

The Survey of the Automatic Transient Fingernail Nail Authentication

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ABSTRACT

Biometrics is a scientific method of measuring and analysing person behavioural (in which human behaves) and physiological (in which the bodies of human works) characteristics such as facial features, fingerprint ridges, iris, palm print keystroke, gait, DNA, ear and foot ridges etc. In a fraternal twins or even different fingernails of a soul there is a high extent of individuality in case of an finger nails of an individual. Finger nail plates of five fingers such as Middle, Little, Ring, Index and Thumb fingers are taken for authenticating an individual. Biometrics can be implemented in commercial, government and forensic application. We also reviewed the previous research and discuss process of fingernail authentication.

Keywords – Biometrics, Authentication Process, Merits and Demerits.

INTRODUCTION

The security system mainly comprised of validation, dispensation, and answerability. The more important between these triad elements is validation that we also called authentication through this we can verify the identification of any equipment or user. Various methods of equipment or identity of users. Biometric authentication is widely used recently. A biometric system is a way of recognizing the pattern that works on accumulating biometric data from any individual, then extracting certain features from that accumulated data after that comparing these features against the data set that is already stored in our data set base. [1]. Biometric systems are gaining much more importance now days for identifying a person by computing their physical or behavioural features. Biometrics recognizes an individual for his personal features despite of what the person usually carries for identification or authorization like smart cards. Unlike ownership-based or knowledge-based individual identification method the biometric recognition through biometric identifiers cannot be missing or easily replicate. [2]. Although Biometric has many advantages and widely used but it's hindered due to few reasons:

- Accuracy might be desirably less in some applications like: face recognition. It can be influenced by posture, expressions or illumination [3].
- It's unable to avoid spoofing.
- Sometimes the required unique biometric is not available due to illness or disability.

Biometric system is of 2 types i.e. Unimodal and Multimodal. Unimodal is system in which only one feature is used for identification. In Multimodal system, multiple features can be used for identification. In recent years multimodal is widely used due to its benefits over unimodal system. Several Limitations of Unimodal Biometric system are:



- Influence of biometric sensors to noise, that is matches inappropriately that unwanted data might route to a wrong refusal.
- Unimodal systems i.e. systems which are having a single mode includes within involving different classes in huge communities' groups e.g. Twin's face features may route to inappropriate pairing, as false data may lead to a wrong refusal.
- Aged people and youth children might have problems for registering themselves in a biometric system in which we scan fingerprints because of their blur prints or not fully developed fingerprint lines.
- Single biometrics is prone to parody, where the data can be easily leaked. E.g. rubber fingerprints.

The software system which can be quickly vulnerable and the data can be easily extracted by attacking those system, there we used password smartcards and personal identification number to provide sort of shield over system works like a secure environment for information. Fingernail is a biometric that enhances performance, accuracy and speed of authentication. The finger nails have a hardest part called as nail plate which is over head the epidermis. Security system such as biometric which works on finger nail plates of five fingers of same person which yields in producing the low resolution of nail plate images for personal identification. The finger nail plates of a human have its unique attributes and there is difficulty in forging these unique characteristics. Use of fingernail plate for human identification as security purpose which are based upon appearance and shape texture descriptors instead of using intramural part of nail organ.[4].

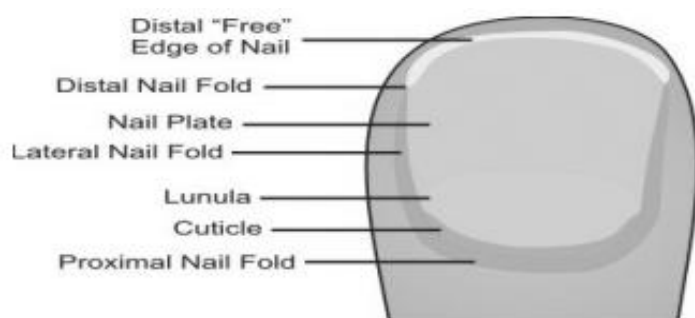


Fig 1.1: Finger Nail Image

The finger shapes are likely to be distorted due to effects of illuminations and reflections in spite of shadow corrections, reduced effects of surface curvatures and edges of intensity depths, etc. The feasibility process, prior information learning, gaining knowledge about shape, size, colour texture, finger geometry all support nail plate design by many folds [5].

LITERATURE REVIEW

S.Pravinth Raja, et al., (2014) [6] presented a creative and non-reflective biometric development at the fore. They proposed a new biometric validation system that depends on finger nail plate images. Low resolution nail plate images are acquired with contactless and unconstrained image setup. It shows the shape and appearance of the nail plate by employing appearance and texture based feature descriptor .The uniqueness of the finger nail plate is

characterized by the elevated distinctiveness of the cuticular structure of the finger nail plate, called as nail bed. Score level fusion rules are used are integrating the nail plates. Biometrics is a scientific method of measuring and analysing person behaviour and physical attributes such as face, fingerprint, iris, DNA, ear and foot etc. Drawbacks of unimodal biometrics are noise of observed data, non-universality, upper bound on identification accuracy and parody attacks. To lessen these limitations, multimodal biometric system is used. A system that comprises of multiple independent or weak correlated biometric recognizers are taken from an individual like face and fingerprint of same person or fingerprints from two non identical fingers of a same person which expands the number of enrolled population in the application, lessen the fraud and lead to the improvement in the security of the system's performance in Multimodal Biometric. Abstract of five fingers of a person such as (Thumb, Index, Middle, Ring, and Little fingers) are used as biometrics taken authenticating a person.

Igor Barros Barbosa, et al., (2016) [7] discussed transient biometrics i.e. the way of identifying the individuals on the basis of their characteristics that changes after a short period of time and also showcased that finger nail plate images can be used as transient biometrics for a expectancy of less than 6 months. The significant use of biometric recognition technologies are in threat of being left over in today's day to day life due to unfair use of such data or facts. The biometric data used in this paper mainly focuses on the fixity of the characteristics involved. "The right to be forgotten is spreading these days very much in international law so to overcome it there should be acquisition of permanent biometric recognition technologies. Some common biometric applications are small-term and so non-permanency biometric attributes of an individual are enough to satisfy their requirements. In this paper the approach is proposed by author that requires no training and a admissible evaluation dataset is made publicly available.

Sathishkumar Easwaramoorthy, et al., (2016) [8] In this paper the author said that to develop or propose a appropriate solution for authenticating an individual, the biometric system based upon finger nail which are very much different in an instance of indistinguishable twins or between dissimilar finger nails of same human. Uniqueness of cuticular structure under the fingernail plate, called as nail bed creates a validation system. Because of irregular characteristics of growing nail plate only the nail bed alone is considered. For making a pentagon structure a semantic point mediation technique is used and texture properties are disguised and implemented as Region of Interest. For feature extraction certain techniques are used such as Principal Component Analysis (PCA) algorithm, Independent Component Analysis (ICA) algorithm, Haar Wavelet technique and Scale Invariant Feature Transform (SIFT) technique. Naïve Bayes and Support Vector Machine (SVM) are used for classification. The accuracy is analysed for each of attribute extraction algorithm with two classifiers.

Kumuda N S, et al., (2015) [9] This paper differentiates distinctive nail parts, finger nail plate with lunula and distal free edge of nail plate by presenting approach of segmentation of finger nail patterns. The total focus is given to the immovable area of finger nail plate and lunula as it does not change its structure where as distal nail edges changes over a period of time. For segmenting finger nail parts an algorithm is devised that spontaneous distinguish not changing the part of fingernail plate from free distal edge of nail structure. The fingernail plate that involves lunula within is used as biometric. According to Theory, every fingernail embraces of the brightest part amongst the apprehend finger data set (in our system).

Presented method is of two stages. In first stage, we get a grey scale image by convert a colour image and by using adaptive histogram equalization, a contrast enhancement is applied. In second stage, segmentation is performed by watershed method that uses maxima and minima properties of marker controlled watershed principles. A confusion matrix is constructed via evaluation has been done with ground truth to verify the performance of the algorithm. Thereafter for quality matrix assessment a segmented objects from both the method is considered. The comparability accuracy between the both ground truth and watershed result is 84.0% accuracy for fingernail plate. Initial fingernail segmentation results are promising, supporting its use for biometric application.

Karbhari V. Kale, et al., (2013) [10] paper combines the approach of Finger-knuckle and finger-nail features. Back hand is very helpful in individual's identification, but it has not gained that much awareness. We can gain multimodal biometric characteristics i.e. finger knuckle and finger nail by Single scan of dorsum hand. In this paper, a fusion of finger knuckles and finger nail biometric is considered as it is a unique biometric trait. Mel Frequency Cepstral Coefficient (MFCC) technique is used to extract finger knuckle feature second level wavelet decomposition are used for extraction of finger nail features. These two attributes are combining using feature level fusion and feed forward back propagation Neural Network for classification. KVKR- knuckle database that includes 100 subject's dorsal hands are used for testing the performance of the system. The results of evaluation show that increase in training set is proportional to increase in performance rate. The proposed system performance has been stretched out to 97% with respective training of 90% of total dataset

Igor Barros Barbosa, et al., (2013) [11] The main focus of biometric recognition system is mainly on biometric features of an individual which are constant as possible example eye retina which gives accuracy over time but at the same time resist in their use for non-critical applications due to the chance of being misuse. If we see on the other hand, "transient biometrics" is based upon certain biometric features that change with time and has been accepted in non critical applications. In this paper we have shown that the fingernail as a transient biometric with a lifespan of approximately two months. The evaluation datasets are made available to the community.

PROCESS OF FINGERNAIL AUTHENTICATON

The block diagram for proposed biometric authentication system is cause to be visible below figure. Finger nail images are acquired with low resolution images using electronic camera in white background are maintained for experimental setup. For security purpose a biometric recognition system is used for authenticating a human. To use finger nail images is an inventive and unique approach to authenticate an individual. Abstracting of five finger nail (index, middle, ring, little and thumb) are used for identification based on extracted features from the nail images. The hand image is captured by electronic camera for authenticating an individual. The Genuine hand should be acquired by electronic device for authentication purpose and then for extraction of nail plate, the finger nail plate image of thumb, index, middle ring little are taken and then from the acquired nail plate image extract certain features from that acquired data. So in this way database gets generated for each individual [4].

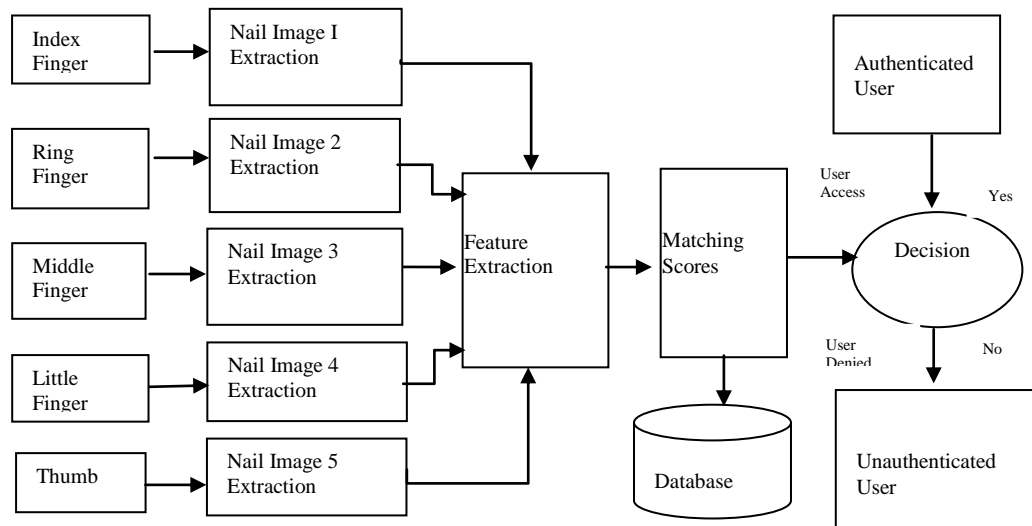


Fig 3: Block diagram of Fingernail authentication.

APPLICATIONS

Following are the main significance of biometrics which are divided into the three groups [2]

- **Commercial applications** The applications that are used in commercial area that includes electronic data security, computer network login, internet admittance, ecommerce, ATM, credit card, physical admittance control, distance learning, cellular phone, PDA, medical records management, etc.
- **Government applications** The government applications that are used in biometrics such as border control, correctional facility, passport control, driver's license, social security, welfare-disbursement, border ,National ID card, etc.
- **Forensic applications** The forensic applications that are used in biometrics such as terrorist identification skeleton identification, criminal examination, parenthood resolution, missing children, etc. These applications have relied on experts to match

PREVIOUS TECHNIQUES

. Several techniques previously used as biometric system

- **Retina Scanner:** A retinal scan is an approach of biometric recognition that uses an image of retinal blood vessel pattern recognition techniques on someone's retina to discover them for access to secure installations. The human retina is a thin tissue collected of neural cells that is detected within the posterior wedge of the eye.
- **Iris Scanner:** It is a mechanism of biometric identification which uses digital design recognition techniques on video images of an individual's eye whose composite pattern is unique and can be seen from any distance.
- **Finger Print Scanner:** Fingerprints are the graphical glide-like ridges on human palms and whose layouts do not change during the life span of a person besides due to accidents and wounds on the fingertips.
- **Facial Biometrics:** The face pattern of each individual is unique, even in case of twins that human eye can't differentiate. It's slightly unique placing of the eyebrows or the width of

the eyes, or the breadth of the nose. Possible markers enables these biometric acknowledgment scanners to in a split second recognize the distinctiveness of every individual examining their facial parts, in this manner empowering the gadget to guarantee that lone the single individual with the right bone structure and highlight situation can obtain entrance.

- **Voice Recognition:** Each individual in the world has a distinctive voice pattern even though the slight changes lives and hardly perceptible to human ear. However, with uncommon voice recognition programming, those moment contrasts in every individual's voice can be noted, experienced and validated to enable the access to individual's correct quality pitch and voice level also.
- **Hand/Palm Print:** unique fingerprint pattern and size and formation of hand can be scanned by placing hand on scanner. It differs from unique finger impression and also contains other data. Handprints can be use in commercial applications too [12].

CONCLUSION

Multimodal biometric systems are establish to be more trusted, robust and accurate systems as contrast to unimodal biometric system. Score level and Decision level can give low performance due to less information, but fusion at feature level can give more validate and true veritable outcomes than both of these. The finger nails of an individual have a high level of uniqueness, even in case of indistinguishable twins or even between various finger nails of an individual. Finger nail plates of five fingers, are taken for validating a person. Biometrics can be executed in business, government and measurable application. We additionally looked into the past research and talk about procedure of fingernail validation and other techniques used in Biometric System.

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