VARIOUS TECHNIQUES TO INCREASES SEARCHING SPEED, UNIFICATION, REDUCE INSTALLATION COST & MEMORY CONSUMPTION

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ABSTRACT:

Biometrics is playing a vital role in today's technical world. In today's world biometrics means security, automation and so many other usages. There are a lot of techniques for searching a biometric data or pattern from large database. This paper is about various techniques for fast searching. More specifically I can say I am going to purpose three new methods to search a person's identity from whole universe's database. Concurrently these techniques will provide universal unification for each human that can solve various security and accessing related problems. All the three methods would contain very small size database for whole universe's humans, and that integrated and common database would be accessible very efficiently. The advantage of these methods is that these can be used in integrated mode or can be applicable individually according to the necessity. Further these methods would be used for accessing online or offline accounts like bank accounts, social networking sites accounts etc. Moreover it enhances the concept of internet security or access security which has always been the main aim of biometrics. I am explaining my techniques using fingerprint technology & further we are flexible to use these techniques with any other technology like iris scan, facial scan etc.

1. MAIN PROBLEMS WITH CURRENT BIOMETRIC TECHNOLOGY:

As per the survey there are three main hurdles on the way of success of biometric technology.

1.) Abundance
2.) Speed
3.) Universal Unification
4.) Memory Consumption & no common database
5.) Cost of Installation

Currently biometric techniques are in use everywhere but not in abundance. There are numerous and significant uses of finger print technology, but still we are restricted to its small scale uses! There could be a common database for whole universe's people that can be used to identify people that increase the security, forbidding fake account creation and can assess online and offline accounts. There would not be any need of carrying passport, identity card, and Visa/Debit or ATM card. In my opinion all the money transactions & all type of access controls should be integrated with biometrics. The example of those persons can be considered who have more than one account on same server of facebook/gmail etc. It means they have other fake accounts for harassing people. This would be controlled using biometric techniques.

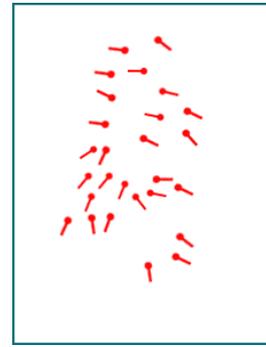## 2. SUGGESTED SOLUTIONS TO THE PROBLEM:

To understand the current techniques I have taken the example of minutiae (finger print matching). To match the minutiae initially a data base of minutiae has been created then the input is taken through finger print reader the input image is matched with whole collected database of minutiae images. This can take 10 seconds per database of ten minutiae. Now suppose we have to search one minutiae pattern from the large database of one billion people.(as shown in fig 2.1,2.2,2.3)
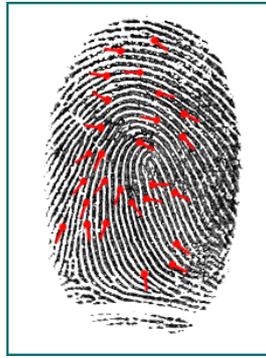
| *Fig.2.1Finger Image* | *Fig. 2.2 Finger Image + Minutiae* | *Fig 2.3 Minutiae* |

As I have already discussed that it's hard to search a single pattern from a large database of billion, But quite easy to search given minutiae pattern from the date base of hundreds or tens. So I three different suggest methods to solve this problem as below:

3. **First Method:**

In this method the work is divided into parts, first person's data till his home address would be searched(as shown in figure 3.1) then we will use biometric technique.
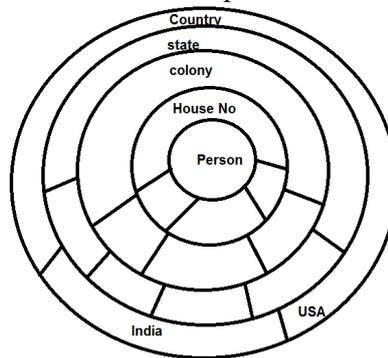
Fig3.1 Minimize the Search

Let's understand this method in steps

1. Create the database
   a. Store the information of people in database in the form of text like country, state, city, colony, house number.
   b. Then assign some numerical standard values like India-890, Singapore-888, Indonesia-899 so on.
   c. Then assign State codes like Punjab-07, Bihar-36 so on.
   d. Then same for city, colony and house number is already in digit form like Patiala-11, Sangrur-13.
2. Then convert this into barcode ex: 890 07 13 007 093 It means person is from India, Sangrur , J.P.Colony, and house no is 93. According to above assumptions.
3. Take the user input through some coding techniques like barcode, Magnetic tape technique. (The barcode/tape can be embedded on some identity card provided by Govt./company)
4. If the barcode/magnetic tape is not readable from I-card or the person does not have card with him, then information would be entered manually from the ID card as the user information will be written on ID card or would be asked from the person.
5. Now we have less than ten patterns to match. Because have to search data from the data base of one family.
6. Use fingerprint reader and do matching.

4. **Second Method**:

As per my research I have observed that the distance between two minutiae points is from zero millimetres to 0.9 millimetres.

Second method is the extension of 1st method, described below:

1. Create the database: a to d points are same
   a. Take input minutiae to the system and trace it's all minutiae points and then start drawing lines top to down and left to right starting from one point to next & so on till end. (Fig.4.1 showing the minutiae pattern and fig.4.2 showing minutiae track pattern)
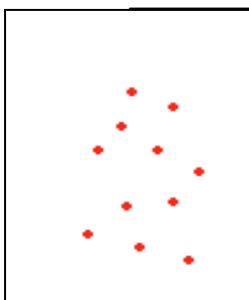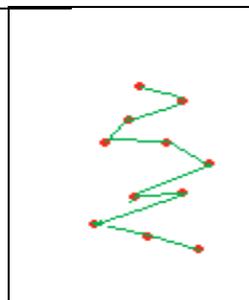
Fig4.1 Minutiae   *Fig4.2 Minutiae Track*

   b. Now measure the distance between each two adjacent minutiae in millimeters. (we may skip e point and can directly move to f point)measured lengths from above pattern in mm are 0.5 , 0.6, 0.7, 0.3, 0.8,1.1,0.9,0.5, 1.0, 0.5,0.6
   c. Now write measured length in 05 06 07 03 08 11 09 05 10 05 06
   d. Now we can design barcode, smartcard or magnetic tape card.

   a. Then convert this into barcode ex: 890 07 13 007 093. It means person is from India, Sangrur, J.P.Colony, and house number 93. According to above assumptions, now it's depends upon usage that whether both the barcodes need to keep separately or merge into one barcode.
   b. Take the user input through some coding techniques like barcode technique. (The barcode will be printed on some identity card provided by Govt.)
   c. If the barcode is not readable from I-card then information would be entered manually from the I-card as the user information will be written on I-card.

Note: 1. Lost cards can be blocked same as lost ATM/Master cards using RFID (Radio Frequency Identification chip). And many encryption techniques would be used barcode or magnetic tape embedding on ID card.

2. The pattern must be taken from joint line to top of finger.

5. **Comparison between two method:**

First Method	Second Method
• Slower than second method	• Faster than first method, less involvedness of biometric and image matching.
• More setup cost, because it needs biometric devices at every required location, Moreover we need barcode/magnetic tape reader at every station.	• Less setup cost because there is no need of biometric devices after gathering data in database. Only barcode/tape reader needed.
• More memory consumption, because	

	• Memory Consumption would be less.
finger print images would be there. • Both methods are equally secure because it's easy to make fake ID card but not cup of tea to upload fake information database.	

Advantages of using this method:

1. Very fast search and reduces the work.
2. The card holder can login to any account like bank account, email account or any social site by using card.

Disadvantages of using this method:

1. Person have to carry a card, otherwise operator have to fill whole detail manually. Which is big problem as it changes the baseline of biometric technique.

6. Third Method

It is based upon observation (the fact) that there are more than 25 Minutiae points, if there are more than 30 minutiae points in a finger scan then mathematically it can be stated that one fingerprint can have 10^30 combinations.

It gives the solution of above problem.
1. Create the database
   a. Take input minutiae to the system and track it's all the minutiae points and then start drawing lines top to down and left to right starting from first minutiae point to second so on till end. (Fig 4.1 showing then minutiae pattern and fig. 4.2 showing minutiae track pattern)

   b. Now measure the distances between two adjacent minutiae in millimeters. (we may skip e point and can directly move to f point)measured lengths from above pattern in mm are 0.5 , 0.6, 0.7, 0.3, 0.8,1.1,0.9,0.5, 1.0, 0.5,0.6
   c. Now write measured length in 05 06 07 03 08 11 09 05 10 05 06 called "trace"(say).

2. Now make a dataset by calculating the sum of trace again and again till comes between 1-10.Repeat the same to calculate by selecting series in different forms as odd position's sum and as shown bellow.

Trace's Sum	Even's Sum	Odd's Sum	First half Sum	Last half Sum	Multiple of 3's Sum	Multiple of 4's sum	Trace

• *Fig.6.1 Trace Packet*

As described earlier that the distance gap between two minutiae points can vary from 0 to 10mm. and the range in each block can vary between 25-250, Let's take 100 as approximate value. Which means remaining data to be searched, will be divided by 100 after each iteration (block passage).

Example: Indian Population is 1.22 Billion that becomes 1220000000. Means after three iterations the remaining data to be searched will become 12.2 approximately that would be directly matched with the *trace*.

This method solves all the above problems. These methods could be used to store and search whole universe's people's data or it can be used in big industries or communities as access control. As these

methods are fast enough so they can be used for every internet account creation & internet bulling can be halted.