Approches for Finding Correlation between Fingerprints and Footprints of a Person as an Identity

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***Abstract*— Today time with the increase in population crime increases day by day, and Police Department have over loaded work. To decrease the crime and to identify the theft and criminal, we try to make a new age safety system in which detect the theft by matching his /her Foot finger prints with Hand finger prints. Because due to plastic surgery sometimes criminal change their identity, and protect them self from punishment. In this work fingerprint and foot finger prints are recognized with the help of minutia because the minutia is the one element of the footprint and fingerprint that helps to find the matching with same and different persons. In this work database is created with the help of different person's footprints and fingerprints. After creating the database the matching of footprints and fingerprints is done with the help of that database and the accuracy of the footprints and the fingerprints are calculated. In this work the maximum accuracy of same person matching is 100% and the minimum 67.42% and the different person matching is maximum 57.66 % and below 50% is rejected cases.**

***Index Terms*— Footprint, Fıngerprint, accuracy, criminals, identity etc.**

I. INTRODUCTION

The field of forensic science has improved criminal investigation in ways that could not have been imagined fifty years ago. With advancements in science and technology, newer and more effective techniques for the identification of criminals are available to police and criminal investigators. Since the earliest methods for the identification of individuals became available, there have been attempts to improve and redefine these techniques to keep up with modern advancements. Over the past hundred years, there have been some of the most important and significant advancements to the field [1]. Technological advancements from the dawn of the age of the computer to the beginning of the age of the internet, have all created easier and more efficient ways of criminal investigation. Police departments throughout the United States and in other countries now have ways to easily store and share information and eliminate problems that traditional paper records posed. The advent of the internet, allows instant communication and sharing of information that is often vital in the fast paced world of criminal investigation [2]. AFIS databases allow for another level of comparison that manual comparison is not capable of. When a fingerprint is entered for comparison, more than one possible match appears once the search is complete. Within the list of possible matches that appears, each print has some level of similarity between the reference and database prints[4]. This is given as a percentage along with the file that accompanies each fingerprint. Percentages are helpful, particularly when a complete print was not collected, to narrow down the suspect pool to a small list of possibly ten people[3]. Percentages also provide supporting evidence when a fingerprint comparison is used in court. These percentages not only show how closely related one print is to another but also the likelihood of another print being a closer match[4]. Prosecutors and jurors find this level of proof reassuring when presented in court because it the lowers the possibility that the print came from a different source than the defendant. The problem with this is when there is not a full print and a list of possible suspects is generated. If the police have a suspect in mind who happens to be on the list of possible matches, police can become blind to the fact that there could be other suspects and could potentially arrest and prosecute the wrong person.

Concerning the methods of biometric, the favorite was fingerprint recognition, the second place- iris recognition. The following picture shows the preferences of common people in choosing the methods of biometrics.

Table : 1.1. of advantages and disadvantages of biometrics:

No	Advantages	Disadvantages
1	Increase security	Security
2	Can not be copied	Adaptability to rate of change
3	Can not be shared	Scalability
4	Convinience	Miss use
5	Auditable trial	Regulation of use
6	Accuracy	Accuracy
7	Can not be lost	Financial cost
8	Minimaze paper work	Privacy
9	Costs	Time

Security is considered to be the greatest advantage of biometrics, on the second position is accuracy. The greatest disadvantages of biometrics are invasion of privacy and costs of implementation.

II. TYPES OF BIOMETRIC IDENTIFIERS

Biometric characteristics of a person are unique. Most of such keys are impossible to copy and exactly produce. Theoretically these are ideal keys. But by using biometric identification a lot of specific problems appear.

All biometric identifiers can be divided into two big groups:

1) Physiological
2) Behavior

Manuscript received September 23, 2014.

Though behavior biometrics is less expensive and less dangerous for the user, physio-logical characteristics offer highly exact identification of a person. Nevertheless, all two types provide high level of identification than passwords and cards.
Spheres of use:

- Criminalistics (biometric identifiers are used to recognize victims, unidentified body and protection of children against kidnapping.)
- Marketing (methods of biometrics are used to identify owners of loyal cards)
- Time accounting systems at work, schools, etc
- Security systems (are use to control the access to the rooms and control access to internet resources)
- Voting system (during the functionality of voting system identification/authentication of people, that take part in voting is demanded)
- According to actual international demands (for example, according to the standard of ICAO there should be biometric part in passport.)
- Biometric identifiers are used for registration if immigrants and foreign workers. It allows identifying people even without documents.

For organization of distribution of social help.
Methods of biometric authentication differ according their degree of safeness:
- DNA
- Iris recognition
- Fingerprint

Footprint
- Face recognition
- Voice
- Typing Rhythm

III. LITERATURE SURVEY

Nivedita Soni (2013) In this paper, we are defining techniques to overcome the issues of blurred images and have to find out better minutiae to match with the database set. To extract the features from blurred images, images which are taken by low cost sensors are filtered and then further processed for minutiae matching. [6]

Luca Lugini (2013) has presented the Biometric systems are widely deployed in governmental, military and commercial/civilian applications. There are a multitude of sensors and matching algorithms available from different vendors. This creates a competitive market for these products, which is good for the consumers but emphasizes the importance of interoperability.In this -scale empirical study of the status of interoperability between fingerprint sensors and assess the performance consequence when interoperability is lacking. [11]

D. Vinod kumar (2012) the purpose of this work is to increase the security that customer use the ATM machine. Once user's bank card is lost and the password is stolen, the criminal will draw all cash in the shortest time, which will bring enormous financial losses to customer, so to rectify this problem we are implementing this project. The chip of LPC2148 is used for the core of microprocessor in ARM7, furthermore, an improved enhancement algorithm of fingerprint image increase the security that customer use the ATM machine. [7]

Megha Kulshrestha(2012) have studied the Fingerprints are the most popular and studied biometrics features. Their stability and uniqueness make the fingerprint identification system extremely reliable and useful for security applications. Fingerprints are the oldest and most widely used form of biometric identification. Everyone is known to have unique, immutable fingerprints. Two approaches have been discussed in this that is based on minutiae located in a fingerprint and based on gabor filter which is used to matching the fingerprint. [16]

Hafiz Adnan Habib (2006) this paper presents a novel mono-vision virtual keyboard design for consumers of mobile and portable computing devices such as PDA's, mobile phones etc. Fuzzy approaches to gesture recognition are developed to reveal the key pressed over the printed sheet keyboard by analyzing the hand and finger gesture captured in the video sequence. Real-time system is developed by integrating SDIO camera with PDA in the application environment. Reliable results are experienced by the implementation of the proposed real time mono vision gestured virtual keyboard system. [15]

Andrew Senior (2001) This paper describes novel methods of classification using hidden Markov models (HMMs) and decision trees to recognize the ridge structure of the print, without needing to detect singular points. The methods are compared and combined with a standard fingerprint classification algorithm and results for the combination are presented using a standard database of fingerprint images. The paper also describes a method for achieving any level of accuracy required of the system by sacrificing the efficiency of the classifier. The accuracy of the combination classifier is shown to be higher than that of two state-of-the-art systems tested under the same conditions. [5]

IV. PROBLEM FORMULATION

The major problem for flatbed optical fingerprints is low contrast between ridges and valleys. In the case of difficulty in extracting orientation images reliably, a general purpose approach improving local image contrast is favored. Today time with the increase in population crime increases day by day, and Police Department have over loaded work. To decrease the crime and to identify the theft and criminal, we try to make a new age safety system in which detect the theft by matching his /her Foot finger prints with Hand finger prints. Because due to plastic surgery sometimes criminal change their identity, and protect them self from punishment.

V. OBJECTIVES OF WORK

The proposed research work is directed towards the fulfillment of the following features:

- To analyze Basic methodology of fingerprint and foot finger prints recognition.
- To analyze various techniques used in fingerprint and foot finger prints recognition.
- To create a database with the help of available data for give problem.
- To check the accuracy of the system

VI. METHODOLOGY

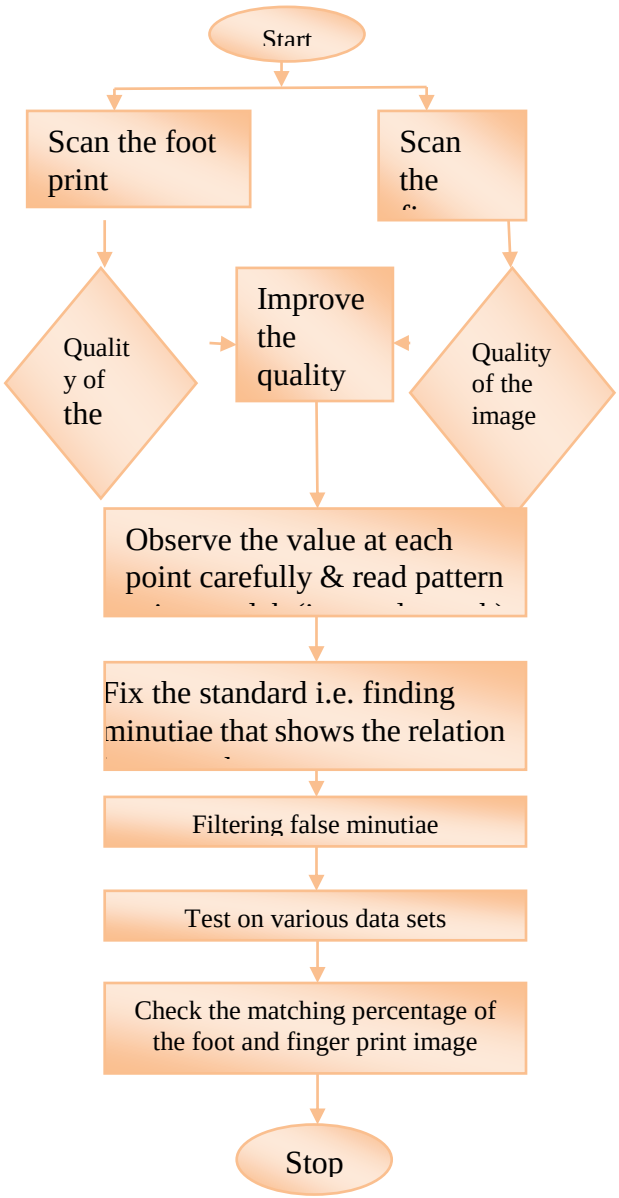
The aim is to match the finger prints with the foot print of the same person and with the different persons. It is based upon GUI (graphical user interface) in MATLAB. It is an effort to further grasp the fundamentals of MATLAB and validate it as a powerful application tool. There are basically different files. Each of them consists of m-file and figure file. These are the programmable files containing the information about the foot images and finger images and figure files are the way to analyze the given input images and footprint and finger print images related data.

In this work we will firstly create the database of footprint images and finger print images in the .jpg format. After creating the database of the images, upload that database for the matching. There is scan button that is used to scan the images one by one and match with foot print and finger print images. In the GUI figure there is two buttons that shows the same person matching and different person matching of footprints and fingerprints images. The Percentage of matching is shown in the text box, means how matching percent footprint and finger print matching with same and different person.

VII. ALGORITHM FOR FOOTPRINT AND FINGERPRINT MATCHING

Step 1 : Start the GUI .
Step 2: Scan the footprint images and finger print images.
Step 3: Check the quality of both images and enhance the quality of the images.
Step 4 : Observe the value at each point carefully & read pattern using matlab (i.e. Apply mask).
Step 5: Fix the standard i.e. finding minutiae that shows the relation between the footprint images and the finger print images.
Step 6: Filtering false minutiae.
Step 7: Test on various data sets.
Step 8: Check the matching percentage of the foot and finger print image
Step 9: Repeat the step 2 to step 8 for different data sets.
Step 10: Stop.

VIII. DATA FLOW OF THE WORK



IX. RESULTS & DISSCUSSION

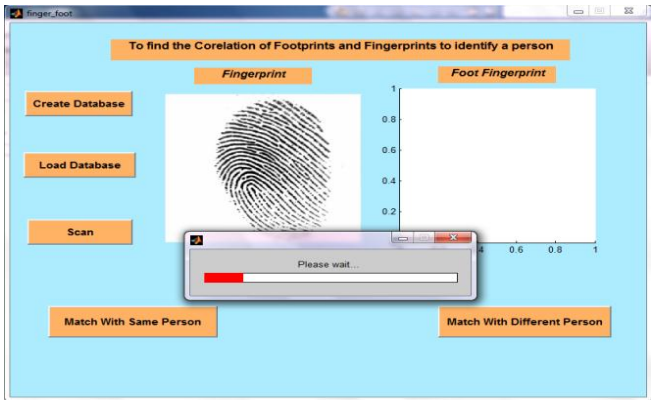


Figure : 1 scanning the images within the database for matching

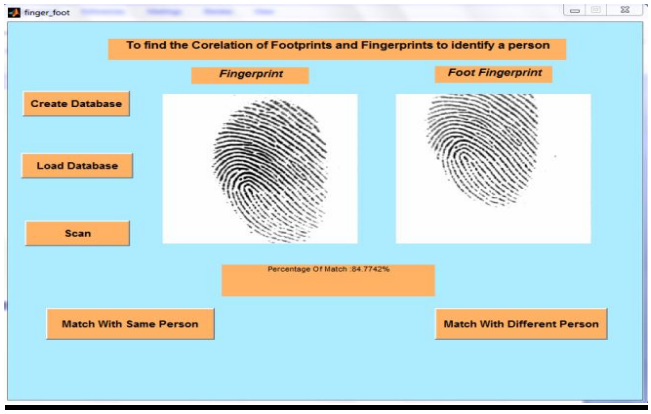


Figure 2: Footprint matching with fingerprint matching with same person

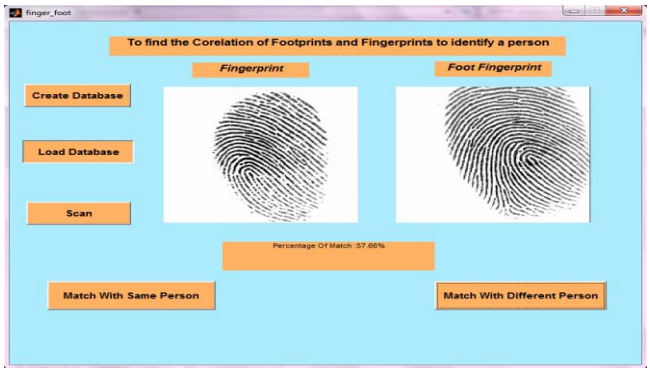


Figure 3: Footprint matching with fingerprint matching with different person

Table 1 : Similarity between fingerprint or footprint

Similarity between fingerprint or footprint	**Percentage of Matching**
Similarity between fingerprint or footprint of 101_1.tif and 101_1 from FVC2002	100.00%
Similarity between fingerprint or footprint of 101_1.tif and 101_4 from FVC2002	88.40%
Similarity between fingerprint or footprint of 101_1.tif and 101_2 from FVC2002	77.07%
Similarity between fingerprint or footprint of 101_1.tif and 101_8 from FVC2002	73.98%
Similarity between fingerprint or footprint of 101_1.tif and 101_6 from FVC2002	71.26%
Similarity between fingerprint or footprint of 101_1.tif and 101_3 from FVC2002	68.48%
Similarity between fingerprint or footprint of 101_1.tif and 101_5 from FVC2002	67.42%

Table 2 : Similarity between fingerprint or footprint with other persons

Similarity between fingerprint or footprint with other persons	**Percentage of Matching**
Similarity between fingerprint or footprint of 101_1.tif and 101_7 from FVC2002	57.66%
Similarity between fingerprint or footprint of 101_1.tif and 107_5 from FVC2002	32.23%
Similarity between fingerprint or footprint of 101_1.tif and 105_8 from FVC2002	31.67%
Similarity between fingerprint or footprint of 101_1.tif and 106_8 from FVC2002	31.67%
Similarity between fingerprint or footprint of 101_1.tif and 106_6 from FVC2002	31.55%
Similarity between fingerprint or footprint of 101_1.tif and 107_2 from FVC2002	31.55%
Similarity between fingerprint or footprint of 101_1.tif and 103_8 from FVC2002	31.03%
Similarity between fingerprint or footprint of 101_1.tif and 103_4 from FVC2002	30.77%
Similarity between fingerprint or footprint of 101_1.tif and 107_4 from FVC2002	30.46%
Similarity between fingerprint or footprint of 101_1.tif and 107_1 from FVC2002	30.15%
Similarity between fingerprint or footprint of 101_1.tif and 106_7 from FVC2002	29.97%
Similarity between fingerprint or footprint of 101_1.tif and 106_1 from FVC2002	29.85%
Similarity between fingerprint or footprint of 101_1.tif and 103_5 from FVC2002	29.85%
Similarity between fingerprint or footprint of 101_1.tif and 105_5 from FVC2002	29.69%
Similarity between fingerprint or footprint of 101_1.tif and 107_3 from FVC2002	29.26%
Similarity between fingerprint or footprint of 101_1.tif and 106_4 from FVC2002	28.72%
Similarity between fingerprint or footprint of 101_1.tif and 108_1 from FVC2002	28.65%
Similarity between fingerprint or footprint of 101_1.tif and 106_3 from FVC2002	28.49%
Similarity between fingerprint or footprint of 101_1.tif and 109_4 from FVC2002	28.20%
Similarity between fingerprint or footprint of 101_1.tif and 106_5 from FVC2002	28.04%
Similarity between fingerprint or footprint of 101_1.tif and 107_8 from FVC2002	28.04%

Similarity between fingerprint or footprint of 101_1.tif and 104_8 from FVC2002	27.99%
Similarity between fingerprint or footprint of 101_1.tif and 109_5 from FVC2002	27.71%
Similarity between fingerprint or footprint of 101_1.tif and 109_7 from FVC2002	27.71%
Similarity between fingerprint or footprint of 101_1.tif and 109_8 from FVC2002	27.25%
Similarity between fingerprint or footprint of 101_1.tif and 106_2 from FVC2002	26.87%
Similarity between fingerprint or footprint of 101_1.tif and 102_7 from FVC2002	26.67%
Similarity between fingerprint or footprint of 101_1.tif and 103_3 from FVC2002	26.67%
Similarity between fingerprint or footprint of 101_1.tif and 108_2 from FVC2002	26.44%
Similarity between fingerprint or footprint of 101_1.tif and 109_3 from FVC2002	26.38%
Similarity between fingerprint or footprint of 101_1.tif and 104_4 from FVC2002	25.71%
Similarity between fingerprint or footprint of 101_1.tif and 104_6 from FVC2002	25.64%
Similarity between fingerprint or footprint of 101_1.tif and 104_5 from FVC2002	25.60%
Similarity between fingerprint or footprint of 101_1.tif and 107_6 from FVC2002	25.23%

X. CONCLUSİON & FUTURE WORK

In this work fingerprint and foot finger prints are recognized with the help of minutia because the minutia is the one element of the footprint and fingerprint that helps to find the matching with same and different persons. In this work database is created with the help of different persons footprints and fingerprints. After creating the database the matching of footprints and fingerprints is done with the help of that database and the accuracy of the footprints and the fingerprints are calculated. In this work the maximum accuracy of same person matching is 100% and the minimum 67.42% and the different person matching is maximum 57.66 % and below 50% is rejected cases.

XI. FUTURE WORK

In the future work the footprints and fingerprints is matched with the help of different filters because i have implement with enhancement .The maximum accuracy of the matching is improved with the help of different techniques and different algorithms.In the future the footprint accuracy is improved upto 90% with fingerfrints that i have calculated upto 57.66% .

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