Renewable Iris Authentication Algorithm in Mobile System

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Abstract: Recently the numbers of patent about the technology for mobile payment with IC or bluetooth-chip are being increased more and more. The reasons of patent increment for mobile payment are advancement of wireless internet technology and rising of customer's request for it. The customer wants to be able to pay for purchase, tax and aid with own mobile phone. So every mobile service provider applies for patents about that competitively. And in the near future the biometrics is generalized in the mobile payment system. Especially the payment service of iris recognition is significant technique in this area for the future prospect. The biometrics of iris is an accurate authentication method because it has about 250 distinguish parameters to the finger print's 30. The biometrics of iris can recognize and identify a person for 2 seconds. But the image of iris is changed by transformation of body in the life. And the existing iris authentication system has problem that can be miss-recognized. In this paper, we propose the new method that reduces miss-recognizing rate with Renewable Iris Authentication Algorithm(RIAA) in mobile system.

Authentication, Biomatrics, Payment System, Renewable Algorithm, Iris Authentication

1. INTRODUCTION

Recently the numbers of patent about the technology for mobile payment with IC or bluetooth-chip are being increased more and more.

The reasons of patent increment for mobile payment are advancement of wireless internet technology and rising of customer's request for it.

The customer wants to be able to pay for purchase, tax and aid with own mobile phone. So every mobile service provider applies for patents about that competitively.

There are introduced some kinds of payment service method, the Bar-code recognition payment service that individual economic information is transferred from the barcode of cellular-phone's LCD to merchant, the IC-Chip type payment service that individual economic information is transferred from the cellular-phone with built-in IC-Chip to merchant, the optical payment service that use the cellular-phone with built-in bluetooth chip or IR transport interface.

And in the near future the biometrics is generalized in the area of mobile payment system.

Especially the payment service of iris recognition is significant technique in this area for the future prospect.

We expect that developments and standardizations of mobile wireless security and authentication technology will be progressing actively.

The biometrics of iris is an accurate authentication method because it has about 250 distinguish parameters to the finger print's 30.

The biometrics of iris can recognize and identify a person for shorter time than 2 seconds.

But there are problem, the image of iris is changed by transformation of body in the life. And the existing iris authentication system has not the solution of this problem that can be miss-recognized.

So in this paper, we propose the new method that reduces miss-recognizing rate with Renewable Iris Authentication Algorithm(RIAA) in mobile system.

In this paper, chapter II explains general concept of iris authentication technology, chapter III describes reducing method of miss-recognizing rate with renewable iris authentication algorithm, Chapter IV proposes the new method that the Renewable Iris Authentication Algorithm(RIAA) can be applying to mobile system. Chapter V is conclusion.

2. GENERAL CONCEPT AND PROBLEM OF IRIS AUTHENTICATION

2.1. The trend of Biometrics technology

Biometrics are thar recognizes personal identity based on special feature of general physiological or behavioral action automatically.

Biometrics consist of behavioral biometrics and physical/physiological biometrics, the former is divided to

signature verification and speaker verification, the latter is divided to recognition of face, finger print, iris, finger shape, hand shape, retina, vein etc.[1]

This biometrics has not the risk of loss and copying, stealing because it does not depend on memory as like password, office number, phone number or possession as like card, key, identification card.

There are some ideal biological characteristics as universality, uniqueness, permanence, and collectability. And there are some specifics as performance to request for designing of biometrics authentication system, acceptability that means the ratio of people have not rejection mind and circumvention that is grade of ease to cheat system for injustice use.[2]

So if biometrics is used in authentication field, the objects should have each individual characters per person. And that should be not changed by time, accident.

This is the reason why finger print, iris, face, voice, vein are used generally. Especially the biometrics of iris is an accurate authentication method because it has about 250 distinguish parameters to the finger print's 30

2.2. The problem of Iris authentication

The technology of iris authentication is much more reliability. However, iris image can be changed according to body change, in this case identification system using common iris to validate has problem that can be miss-recognizing.

One of reason to change of iris is the cholesterol-ring according to body change, this situation can appear according to disease or aging process, and own self or another person's eyes can not see it but it is possible to discover thru taking photograph or using magnifying glass. (a) is normal person iris without the cholesterol-ring in Figure 1, (b) is the case that generates the cholesterol-ring, in this case miss-recognizing can be generated.
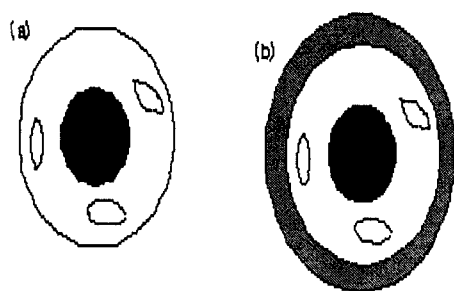

Figure 1. The phenomenon of cholesterol-ring

And the other of reason to change of iris is change of color pattern as like color pattern on iris, (a) of figure 2, is disappeared, (b) of figure 2, by accident or time past. In this case possibility of misunderstanding is increasing much more.
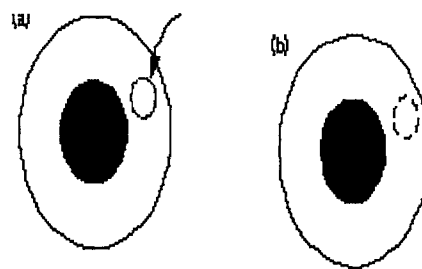

Figure 2. Change of color pattern

To solve these problems we need new algorithm in biometrics system.

3. THE ALGORITHM OF RENEWABLE IRIS AUTHENTICATION

3.1. The method of iris image extraction for iris authentication

The processes of iris authentication system consist o᠄ taking picture for eye image, extraction of iris region, extraction of iris texture and code generation, general searching to compare with DB.

And the eye image used for iris authentication has to include reasonable region of iris.

This means that image of eye with enough for information to accurate iris code generation is very important.

There are some methods that acquire automatically using template matching technology[3], gray level difference[4 until now

3.2. The structure of Renewable Iris Authentication System

At first this iris authentication system acquires iris image from individual person and divide as step and assigns the priority and saves iris information according to priority lastly.

And the input of captured iris image compares with pre-saved iris information for confirmation o᠄ identification. After comparison if the result of comparison is less than based identified rate level, we save uptodate the renewable iris image data.

In case of renewable iris image data, we divide whole iris image to some iris region as step and set priority to that And each other region has to assign each different percent rate and has to be got renewable original iris information. The figure 3 describes the internal structure of program to process data from iris image in iris authentication system.
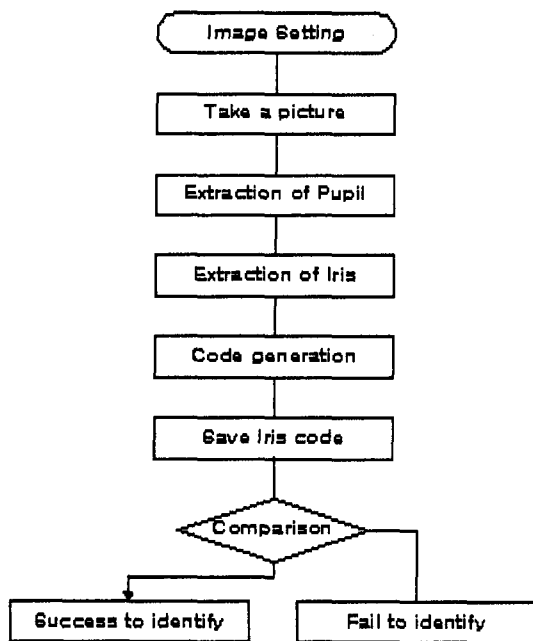
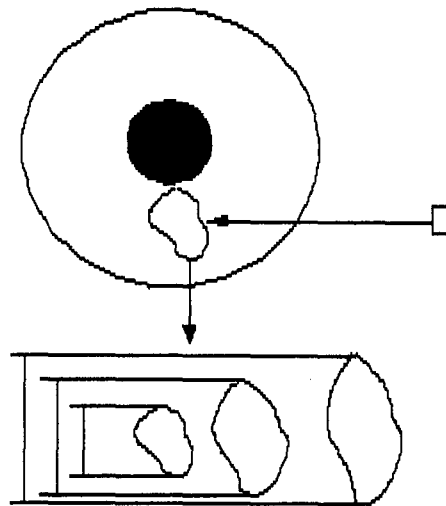Figure 3. Processing structure for iris authentication

Figure 4. Take a tomography of iris color pattern

And figure 5 shows structure of iris renewable algorithm.
The input of iris images are classified as brightness and extract iris area and are compared with pre-saved data. If value is outbound of limit value then these value is saved newly. These are the role of main process.
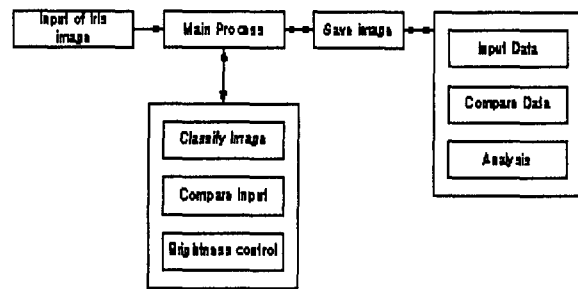
The roles of each step in figure 3 are as like following.

- Image setting : autofocus position as initial focus
- Shift take a picture : take a tomography as 1/10 to winding width(2 mm) of iris surface
- The extraction of Pupil : The pupil authentication get threshold value using histogram for getting different value of gray value
- The extraction of Iris : acquired image using pupil radius and center point and recognize boundary of image
- Code generation : generate gray code image using width, height of iris image in iris region
- Iris code save
- 1:1 Compare with pre-registered iris image information(data)
- If it identify, confirmation of identification is successful

In this paper, taking a tomography for color pattern on iris is as figure 4 and it is different from common iris color pattern method using image gotten by infrared rays.
This way is increasing security by multi-save information according to depth of image pattern.

Figure 5. The structure of renewable iris algorithm

4. APPLICATION OF RENEWABLE IRIS AUTHENTICATION IN MOBILE SYSTEM

We can apply Iris authentication algorithm proposed in Chapter III to mobile system and this make possible to applicable biometrics implementation in variety field.
As adaptation method the mobile terminal download client program from server in first step and transfer to server for saving input of iris information gotten by built-in camera of mobile phone.
And if the value of input data change to outbound of threshold value that can identify, this value is up-to-date. This can keep the latest value of iris image through renewable iris and avoid misunderstanding.
If mobile phone has not built-in camera, we can use external camera and flash memory unit and attach to mobile phone and operate according to before explain.
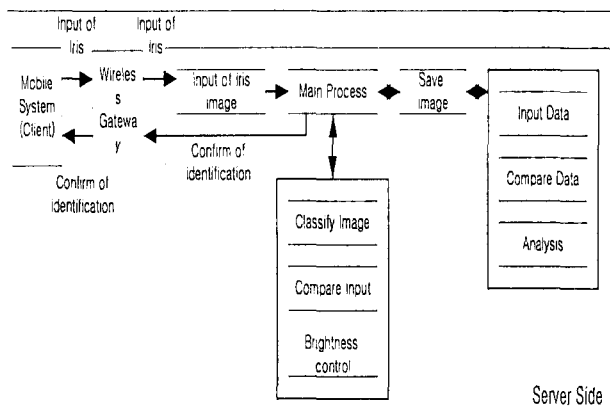
Figure 6 The structure of renewable biometrics in mobile system

Figure 6 shows block diagram for implementation of biometrics technology in mobile system.
Especially as we know in this figure, this system includes wireless gateway for supports to mobile system.
The wireless gateway transfer iris input data to Renewable Iris Authentication Server side and retransfer the result of compare and confirmation to client mobile system.
And if the results are the value of range that has to update then these value are restored in database of server side.

5. CONCLUSION

In this paper, we propose the mechanism to implement renewable Iris biometrics authentication in mobile system. If pupil or iris has some problem according to old age, disease then the identification rate is being less than constant value and it cause system to miss-recognize in general iris authentication system. But this mechanism make compare captured iris image with pre-saved iris information for confirmation of identification and this system can keep the latest value of iris image through renewable iris and avoid misunderstanding.
As a result, we suppose the new mechanism of iris biometrics system to support secure payment algorithm in mobile system.

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