A COMPARATIVE STUDY ON SEGMENTATION METHODS USED IN CANCELABLE BIOMETRICS

Dr. K. Lakshmipriya, Assistant Professor & Head, Department of Computer Science,
Kamalam College of Arts & Science, Udumalpet

ABSTRACT

The Cancelable biometrics is one of the recently used safest methods to protect the original templates by duplicate values. In order to avoid the theft of biometric pattern, it is very must to design irrevocable and non- invertible transformations to create cancellable biometric templates. To improve security, the cancelable biometric values can be generated to interpret the original biometric features. Segmentation is used in image to separate the image according to similarity, discontinuity or by determining the edges to explore the information. In this paper, various segmentation methods are surveyed in the aspect of non- invertible template generation and security.

Keywords

Biometrics, cancelable biometric templates, segmentation Technique.

I. INTRODUCTION

Biometrics is termed as physiological or behavioral characteristics such as face, fingerprints and iris and behavior characteristics such as voice, gait and keystroke are referred to be unique for every individual [6]. This Biometrics analysis offer best solution to the problem of security and verification. The main problem in biometric system is regaining of the individuals pattern by applying any cross matching technique to hack the unique identity [1]. To address this problem, the cancellable techniques are used to revoke the pattern of uniqueness. Every biometric system has its own way of cancelable technique [4][5]. In this paper, section II reviews the literature of recently used segmentation technique used in cancelable methods, section III says the comparative study of existing segmentation methods and section IV concludes the paper with brief summary and discussion.

II. LITERATURE REVIEW OF RECENT CANCELABLE METHODS

Now - a - day's cancelable biometrics plays a vital role in authentication and verification of uniqueness [1]. Cancelable biometrics means uses transformed domain values not the original to hide the uniqueness of pattern [2][4]. The only desired property of cancelable templates is to provide no compromise in re-enrollment of pattern using another transformation to find original biometric form. These cancelable methods are used for different type of biometrics according to their usability [1][5].

All the biometrics features are applied with cancelable technique to solution the problem of stealing identity [8]. Recent trends focus on iris biometrics with cancelable property for providing authentication to their uniqueness [3].

There are many segmentation methods to support the cancelability of biometrics. They are discussed below.

A .Thresholding based Segmentation:

The Threshold based segmentation is don with the help of histogram of the grey scale or multilevel image to be transferred into Binary image [9][10].

B. Edge Based Segmentation:

In this method, the edges and pixels between the region with some changes in intensity and connectivity link with the pixel is carried out to form closed boundaries [8].

C .Region Based Segmentation

The Region based Segmentation method focuses on the similar subset or pixels of an image based upon some criteria which are grouped together to form image region. This method is simple and more resistance to noise [9].

D. Clustering

This method uses grouping which is based on maximizing the similarities using either of the two types of clustering methods like k- means and fuzzy method[7][8].

E. Artificial Neural Networks

With the help of Neural Network, human brain can try to simulate its learning process. It helps in segmentation task in image analysis [10]

III. COMPARATIVE STUDY OF SEGMENTATION METHODS

The Uniqueness of any image pattern can be prevented using cancelable strategy [6].

In this Section, many segmentation techniques in improving the cancelablilty are discussed [3][7]. The security is the major factor of cancelable biometrics in order to avoid the compromise in the level of authentication [10]. The below mentioned methods are consider for comparison in deciding the security level

. Table:1.1 comparative analysis of Segmentation Techniques[9][10]

Segmentation Technique	Method Description	Advantages	Disadvantages
Thresholding Method	Based on histogram of image	Simple approach and no prior requirements are need	Not work when the image contain so many edges
Edge Detection Approach	Depends on discontinuity of pixels	Easily detection of the edges	This method is less resistance to noise. It is not perfect if edges are not defined properly
Region Based Method	Grouping of pixels having similar properties and form the region.	Work perfect when the region are homogeny and more resist in noise	Take more time and memory
Clustering Method	Cluster values according to their visible intensities.	Detection and implementation are more flexible.	K –Value must be defined properly
Artificial Neural Network	It uses the neural network consist of nodes	Trained data are used and error detection is easy	Consume more time for processing trained data

In Table 1.1 the comparison of methods of segmentation are made and have find that Region based segmentation is seem to be better in cancelable Biometrics.[7][8][10].Moreover, the perfect match of biometrics cancelable methods are preferred according to the proof needed to authenticate the level of domain.

IV.CONCLUSION

This Paper concludes the important aspects of cancelable technique. Revocability and Diversity are two most important characteristics of Cancelability .If the transformed biometric template is stolen or lost, the algorithm should be able to generate

another transformed template from the original template. Moreover, the algorithm should be able to generate different transformed templates of an individual for different applications. In this paper, various segmentation methods are surveyed in the aspect of non- invertible template generation and security. This will help the researcher to develop revocable templates using their own algorithm to maintain comfort security.

REFERENCE:

[1]. Vishal M. Patel, Nalini K. Ratha, ET.AT..”Cancelable Biometrics: A Review”. IIEEE Signal Processing Magazine, VOL. X, NO. X, MONTH 20XX

[2] Sanjay Kanade, Dijana Petrovska-Et.Al. “Cancelable Iris Biometrics and Using Error Correcting Codes to Reduce Variability in Biometric Data”. IEEE, 978-1-4244-3991-2009.

[3].J Tang, ‘‘ A Color Image Segmentation algorithm Based on Region Growing, in Proc. IEEE Trans. Electrical Engineering, Conf., pp. 634-637 April 2010.

[4]. Nalini K. Ratha, and Jonathan H. Connell,”Cancelable Iris Biometric”**.** IBM Watson Research Center, 978-1-4244-2175-6/08/$25.00 ©2008 IEEE

[5].E. Chandra, & K.Kanagalakshmi ,”Cancelable Biometric Template Generation and Protection Schemes: a Review”. IEEE Dept. Of Computer Science, DJ Academy Managerial for Excellence, 978-1-4244-8679-3/11/$26.00 ©2011.

[6]. Rathgeb, F. Breitinger and C. Busch. J. K. Pillai, Et.Al.“ Alignment-Free Cancelable Iris Biometric Templates based on Adaptive Bloom Filters”.. In Proc. IEEE Int’l Conf. on Acoustics Speech and Signal Processing, pages 1838–1841. IEEE, 2010.

[7]. Bismita Choudhury, Patrick .Et.Al.”Cancelable Iris Biometrics Based on Data Hiding Schemes”. 2016 IEEE Student Conference on Research and Development (SCOReD) 9781-5090-2948-8/16/$31.00 ©2016 IEEE

[8] Review of Image Segmentation Techniques by H.P.Narkhede/ISSN:2319-6386,vol-1,issue-8 July 2013

[9]. Savita Agrawal et al “Survey of image segmentation techniques and color models” vol 5(3), 2014, / (IJCSIT) International Journal of Computer Science and Information Technologies

[10].H. Zhang, J. E. Fritts, S. A. Goldman, “Image Segmentation Evaluation: A Survey of unsupervised methods”, computer vision and image understanding, pp. 260-280, 2008.

Author's Biography:

Dr.K.Lakshmipriya pursued M.Sc., M.Phil., Ph.D., Under Bharathiar University. She is also working as Head and Assistant Professor in Department of Computer Science in Kamalam College of Arts and Science College, Udumalpet, Tirupur, Tamilnadu. She is having 15 years of teaching experience. She has attended various National and International conferences and published research papers in various journals. Her area of interest are Data Mining and Biometrics. She received "GNANAGURU" award from Alagappa university study center & Lion club of Pollachi.