer, "Identity verification using iris images: Performance of human examiners," in Proc. IEEE 6th Int. Conf. Biometrics, Theory, Appl., Syst. (BTAS), Sep./Oct. 2013, pp. 1–6
8. H. Proenca, "Iris recognition: On the segmentation of degraded images acquired in the visible wavelength," IEEETrans.PatternAnal.Mach.Intell.,vol.32,no.8,pp.1502–1516,Aug.2010.
9. H. Proenca, S. Filipe, R. Santos, J. Oliveira, and L. A. Alexandre, "The UBIRIS.v2: A database of visible wavelength iris images captured onthe-move and at-a-distance," IEEE Trans. Pattern Anal. Mach. Intell., vol. 32,no.8,pp.1529–1535,Aug.2010.
10. Z. Sun, L. Wang, and T. Tan, "Ordinal feature selection for iris and palmprint recognition," IEEE Trans. ImageProcess.,vol.23,no.9,pp.3922–3934,Sep.2014.
11. M. S. Sunder and A. Ross, "Iris image retrieval based on macro-features," in Proc. 20th Int. Conf. Pattern Recognit.,2010,pp.1318–1321.
12. J. De Mira and J. Mayer, "Image feature extraction for application of biometric identification of iris—A morphological approach," in Proc. Brazilian Symp. Comput. Graph. Image Process., 2003, pp. 391–398.
13. F. Shen, "A visually interpretable iris recognition system with crypt features," Ph.D. dissertation, Dept. Comput.Sci.Eng.,Univ.NotreDame,IN,USA,2014
14. F. Shen and P. J. Flynn, "Using crypts as iris minutiae," Proc. SPIE, vol. 8712, p. 87120B, May 2013.
15. F. Shen and P. J. Flynn, "Iris matching by crypts and anti-crypts," in Proc. IEEE Conf. Technol. Homeland Secur., Nov. 2012, pp. 208–213.