

Iris Recognition in ATM Using CASIA Dataset

Akhil T Vinod ¹, Mahin N K ², Merin Sara Thomas ³, Sona Maria Jacob ⁴, Syama S ⁵, Vinod P R ⁶

U.G. Student, Department of Computer Engineering, College of Engineering, Chengannur, Kerala, India ^{1,2,3,4}

Assistant Professor, Department of Computer Engineering, College of Engineering, Chengannur, Kerala, India ^{5,6}

ABSTRACT: In today's world, the need for security and authentication has increased as the most important part of our lives. ATM is one of the main areas where it is a must. The present ATM systems have chances to get exploited. So giving it a more secure feature like biometrics has gained much importance today. Biometrics refers to metrics related to human characteristics. It includes fingerprint, iris, palm veins, DNA, retina, etc. Among these, the iris has proved to be the best biometric feature for the unique identification of a person. The transactions done in ATMs have to be confined to a single person so that the chances of getting exploited are reduced. Adding the iris recognition feature for ATM authentication can help this. Iris recognition has 4 main steps: Image Acquisition, Normalisation, Feature extraction, and Matching. The resulting template is stored in the database. A transaction is allowed if the iris template of the person matches that of the stored one. An additional sanitizing facility is provided so that only after sanitizing hands, the transaction is allowed to perform.

KEYWORDS: Authentication, Acquisition, Normalisation, Feature extraction, Matching

I. INTRODUCTION

ATM(Automated Teller Machine) is an electronic telecommunication system which enables the people to perform their daily financial transactions in a more easy way than going to a bank. In today's life, the security system in ATM is important as ATM skimming had reached epidemic levels and continues to grow. This project deals with ATM protection through biometric authentication through iris recognition in which unique characteristics of the human iris are taken to verify the identity of an individual as the iris is the most reliable and accurate biometric identification system.

After logging into the personal account in ATM, the user needs to verify their iris in which iris recognition is split into several steps: 1)Image Acquisition, in which the image of the eye is taken from a camera. 2)Iris Segmentation is the process in which the center and radius of the pupil are extracted. 3)Normalization creates a dimensionally consistent representation of the iris region. 4)Feature Encoding creates a template containing only the most discriminating feature of iris. Finally, the system decides to recognize the given iris by matching score through a hamming distance algorithm. After successful matching of the iris, the user can do their further transactions.

The paper is organized as follows. Section II describes the various biometric techniques available and the existing system in ATMs. Section III describes how iris recognition can be used in ATM. Section IV presents the experimental results of performing iris recognition using the CASIA dataset. Finally, Section V presents the conclusion.

II. RELATED WORK

A)FINGERPRINT BASED VERIFICATION

In the existing system, each customer account is linked with their fingerprint(s).To perform atm transaction account holder has to provide his/her fingerprint using fingerprint reader attached in atm. Then the system checks the fingerprint with the template in the database for verification. If verification is successful then the user can perform atm transaction. If the customer is unable to perform the transaction then this system provides a facility for the customer's nominee to perform the transaction[4]. The fingerprints can be easily faked or copied is the main drawback of this system.

B) BIOMETRIC VOICE BASED ACCESS CONTROL SYSTEM

In the existing system, access will be authorized by a user speaking into a microphone in atm. It consists of mainly two phases: first is the training phase and second is the operational or testing phase. The system is less accurate compared to other biometric systems. Voice can be easily misused is the main drawback of the system[5].

C) TRADITIONAL ATM USING CARDS

To perform a transaction in ATM, the customers should have an ATM card which will be provided by the bank. ATM card is a special type of plastic card that is encoded with user information on a magnetic strip. All the customers who have an ATM card are provided with a unique pin. The customer should insert the ATM card into an ATM and enter the unique pin assigned to his/her for a transaction. The pin will be transmitted to the bank's central computer by a modem. After verifying the pin, the customer will be allowed to perform the transaction. The card reader reads information from the card. If another person places a thin embedded system in the card slot, he can collect card information and can easily access the account using duplicate atm card. If the card is damaged or stolen then the bank has to provide new atm cards frequently. The stolen cards can be easily misused by others.

D) FACE RECOGNITION

In the existing system, a person is identified using facial images. The image taken as input is compared with that stored in the database. Many techniques like Principal Component Analysis(PCA), Linear Discriminant Analysis(LDA) are used for face recognition. To implement this system, a large number of datasets are needed. High implementation costs and data storage are some cons of the system[6].

III. METHODOLOGY

In the proposed system, ATM authentication is given an extra security feature using Iris Recognition. It improves the existing system's drawbacks and preserves its essential features thus making the system more efficient and secure.

To store the customer details, there should be a server centralized to a bank. If a person opens an account for the first time, then the bank should get the iris image of that person and store the corresponding iris template in the database of the customer and he gets registered. If the person already has an account, then he/she can perform the transaction after verifying the unique pin assigned to the ATM card and then performing Iris Recognition.

As a preventive measure against the wide-spreading viral disease like COVID-19, the ATM system is equipped with a hand sanitizing system. These diseases are usually spread through contact between people. So safety measures must be taken in ATMs where many people are coming and performing transactions. As the system is equipped with hand sanitizer, the proximity sensor senses the presence of hands and pour some sanitizer, and only after that process, the person is allowed for further transaction.

The customer should then insert the card and enter the unique number assigned by the bank. If the pin is verified successfully, then the machine will scan the iris of the customer using the iris scanner equipped in the system and generates the corresponding iris template of the scanned iris image. Then the iris template generated will be matched with the template stored in the iris database and if it matches, the ATM displays the transaction detail list and the customer can perform the desired transaction. But if it is a mismatch, the transaction will be rejected.

Iris Recognition consists of two phases-Enrollment phase and Authentication phase. The enrollment phase consists of the following steps:-

A) IRIS SEGMENTATION:

In iris segmentation, the boundaries of the pupil and iris are detected and thus the center and radii of both pupil and iris are determined. Segmentation can be performed by Daugman's Integro-Differential Operator.

B) IRIS NORMALIZATION:

Iris images of the same person taken twice may differ in size, shape, etc. So to get a consistent representation of iris image, normalization is performed which involves unwrapping the iris and converting it into its polar equivalent. Normalization can be performed using Daugman's Rubber Sheet Model.

C)FEATURE EXTRACTION:

In feature extraction, the most discriminating feature is extracted from the normalized iris pattern. The phase information in the pattern is used as the phase angles. Feature extraction can be done using 2D Gabor Filter. The authentication phase involves all the steps of the enrollment phase. In the final step, matching is performed. The extracted features of the iris are compared with the iris features in the database. Matching is performed using Hamming Distance.

IV. EXPERIMENTAL RESULTS

Figures show the result of iris recognition in an ATM using CASIA dataset version 1 which consists of 756 iris images of 108 persons. Fig. 1. a) shows the registration phase in a bank. If the person opens an account for the first time, the bank has to collect his iris images. Here, CASIA dataset images are used. Fig b) shows the login phase which corresponds to a customer entering the ATM and inserting his ATM card. The customer has to verify the unique pin assigned by the bank. Fig c) shows the iris recognition phase in which the ATM scans the iris of the customer. Here CASIA dataset images are used to verify the person. Fig d) shows the services phase which will be displayed to the customer upon successful iris recognition.

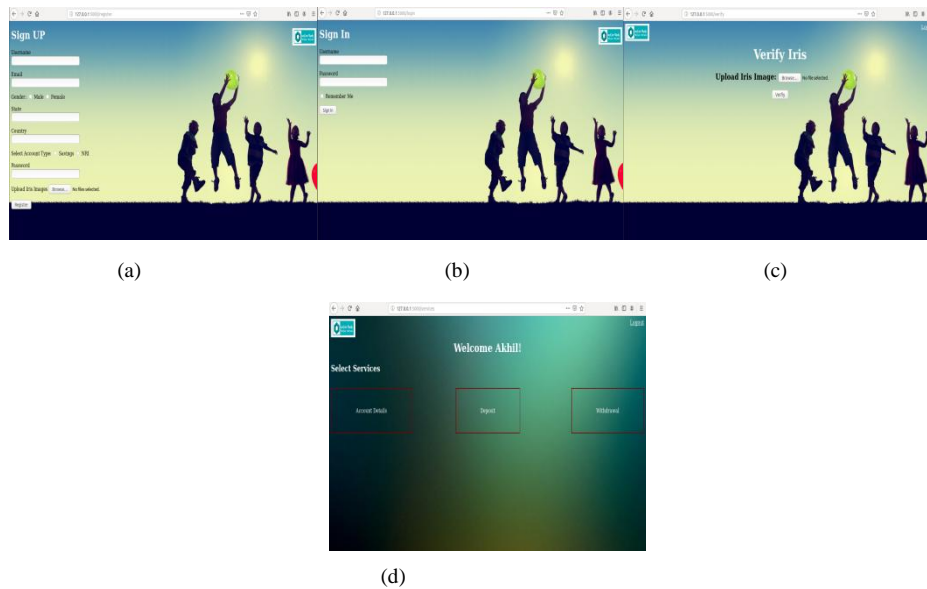


Fig. 1. Iris Recognition in ATM (a) Registration Phase (b) Login Phase (c) Iris Recognition Phase (d) Services

The results after performing iris recognition on the CASIA dataset are found correct and accurate. The threshold value for Iris Recognition is around 0.35 for the CASIA dataset.

V. CONCLUSION

Iris Recognition based Authentication System in ATM provides the users with high-end protection from unauthorized persons as biometric authentication using iris is the most accurate and reliable method of an individual's identification. It ensures that the skimming of PINs and account details cannot be a source for criminals to take control of money. In the proposed system, the standard dataset available from CASIA has been used. Daugman's Integro-Differential operator used for iris segmentation is better than the Hough Transform method and the values obtained from segmentation are used in the next stage of Normalization. Hamming Distance is chosen as a matching matrix. This proposed approach gives a great advantage when comparing with other security systems available presently.



REFERENCES

- [1] Rajesh.V, Vishnupriya.S, "IBIO-A New Approach for ATM Banking System.", International Conference on Electronics and Communication Systems, Feb.13–14,2014,Coimbatore, India.
- [2] K.Laxmi Narsimha Rao, Vikram Kulkarni, C.Krishna Reddy,"Recognition Technique for ATM based on IRIS Technology", International Journal of Engineering Research and Development, Volume 3, Issue 11, September 2012.
- [3] J. Daugman,"How iris recognition works.", Proceedings of 2002 International Conference on Image Processing, Vol. 1, 2002.
- [4] Sri Shimal Das, Smt.Jhunu Debbarma, "Designing a Biometric Strategy (Fingerprint) Measure for Enhancing ATM Security in Indian E-Banking System," ISSN-2223-4985 International Journal of Information and Communication Technology Research, vol.1,no.5, September 2011.
- [5] Yekini.N.A, Iteboje.A.O, Oyeyinka.I.K, Akinwale.A.K,"Automated Biometric Voice-Based Access Control in Automatic Teller Machine (ATM)", International Journal of Advanced Computer Science and applications. Vol.3,No.6,2012.
- [6] Kyunghnam Kim, "Face Recognition using principal component analysis", USA, June 2000.