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REPRESENTATION OF COMPOUND METHODS OF FINGER AND INDIVIDUAL SPECIFICATION FROM FUZZY LOGIC FOR INCREASE THE SECURITY AND RECOGNITION OF USER IDENTIFY IN AUTOMATION TELLER MACHINE

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ABSTRACT
In according to daily advance of bank electronic systems, everyone is able to withdraw of his account by having password and bank card, though credit cards and automation teller machine had many advantages but the custom method of confirm the customers identify has accompanies many problems such as robbery the card and password, Loss the card and … etc. by using the card password. In this article we use from fingerprint sensor compounds model and one of the individual specifications that receive for registration and save in database for recognition and identify a user. This act is cause to increase the security. In continues, in according to increase the fingerprints specification, we use of fuzzy logic for the mysticism reconciliation act of finger print by it′s sample in database. At the end of flowchart, we comparison the suggestions with concludes of statistical analyze of this method by another method of biometric authentication systems.

Keywords: Fuzzy Logic, Biometric, Fingerprint Sensor, Automation Teller Machine, Security

INTRODUCTION
Nowadays ATM plays a main role in bank financial communication their availability in all hours has been results to significance use. In according to high volume of cash's transfer from these instruments, their security is very important. One of the main discussions in present society is security and recognition and authentication identify. The provision of security and guarantee of transaction information among users and bank are the important trouble of banking system, communication security is means provide the safe channel among user and credit bank and his/her authentication identify and explosion. Although use of credit cards and MAT have many advantages. But the custom method of the authentication identify of customer by use of card and password is accompanies with many security problems such as robbery the card and password, loss the card and forget the password and other cases. Using of long password for users are difficult (Abhishek *et al.,* 2012). Representation of compound method in which it's includes of fingerprint and individual specification can be increase the security index for users. Lateral advances have been allowed to advance the biometric system in portraiture technology and inform.

Biometric systems are systems that able to extraction the sample of identify recognition and they can comparison the reference date, and show that does the authentication identify by individual is or no? (Sarkodie, 2006). For reply to these question in first step we should determinates identify of individual. On the other hand, by rapid grow of technology. We can observation that communication between individuals should be more electronically. Thus, we need to defines the. Individuals identify automate.

Different kinds of biometric system use for identify the real time. Among all these system the identify of fingerprint is one of the most advance methods and it has been confirm (Jain *et al.,* 2000; Zhou and Gu, 2004). In this plan, the level of individual identify recognition has been improved. Necessary instruments for assured password and valid transaction not only protects of change or robbery the data but also is use for authentication user identify, too (Uludag *et al.,* 2004). The formal authentication of explosion Automated teller machine (ATM) through real time constraint notation (RTCN) is a model of explosion of ATM that it's suggestion in banking part by help of real time constraint notation (Vivek *et al.,* 2011). In second section we pay to introduction the automated teller machine equipped to fingerprint sensor, and suggested method in third section pay to definition of fuzzy logic, in forth section we represent the

Research Article

application of fuzzy logic in extraction od main specifications of one finger print, suggested chart and analyze the conclusion … in fifth section we pay to more conclusion and discussion.

## 1. Finger Print Sensor and Individual Specifications in ATM

In present world, every human is regard as a user.

And for authentication identify and own validity, we use of one of the three identify method for enter to every place and instrument:

1- What we know about everything (such as: the password)

2- What you accompany (such as credit cards and identify)

3- Specifications and your own (the physician and behavioral specification)

Among three group in which mentioned above, every kind has advantages and faults in which defines in their domains. In first situation, problem is forgotten the password and learning the password. In second situation, loss or robbery the card but in third situation there aren't any problems such as problems in previous situations. The last care is biometrics. Biometric in fact is reform to behavioral and physician specifications of individual for. Recognition the identify (Ross *et al.,* 2006). One of the oldest. And most successful technology in recognition the identify of fingerprint ATM system (Fridrich, 1998).

One finger is made of multi wrinkles and protrusion. This wrinkles and protrusion have good simulations, because they are parallel and have an equal lent width. But in according to vast studies a bout recognition the finger print, this result is achieves in which the wrinkles and protrusion have no effect on this recognition. But minutiae are important. We con not comparison the finger print the finger print with picture. They use from base methods on specification of points as namely minutiae (Sachenko *et al.,* 2009). In proposed plan, user retested one of individual specification in which its definition by bank (such as serial No or national card and birth date) With the model of finger print in data base, in which he/ she use of them when using of ATM for authentication identify such as figure (1):
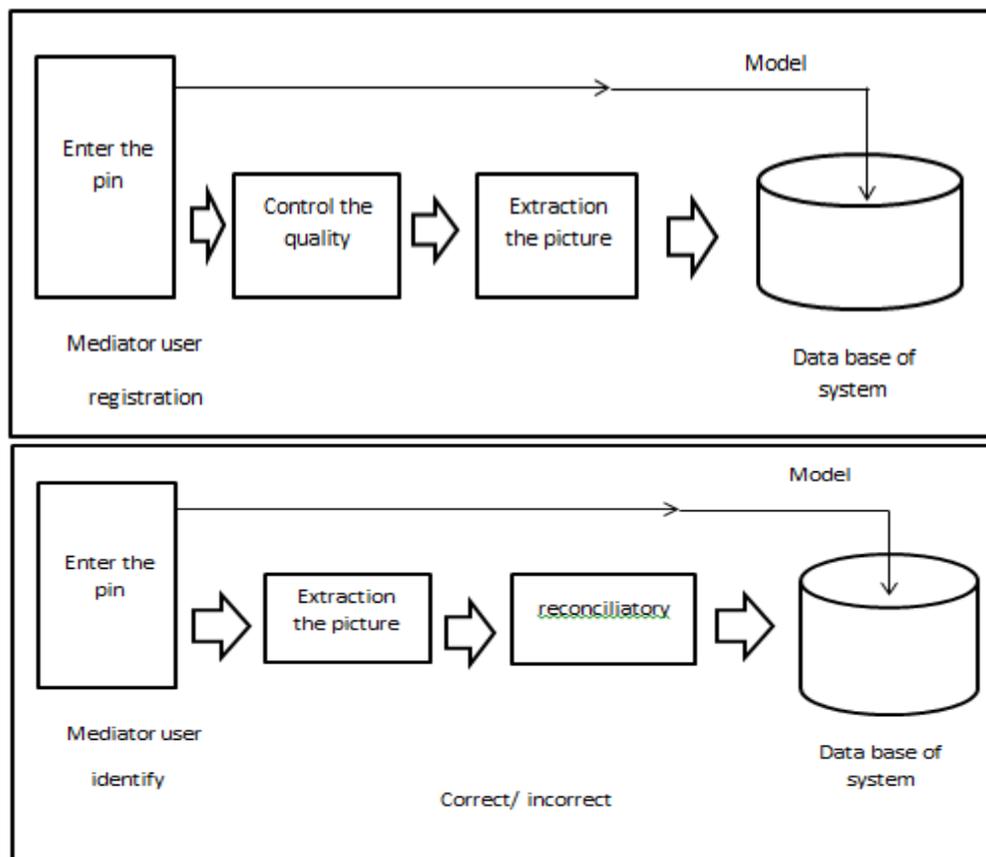

Figure 1: the identify and biometric registrant (Aranuwa and Ogunniye, 2012)

Research Article

After record the necessary information and the model of finger print, user be allowable that he/she doing own explosions by two factors. The main discussion is that how correct model is recognition? And Is there any way for increase the speed of identify and recognition? As it was pointed out, the finger print has much specification. Among them, we use of minutiae for recognition the model in data base. Among minutiae's in which refers to them in different studies, two case have vast use. One is terminal and on other is fork (figure 2, 3).
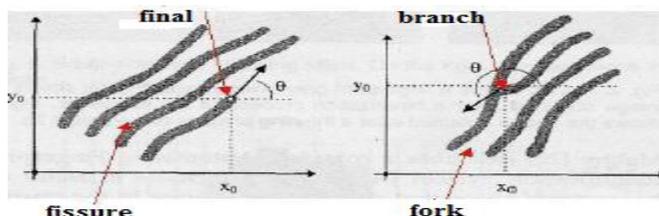
Figure 2: Kind of minutiae
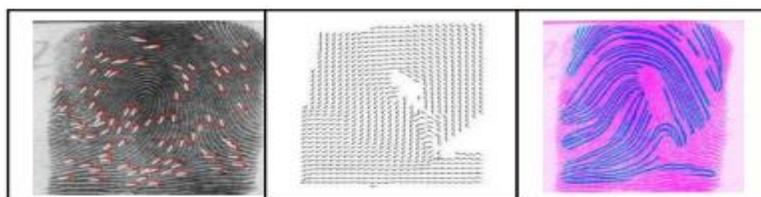
Figure 3: The picture of minutiae′s recognition

Every point of minutiae in which it has been link multi protrusion, has two coordinates (x, y) and a measurement for qualification the data. Adjustment the finger print is depends to place and rotate on it. For this reason, every finger print cannot be show because the group of coordinate′s point don't integrate to each other, when two finger print are comparison, at first the coordinates are comparison if this step is donnish successfully, then their coordinates has been deformed (Iancu *et al.,* 2010). After authentication the finger print, so we want to know that probability of finger print of one individual is high, so the probability of. Belong to one finger print to individual is be completely (True, 1) or (False, 0). In many cases, probability in belong one finger print to one individual is the subset between (1,0) and this is results us to use of fuzzy logic for their account (Iancu *et al.,* 2010).

2. Fuzzy Logic in Real Fingerprints Pattern Detection

Fuzzy logic in recognition the model of multi rate logics and its rely on theories of fuzzy sets the fuzzy sets are includes of generality and advance the crisp sets.

Crisp Sets

Crisp sets in fact are the same ordinary sets that at the beginning of classic theory. The sets are in production. By adding the crisp's word, in fact it's cause the distinction that by to help it, there has been a creative and critical concept in fuzzy logic as membership function in mind. In crisp sets situation, membership function had only two rate in range (in mathematics, the range is the equal lent). Function by sets all the outlet function) 0, 1 are two rate in classic divalent logic thus:

$$MA(X) = \begin{cases} 1 & if\ X \in A \\ 0 & if\ X \notin A \end{cases}$$

(1)

In which, here $\mu A(X)$ is membership function set A.

There are two specifications in authentication identify systems by using of biometric: The range of error acceptance, the range of error rejection. The range of error acceptance is defines as the number of tries to accepted identify of one unallowable in which he/she has been done. The authentication identify id suitable. When the range of assurance of comparison of created model in registration is should be high or equal of the determinate range of threshold. The range of threshold can be definition in two modes as

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Research Article

theory assessment and in base of environments. The exit mode is a قطعی ; correct, or false in which we know it as the situation of 0, 1 that may be happen 0 or 1.

In a biometric system, the range of threshold can be uses in a collection in world level (for all people) or as separately. In this reference (Sachenko *et al.,* 2009), it has suggested that we should use from fuzzy logic as a average or nature expression of incorrect errors accepted level. The proposed method is constituted of three levels.

First Step

In this level, in according to definition the incorrect accepted range, the range of membership functions in fire level from incorrect accepted level is definition, such as %5 , %2 , %1 , %05, %01 then for every level we can calculates the ranges of membership function in five security level as very low, low , middle, high and very high.
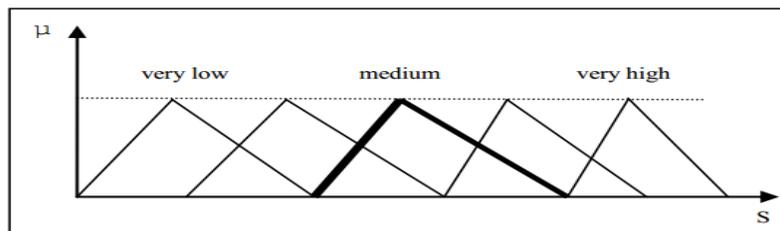
Figure 4: The membership function for showing the security level

Second Step

In this step through propriety use of fuzzy rules, it has been received a result about fuzzy request of the threshold range, these rules are acquired in according to reply for one question about un threshold communication (T) and security determinate level (s).

Rule 1: if "S is very low" then "T id very low",
Rule 2: If "S level is low" then "T is low",
Rule 3: If "S is medium" then "T is medium",
Rule 4: If "S level is high" then "T is high",
Rule 5: If "S is very high" then "T is very high".

Third Step

In this step we use from fuzzy foundation that fuzzy rates is convert to determinate rates of user function.
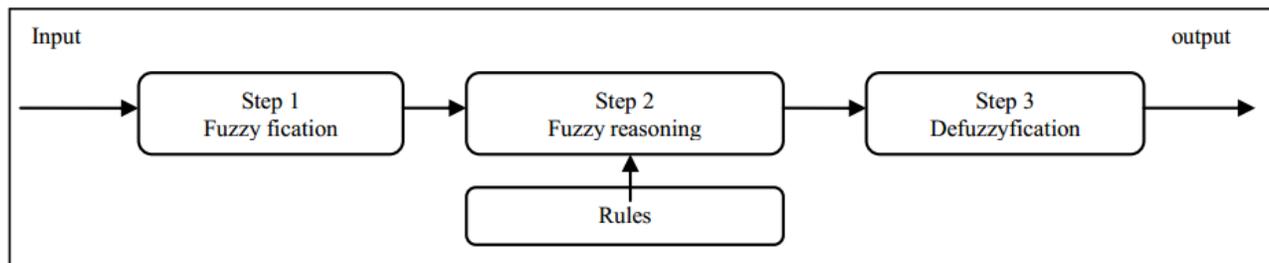
Figure 5: The step of using the fuzzy logic in biometric systems

The Method of Finger Print's Identify in Date Base on Fuzzy Logic

The picture of finger print by sensors of finger print in shape of **bitmapping**, the grey rates is eliminated. Then the picture is converting in two color black (for protrusion) and white (for bight) by set of algorithms of picture's process. Finally, the process finger print use from fuzzy mathematic for enter to engine the fuzzy logic by extraction he characters of finger print. There are three modes for identify as:

Processing of the Picture

In this step, the processing has been done in picture in according to acquire high quality because may be the received picture has an undesirable quality and this step is including if: normalization, Gabor filter,

Research Article

binary picture and skeletal picture. After doing this step, the picture's extraction without break or fracture is extraction. In figure (6) you can observe the step of picture's pre processing.
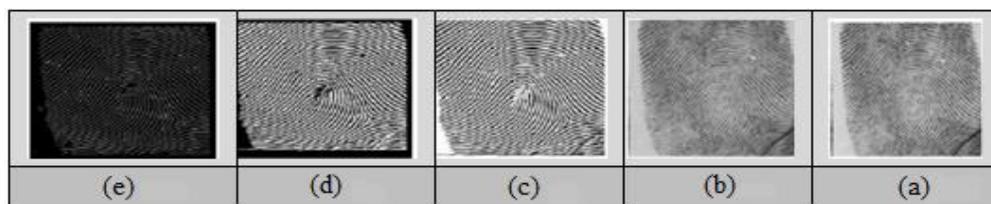
Figure 6: a) main primary picture , b) the first step is normalization, C) second step is Gabor filter, d) in the third step, the convert to binary picture and finally e); the skeleton picture

Extraction of Main Specifications or Minutiae
By using of skeleton picture in which its a acquire in pre processing step we want to deleted the uncorrected minutiae and determinate the correct minutiae, as show in figure (7) all kind of incorrect minutiae are represented.
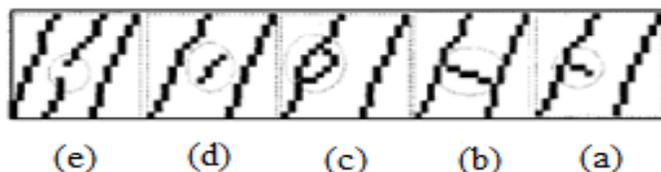
Figure 7: The models of incorrect minutiae.

Minutiae. Generally are divided in three levels:
1- Final minutiae- fork (such as figure (7a))
2- Fork minutiae- fork (such as figure (7b , 7c))
3- Final minutiae- final (such as figure (7b, 7e))
After deleted the incorrect minutiae, the correct minutiae are determination and save. The figure (8) shows the model of correct minutiae.

Figure 8: Show the model of correct minutiae (Garima, 2013)

The Reconciliation of Picture to Model
After the picture of finger print has been process then it's prepare for conciliation to main model. Here, the minutiae should be coding by fuzzy logic then it's deterring mind in which whether the entered finger print is correct or no.
*Compound Method, Analyze the Conclusion*
In this part of article we pay to coding by fuzzy logic and then we representation the suggest that by using of individual specification and finger print that it's done by fuzzy logic. Then we comparison the kind of biometric models.
*Fuzzy Coding of Finger Print*
At first, each picture of finger print is the size of 512×512 and it's derided to parts of 8×8 by width 64 pixel (figure 9). A set of communicated fuzzy by every area in inner's parts of picture of communicated finger print has been communicated.

Research Article
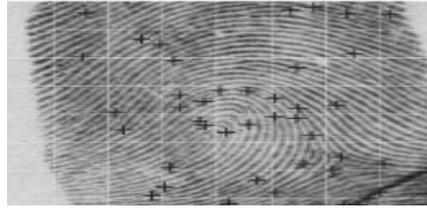
Figure 9: The picture by fork's point in 8×8 part

In next step, we consider a membership rate for every fork of finger in a conical function for each part of finger print in according to show the structure of forks. The findings of this analyze are use for earing the rate of fork′s membership in fuzzy collection (figure 10).
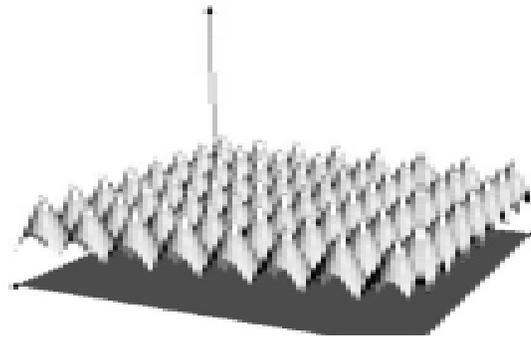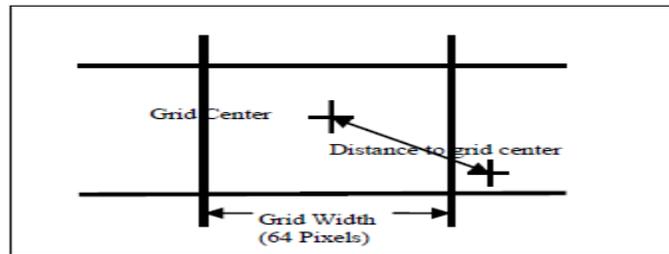

Figure 10: The conical function for finger print′s fork

The membership function in parts of finger print calculates as:

$$m(i,j) = \sum_{n-1}^{m}\left(1 - \frac{\text{Distance To Grid Center}}{\text{Grid Width}} n\right)$$

(2)

In which, the member ship function is M (i, j) from m(I, j) part. The point of fork near to center (I, j) and the width of each part is 64 pixel.


Figure 11: The parameters and member ships rates

In third step, the set of memberships rates in each part has been calculates, then its earn the structure of fuzzy pictures forks and the grey level of picture is calculates as:

$$
F(I,j) = \begin{cases}
255 \ if \ m(i,j) \geq 1 \\
M(I,j) \times 255 if \ 0 \leq M(i,j) < 1 \\
0 \ if \ M(i,j) < 0
\end{cases}
$$

(3)

Here, f(x, y) is the grey level in each network (I, j), in which its show as figure (12) (Tang and Shing, 2008).
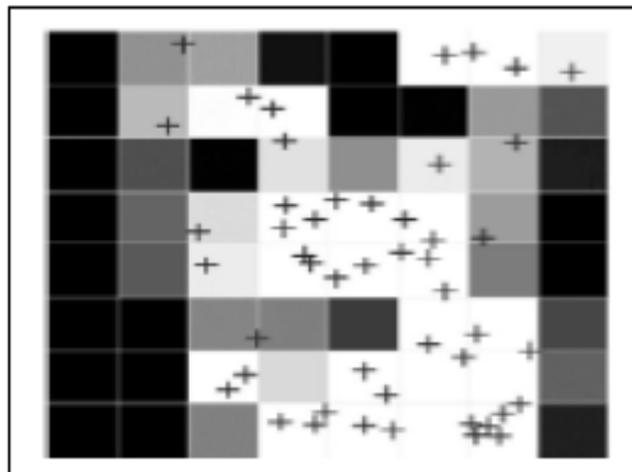
Research Article
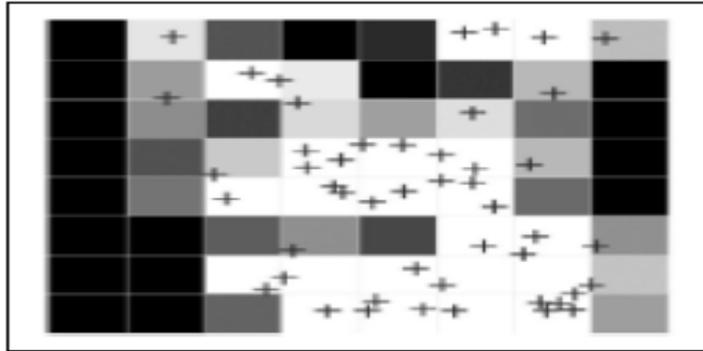
Figure 12: The fuzzy picture of structure of finger prints fork

The rotation in finger print is a nature problem and its accruing when finger print is scan for detection. The fuzzy picture are bears the errors in rotation. If we spin the direction of print in 5 degree in direction of hour index (Figure 13). We can acquire the fuzzy picture of showed forks structure.
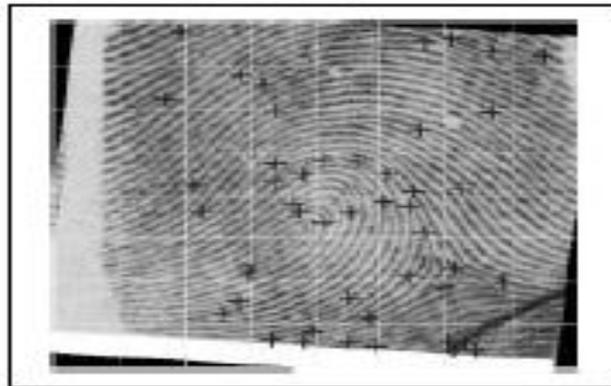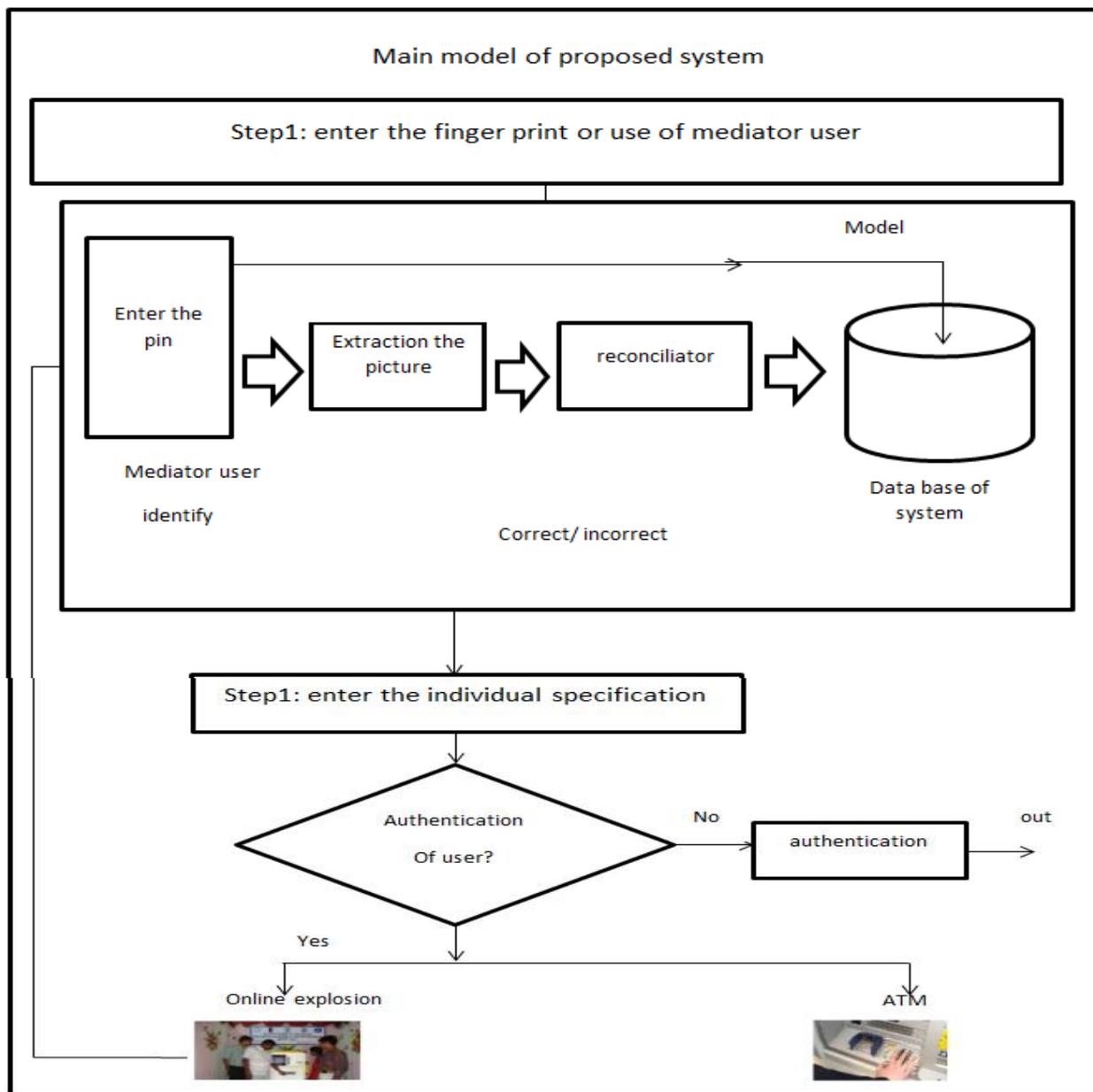

Figure 13: The rotation of finger print in 5 degree in direction of hour index

The picture of fuzzy structure of finger print after 5 degree rotation is shows in figure (14).

Figure 14: The picture of fuzzy structure of finger print after 5 degree –rotation in direction of house index

Research Article

Finger 15: Proposed flowchart of compound method of finger print and individual specification by use of fuzzy logic

In according to figure (15), the finger print of every user is take by bank Suring the registration and it's enter to database by one of individuals specification. User that his/ her finger print is is in according to saved sample in database of bank and he/ she could enter the password or individual specification is a authentic. In this time, when user entered his/ her finger on sensor of finger print, it's take the picture of it, in which this picture should be pass from few filter until it's determined the validity of it's authentic. The method in this plan is that the picture of extracted finger print at first is preprocessed. As we say in study (Geethanjali and Thamaraiselvi, 2013), the preprocessing is include of normalization filers, orientation of course, Gabor's filter, subtlety model picture and skeleton picture. After picture had passed from this filter then the extraction of minutiae are begin minutiae are divided in two groups of finally and forks that should be deleted. The in correct minutiae. After elimination the addition minutiae and determination the

Research Article

correct minutiae, the coding by fuzzy logic is beginning. That it's cause to speed up in reconciliation of model. Regardless to fuzzy logic, there aren't two mode of correct or authentication and in correct or unauthentication. If after these steps, the picture is reconciliation to model of data base the user is authentication and he/ she enter to PIN step in which it is as individual specification in which If PIN is enter correctly then it's enter to mentioned explosions. This compound method is cause to increase the security of ATM. There are many biometric compound methods in which they are cause to increase the security as you see in table (1). We comparison kinds of biometric from different dimensions.

Table 1: Comparison the different biometric together.

Signature	Sound	retina	Personality	Iris	Geometry Of hand	Finger print	specification
Moderate	moderate	High	moderate	High	moderate	high	**Endurance**
Moderate	moderate	High	moderate	Very high	moderate	High	**Security level**
Moderate	High	Moderate	moderate	Moderate	moderate	moderate	**The rate of users acceptance**
High	High	Very high	High	Very high	High	High	**Cost**
High	High	Very high	High	Very high	High	High	**The author of function**
Cheng the signature	Noise, ill, weather	glass	Light, age Glass, hair	Law light	Injury-age	Drought-age-dirt	**Erroneous factors**
High	High	Down	moderate	Moderate	high	high	**User simplicity**

Conclusion
The banking system has been developing by high speed. Custom system in which use as credit cards and PIN have very low security coefficient. One of the beneficial solutions which can be replaced to the custom method is use of biometric science. Biometric now is one of the most proposed discussions and authentication identify. Now, there is biometric in body of every person, then the owner ship of each card is determinates that in custom method isn't such as mention above. In according to mentioned proposition, the biometric for ATM systems of banks is the best option. In proposed system, the authentication of user is done by use of finger print. One of the oldest and the best biometric for finger print is one of the oldest and the best biometric for determination the authentication identify. This method is accompanies the 100 percent of security for user. Fuzzy logic is because that complication, and challenges in distinction has been near to human cognition. In fuzzy logic, we consider the specification in which has a more importance, this specification is cause that the step of reconciliation of model is done by authentication and high speed increase the security in ATM system. The conclusion show that use of compound biometric can provide the high security for ATM systems users and this can be studious matter for the future.

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Research Article

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