

A Survey of Mobile Iris Recognition Methods for Mobile Security

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ABSTRACT

Iris recognition is the most reliable biometric identification system available. Various types of biometrics like face, finger, iris, retina, voice, ear in all these characteristics, the iris recognition gaining an attention because the iris of every person is unique, therefore it never changes during human lifetime and highly protected against damage. Because of this unique feature the iris can be good security measure. This survey covers the review of existing iris recognition methods with a focus on enumerating the open issues that must be addressed in order to be more confident in the performance, security and privacy aspects of iris-based biometric systems. That different methods which are discussed in this paper are ICE(Iris Challenge Evaluation),IREX(Iris Exchange), NICE(Noisy Iris Challenge Evaluation) and MICHE(Mobile Iris Challenge Evaluation).

Keywords: Iris recognition, Biometrics, ICE, IREX, NICE, MICHE.

I. INTRODUCTION

Iris recognition is a method of identifying people based on unique patterns within the ring shaped region surrounding the pupil of the eye. The iris usually has a brown, blue, gray, or greenish colour, with complex patterns that are visible upon close inspection. Because it makes use of a biological characteristic, iris recognition is considered a form of biometric verification. Mobile devices have been widely used for social communications, storing large amount of private data and online banking. It is important to build a reliable, user-friendly biometric recognition system for the mobile payment and sensitive data protection. Compared with other biometric modalities, iris is the most reliable one because it is difficult to be replicated and highly unique. The Iris recognition system has wide applications in variety of fields such as premise access control (home, office, laboratory), secure financial transactions, internet security, credit card authentication, secure access to bank accounts, anti-terrorism (e.g. security screening at airports) and many more.

There are various methods for limiting the access to the device, like passwords, PIN numbers, patterns drawn on screen and biometric systems. Biometric

authentication technique based on iris patterns is appropriate for high level security systems. Iris is the annular ring between the pupil and the sclera of the eye. The structure of iris is fixed from about one year in age and remains constant over time. It exhibits long-term stability and infrequent re-enrolment requirements. The iris is highly protected, non-invasive and ideal for handling applications requiring management of large user groups, such as voter ID management. The iris recognition techniques potentially prevent unauthorized access to ATMs, cellular phones, desktop PCs, workstations, buildings and computer networks. The accuracy of iris recognition systems are proved as much higher compared with other types of biometric systems like fingerprint, handprint and voiceprint.

II. REVIEW

- The iris has been in use as biometric from few decades. However, the idea of automating iris recognition is more recent. In 1987, Flom and Safir obtained a patent for an unimplemented conceptual design of an automated iris biometrics system with the concept that no two irises are alike.
- The pioneering work in the early history of iris biometrics is that of Daugman. Daugman's 1994[1]

patent and early publications became a standard reference model. Integro-differential operators are used to detect the center and diameter of theories. The image is converted from Cartesian coordinates to the rectangular representation and polar coordinates of the region of the interest is generated.

- Later in 1996, Wildes et al proposed a machine vision system for iris recognition [6].
- In 1997, Wildes proposed an iris recognition system using a diffuse light source.
- In 1998, Boles and Boashash proposed an iris recognition system for recognition with the help of iris images and their wavelet transform. They calculated the zero-crossings of wavelet transform for different resolution steps.
- In 2000, Zhu et al. presented an iris recognition system for recognition mode based on iris patterns and pattern recognition.
- In 2001, El-Bakery et al. proposed the fast iris recognition system by using modular neural networks.
- In 2002, Ma L. et al. presented circular symmetric filters (CFS) for iris recognition system. CFS was a variation of the Gabor wavelet.
- In 2003, Ma et al. enhanced the method of Wildes and proposed an iris recognition system for personal identification mode.
- In 2004, Daugman used a near-infrared camera for acquisition of an iris image.
- In 2005, Monroe, D.M. and Zhang, Z. described a method for reducing the complexity of iris coding and matching. They captured the local frequency variation.
- In 2006, Liu and Xie worked on the feature extraction stage. In the second level wavelet decomposition of normalized iris image.

III. METHODS OF IRIS RECOGNITION

1. ICE(Iris Challenging Evaluation): The ICE 2006 is the first independent evaluation for iris recognition algorithms. Although face and iris are the complementary biometric technologies, conducting a concurrent technology evaluation allowed for assessment of each biometric and

comparison of their capabilities. ICE 2006 consisted of a major, open, self-regulating technology evaluation of iris recognition technology. To guarantee an accurate assessment, the ICE measured performance with sequestered data (data not previously seen by the researchers or developers). A standard dataset and test methodology was implemented so that all participants were evenly evaluated. The primary goal of ICE 2006 was to determine the state-of-the-art capability of automatic iris recognition technology and to establish a performance baseline against which to measure future progress.

- 2. IREX(Iris Exchange):** IREX-I was being conducted to address two issues: The first issue is how far compression can be pushed before the accuracy of top commercial matching algorithms begins to degrade. The Second is, the compact polar form accuracy of iris images in when it is prepared by one dealer and confirmed later by another person. The program supports identity management applications where compact size and interoperability are of primary concern. These include the federated identity record or network-based applications. Iris Exchange support a marketplace of iris-based applications based on standardized interoperable iris imagery.
- 3. NICE(Noisy Iris Challenge Evaluation):** The NICE competition is concerned with methods that use the texture pattern of the iris as a means to recognize a person. Whereas business iris biometrics technology, such as that working in India's Unique ID course, uses near-infrared illumination of the eye, the NICE competition focuses on what level of presentation can be obtained using color images captured under already-existing illumination. The second phase of the NICE competition evaluated the performance of algorithms for feature extraction and matching.
- 4. MICHE (Mobile Iris Challenge Evaluation):** MICHE-I is a dataset of iris images acquired in visible light by mobile devices. It was collect for the specific purpose of the Mobile Iris Challenge Evaluation (MICHE) competition (Part I). The goal of the competition is to review the state of the art about iris recognition on mobile devices. The key features of the MICHE-I dataset are a wide and different population of users, the use of different mobile devices for the acquisition, realistic

simulation of the acquisition process (including noise), several acquisition sessions separated in time, and image annotation using metadata. MICHE-I characteristics are thus consonant with the stated objective to further develop iris authentication for uncontrolled settings, interoperability, and real-world applications.

IV. APPLICATIONS

Iris recognition, such as facial recognition, is mainly used for security-related applications. Techshino's iris module included into mobile devices can be used for:

- Mobile apps – transaction authentication, Indian UID apps
- Time and attendance
- Physical access control
- Logical access control
- Patient identification
- cell phone and other wireless-device-based authentication
- secure access to bank accounts at cash machines

V. CONCLUSION

Iris recognition has gained a greater attention due to its uniqueness, stability over the years and difficulty in forging the Iris. This paper presents the review of various existing methods proposed by different authors. The Iris recognition system is one of the best secure methods of authentication. The uniqueness of the Iris and low probability of a false acceptance or false rejection all contribute to the benefits of using Iris recognition technology.

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