Automated Human Identification Using Ear Imaging

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ABSTRACT

Reliability in human authentication is the important aspect for the security requirements in various applications ranging from airport surveillance to electronic banking. Many physical characteristics of humans, i.e., biometrics, are usually don't change over time, unique to every person and easy to capture. Currently research in biometrics is focused on iris, fingerprint, gait, signature, face, palm print, or hand-geometry. Ear of the human is best source of data for human identification in various applications. The ear is quite efficient biometric candidate because it's a) Stable and appropriate structure that is preserved from birth and is unique in individuals b) Facial expressions can vary with time but this is not case with ear, c) Relatively immune from hygiene issues and privacy with several other biometric elements. This system investigates a unique approach for the automated human identification using 2D ear imaging. Multiple geometrical feature extraction such as identification of shape a person using ear biometrics.

Keywords: *- Biometrics, Person Identification, Multiple Geometrical Feature, 2D Ear Imaging*

1. Introduction

We have developed a system for the automated ear segmentation which has been proven to be quite effective in achieving robust segmentation of the curved region of interest. Our ear segmentation approach effectively utilizes combinations of cascade classifiers and histogram techniques to achieve reliable ear segmentation.

Efforts are directed to ascertain the performance for the automated ear identification using new feature extraction approaches on the ear images. We finally present a computationally attractive and promising alternative to characterize the automatically segmented ear images. We also present comparative performance evaluation from the developed feature extraction approach with those using promising alternatives presented in the literature .Biometrics is the study of methods for measuring physical or behavioral traits of an individual that can be used for uniquely recognizing or verifying that individual's identity. Biometric methods are divided to physical and behavioral methods, which in turn can be divided into invasive and noninvasive methods. Invasive methods are those that require the cooperation of the individual in order to acquire data needed to compare his biometric features to the ones stored in a database. Noninvasive biometrics does not require the cooperation of the individuals; in fact data captured may be done without their knowledge. Applications for biometrics are most common in security, medical, and robotics areas related to fingerprint, face and iris. These biometric areas have gained the most attention among the research community. Automated human identification systems have become increasingly important in society.

Human identification is involved in many applications such as gaining access to secure locations, or for surveillance. Our goal is to advocate the use of ears as a noninvasive biometric technique for human identification.

Ear Classification is the task of classifying/assigning a document to a predefined category. To be precise, if d is a document of the entire set of documents D and {c1,c2,c3… } is the set of all the categories, then Ear Classification assigns one category c to a document d. In detail it is all about detecting the genre of the unlabeled document. An unlabeled document is given as an input to the system. This document has no label for it and expects from the system to give a genre to this document. So the system scans that document and sends it to preprocessing unit. The document can be collected in various format .pdf, .html, .doc, etc. All these documents could be fetched from different sources. The pre processing unit tokenizes, delete the stop words and produce a bag of words. Tokenizing means the entire document is scanned and divided into small number of tokens, so that these tokens can be collected individually. Delete the stop words means the words like "a", "the", "of", "an", "am", "and", "or", "is" and many such words are removed thus leaving a bag of useful words. System is already trained for categorizing the document using some keywords. The system has 5 pre-defined categories, for an example politics, movies, computers, etc. Each of these categories has decided their own keywords like for the genre or category movies, names of actors, box office are all keywords. Similarly each category has their specific keywords. With the help of these keywords, the system detects the genre of the unlabeled document. If the inputted document has the keyword of politics genre then the label of that document is decided as politics. After deciding the genre, the label of the document is set and hence the document is classified. The system also learns the newly added document and trains itself to pick out some more keywords, thus improving the efficiency of the system. For instance, if the genre of the document is decided upon as movies and the label is also set as movies then the system scans the document again and picks out some more new keywords on the basis of frequency count. The new document is thus scanned and new keywords are picked up. This improves the efficiency of the system. And also makes the system dynamic in nature. change in pose and expressions. The ear imaging is also highly immune to privacy, stigma and hygienic issues associated with traditional biometrics. These characteristics of ear make it a viable candidate for the biometrics system. Ear biometrics refers to the automatic measurement of distinctive ear features with an objective to identify or confirm the identity of the human. We propose a completely automated technique for the personal identification using ear imaging. The proposed technique is able to detect ear of different size and shape along with the geometrical features from a picture of the subject's ear. We propose a new technique for the automated segmentation of ear so as to provide sturdy segmentation of the curved region of interest. The accuracy of automated ear segmentation affects the success of the feature extractor and as well as the performance of the system. We will also be taking a dataset of a number of subjects into the database and test it against the system to analyze and improve overall performance of the developed system. The relative database is designed relative to the information obtained per individual. This ensures uniqueness of the individual to be identified as well as in maintaining the security on the basis of user discretion. Constructing a firm base for authentication of any individual corresponding to the access provided to the data stored by same. Thus maintaining its integrity as well as satisfying the properties that should be possessed by biometrics Exploiting the ear image that can be conventionally acquired by any image capturing device which can be used for the identification using an automated approach for the robust segmentation of curved region of interest Where we maximize the positive identification using experimental study on relative databases.

2. Literature Survey

Automated personal identification using unique physiological characteristics has invited significant research and development efforts. Among different biometric modalities personal identification using human face imaging has the highest user acceptance and hence has attracted the majority research efforts in biometrics. Face recognition algorithms are highly sensitive to pose, illumination, expression, anxiety and also ageing. Whereas ear is relatively immune to all such criteria. Also the ear has a stable structure which is preserved since birth with a unique shape, it is also invariable to the change in pose and expressions. The ear imaging is also highly immune to privacy, stigma and hygienic issues associated with traditional biometrics. These characteristics of ear make it a viable candidate for the biometrics operation.

Ear biometrics refers to the automatic measurement of distinctive ear features with an objective to identify or confirm the identity of the human. We propose a completely automated technique for the personal identification using ear imaging. The proposed technique is able to detect ear of different size and shape along with the geometrical features from a picture of the subject's ear. We propose a new technique for the automated segmentation

of ear so as to provide sturdy segmentation of the curved region of interest. The accuracy of automated ear segmentation affects the success of the feature extractor and as well as the performance of the system. We will also be taking a dataset of a number of subjects into the database and test it against the system to analyse and improve overall performance of the proposed system.

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Exploiting the ear image that can be conventionally acquired by any image capturing device which can be used for the identification using an automated approach for the robust segmentation of curved region of interest. Where we maximize the positive identification using experimental study on relative databases
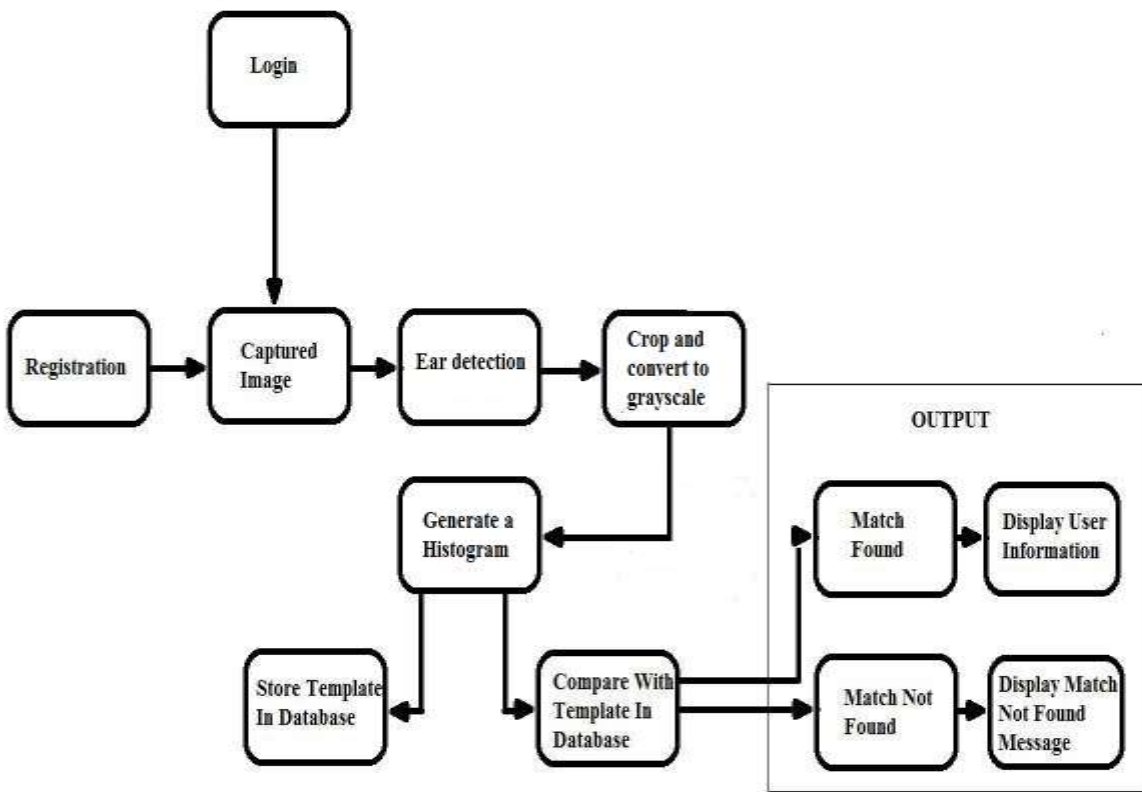
3. Figures Graphs And Tables

Fig. 1   Architecture diagram of the system

3.1 Stored Database Side

i)   Acquire the ear image for database of authenticated person. ii)Perform extraction operation on the image. iii) Store the extracted details of the ear image.

3.2 User Authentication Side

i) Image acquisition of the user .ii) Perform image processing like removing noise. iii) Perform feature extraction on the image.

j)

3.3 Performance Comparison

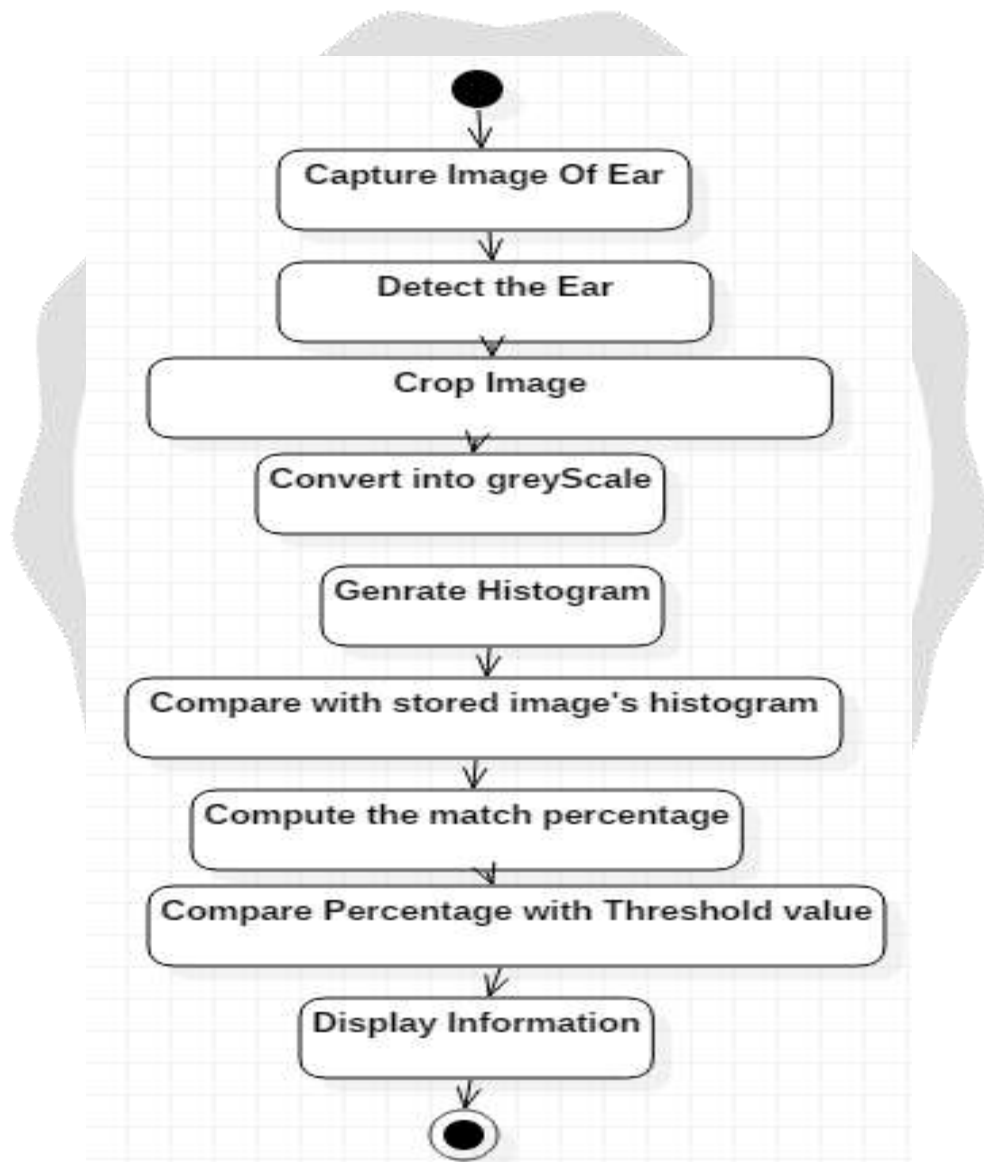Perform comparison of acquire image with image in database and check authentication of human.

Fig. 2 Activity Diagram

Capture image from webcam and crop image and convert it to grey-scale. Then perform edge detection and noise filtration operation. Find edges and boundary to find maxline then find second maxline. Draw reference point from

one maxline to the another then calculate it. Then perform extraction and compare with the one in database and finaly display the authentication result.

4. Results

The result of human identification system is shown below.

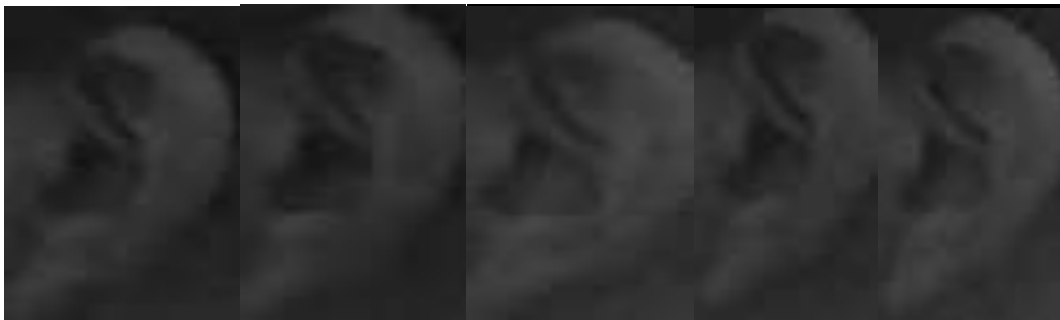Five samples of ear image taken from various positions

Fig. 3 Greyscale samples of ear
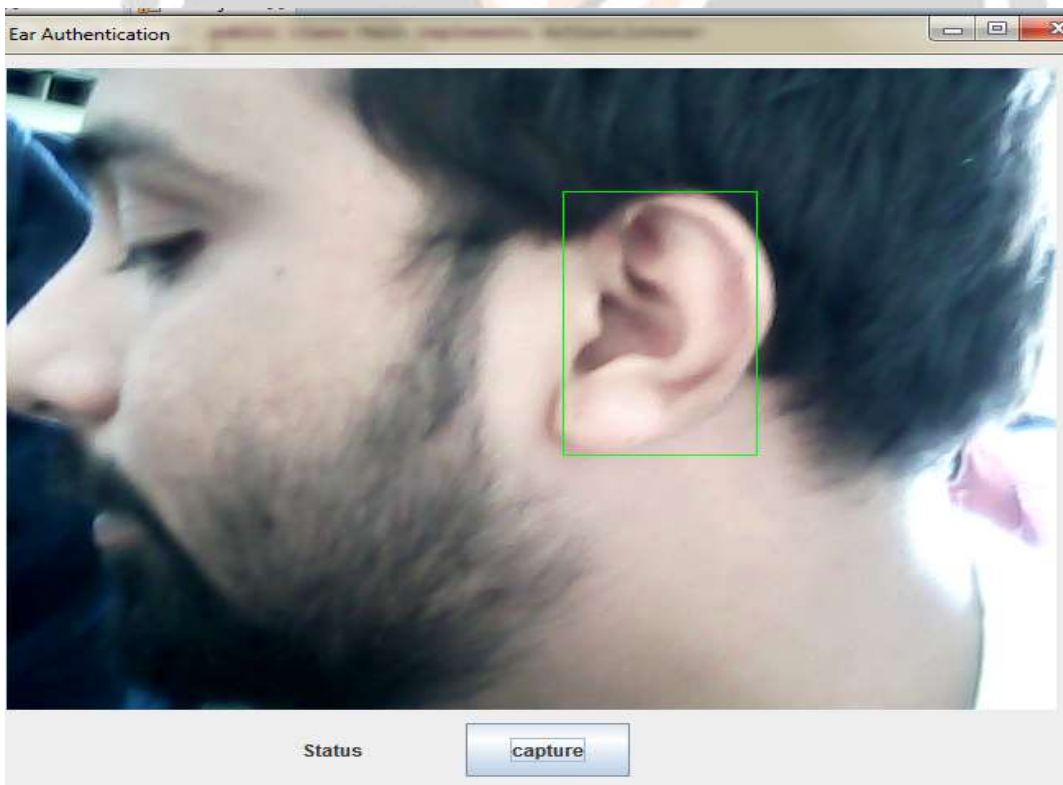
Image to be compared to authenticate the person

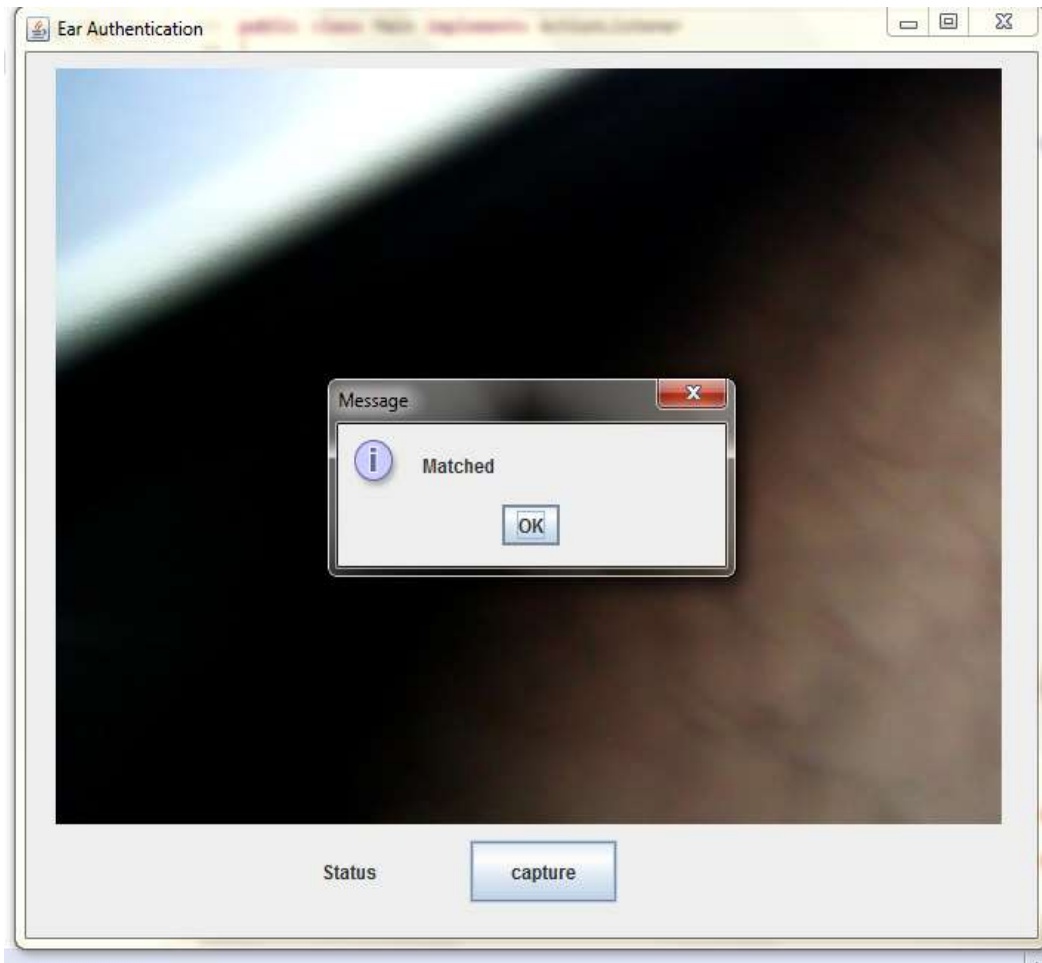**Fig. 4** Located ear image

Result of the comparison

Fig. 5 Result window

5. Conclusion

We have developed a fully automated approach for identification of a person. We have taken the ear as a biometric candidate because ear possesses properties which make it unique and the best candidate. We use geometric approach and use feature extraction to extract a part of the ear. Feature extraction is performed by using cascade classifiers. Once the ear is detected the image of the ear is stored in database in blob format. For authenticating a person image comparison is done. We make use of histogram generated of the images for comparison purposes. The results obtained are reliable and accurate. Hence a robust and reliable system is developed which can be useds in various

countries for human identification and authentication. The system developed is platform independent and hence it can be used on multiple platforms.

6. Future Scope

Future work on this study comprises of more refined techniques for biometrics and recognition of individual, order to assuage common problems of user identification. Other algorithms for extraction shall also be incorporated in the system, The proposed biometric system will be used to effectively identify the human accurately and reliably using the ear imaging. All the techniques put forth will be applied on the whole dataset and hence it can be used for future studies.

7. REFERENCES

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