Human Ear Detection and Recognition Using MATLAB : Review Paper

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Abstract:

The structure of ears are not completely random. They have standard part as other biometric traits like the face ,Ear Recognition is widely used in government, medical, telecommunication, healthcare, traffic, university, etc. Last few years the researchers are follows the ear recognition techniques. In this paper we discussed about The ability to capture ear images from a distance and in a covert manner makes the technology an appealing choice for surveillance and security applications as well as other application do- mains. This paper presents an overview of the field of automatic ear recognition and focuses specifically on the most recent, descriptor- based methods proposed in this area. In our future we develop new techniques for beter development of society. human identification, verification, validation & authors views related to the ear recognition, techniques, algorithms, and models. This paper recognize that ear recognition is most beneficial for the researchers who will work on biometrics techniques. A number of unique researches have already worked on this area. Ear recognition is unique identification technique other than the face recognition; fingerprint recognition so on. For the purpose of result and analysis, experimental the MATLAB tool is very useful for result oriented work.

Keywords - Ear recognition , MATLAB

I.INTRODUCTION

Now a days our whole surounding is electronically connected to form one big global community through internet and other digital means, it has become important to carry out reliable person recognition often remotely and through automatic means. The most important is that who is who ,person who he or she claim's to be because of all financial transaction and of security issues too. Also to verify that people are allowed to pass some points or use some resources [1]. for all these cases people use automated identity authentication systems.

Biometrics is automated methods of recognizing a person based on a physiological or behavioural characteristic [3]. there are different methods for verifying identity of individuals cards, badges, keys are used as identity which very common method and also other like password, Personal Identification Number (PIN); and biometrics like fingerprint recognition, face recognition , ear recognition[2].

Why Ear Recognition is good Technology over other ?

a) It is accurate and allows for high enrolment and verification rates.

b) It does not require an expert to interpret the comparison result.

c) It can use with existing cameras and image capture devices will work with no problems.

The past history of research has suggested the use of ears as a biometric for human identification. Researchers found that the shape and appearance of the outer ear for humans is unique, and relatively unchanged throughout the lifetime of an individual. And we know no one has proved that each person's ears are unique. In addition, the immediate background of the ear is very predictable it is always located on the side of the head. Ears have very important rol forensic science.

Identification or authentication technologies of ear biometric operate using the following four stages:-

A) *Capture* : A sample image is captured with the help of the camera during Enrolment and also in identification or verification process, it is taken by any digital camera and easy to use .

B)*Extraction:* by this unique data is extracted from the sample by using different techniques and by using it on different platforms like matlab and Lab VIEW a template is created .

C)*Comparison:* the template is then compared with a sample .

D)*Match and non match*: the recognition of ear is very complex technique and is based on software , the system shows that the features extracted from the new samples are a match or a non match.

All steps of ear recognition are shown below:-

Step 1 **:-** Capturing of side face by digital camera or other sensor.

Step 2 **:-** Extraction of ear and processing to get template by using Lab VIEW.

Step 3 **:-** Comparison of template of image with sample to make decision .

Step 4 **:-**   Now matching take place image,which decide match or non match.

II. EARLY RESEARCH REVIWE

As early as the 1880s by Alphonse Published by the IEEE Computer Society French police officer Bertillon, who pioneered the use of physical measurements to identify criminals. he used qualitative andquantitative descriptions of various body parts, including the ear, in what he called anthropometry [Identification anthropométrique: instructions signalétiques, 1885].

In 1906, the R. Imhofer, a doctor in Prague, set of 500 ears and he could clearly distinguish between them by on only four features.

After 50 years , a team of researchers visually assessed 206 sets of ear photographs of newborn babies and concluded that for establishment of new born identity the morphological constancy of the ear could be used ["C. Fields et al., "The Ear of the Newborn as an Identification Constant," Obstetrics and Gynecology, July 1960, pp. 98-102"].

In the period of 1948 and 1962, Alfred Iannarelli collected ear photographs of thousands of individuals and extracted 12 different geometric measurements of the ear based on the crus of helix Each photograph of the ear is aligned such that the lower tip of vertical guide on the development easel touches the upper flesh line of the cocha area, while the upper tip touches the outline of the ant tragus. Then the crus of helix is used as a centre point. From the center point Vertical, horizontal, diagonal, and anti-diagonal lines are drawn

to intersect the internal and external curves on the surface of the pinna. The 12 measurements are derived from these intersections and used to represent the ear.

In 1997 the automation technique for ear recognition process is reported by Mark Burge and Wilhelm Burger . ["Ear Biometrics for Computer Vision," Proc. 21st Workshop Austrian Assoc. for Pattern Recognition, 1997, pp. 275- 282]. Mark Burge an

d Wilhelm used a mathematical graph model to represent and match the curves and edges in a 2D ear image.

Two years later, Belén Moreno, Ángel Sa nchez, a nd José Vélez described a fully automated ear recognition system based on various features like ear shape and wrinkles ["On the Use of Outer Ear Images for Personal Identification in Security Applications,"].

After that, researchers have pro-posed differnt feature of extraction and matching schemes, based on computer vision and image processing algorithms, for ear recognition. The simple appearance-based methods for example principal component analysis and independent component analysis . effective in exploiting the 3D structure of the ear with promising results obtained in both instancesis proven by work of Yan & Bower (2005; 2007) . such as, Yan & Bowyer (2007) by capturing and segmenting the 3D ear images and using Iterative Closest Point (ICP) registration, they realized a "97.5% recognition rate on a database of 404 individuals" (p. 291). In 2007 the 3D ear detection and recognition system is recommended Chen & Bhanu. in They utilized an ICP for recognition, and a local surface descriptor, and detailed "96.77 percent rank-1 recognition rate (150 out of 155) on the UCR data set ES and 96.36 percent rank1 recognition rate (291 out of 302) on the UND data set Collection F" (p. 731). It is still not clear , whether 3D techniques for ear biometrics will replace the currently more popular 2D methods as using 2D images is consistent with surveillance or other geometric image scenarios. I

III. METHODOLOGY

A)*Input image:-*

An ear image is selected from the database be to be pre-processed.

B)*Preprocessing :-*

It involves converting the image to grey scale, performing histogram equalization, and Gaussian

filtering. Preprocessing is essential and very important factor in order to remove noise and smooth the image.

C)Region of interest detection :-

Region of interest detection use for identifying the boundary of the ear in the image and extracting it. For this, I used a Haar Feature-based Cascade Classifier.

D)Feature Extraction :-

Feature extraction deals with isolating distinct features of the ear in the image.

E) Identification :-

It is the final act of classifying an ear image as belonging to a certain individual. Identification involves using the set of features that were extracted and comparing them to the database to determine which image matches the closest to it. In order to achieve this, I implemented the SVM classifier, and the K-nearest neighbour algorithm.

IV. CONCLUSION

Research in the field of biometric recognition in recent years a great effort has been focused on ear detection using biometric technique. In this paper, we have survyaed history of biometric tectnique of ear detection. Biometric technique play a very important role in personal identification, the importance of biometrics in every day life has been discussed and different biometrics technologies are introduced. it has been shown that ear biometrics can be used for identification and for the further development it is a good biometric and is comparable to that of face .

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