

Biometric Identification with Human Ear

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Abstract- In this computer-driven era, identify theft and the loss or disclosure of data and related intellectual property are growing problems. We each have multiple accounts and use multiple password or an ever-increasing number of computers and web sites. The concept of authentication verifying is central to all “security” that the user is who he claims to be. Biometric promises to verify the person on the basis of his physiological or behavioral characteristics. By using biometrics it is possible to conform or establish an individual’s identity on “who he/she” rather than by “what he/she possesses” (e.g. An id) or “what he/she remembers”(e.g. A password) biometrics has many ways of identification under it – eye, finger printing ,voice iris, face, etc. several reasons account for this trend: first ear recognition does not affect from some problems associated with other non contact biometrics . Such as face recognition. shape and features are unique for each person and invariant with age and structure of the ear is fairly stable and robust to change in facial expressions . It is most promising candidate for combination with the face in the context of multipose face. In this paper we propose to discuss different method of ear detection and recognition using 2d and 3d technique.

Keywords- Biometric, Ear Recognition, Image Matching.

I. INTRODUCTION

Biometrics are physical or behavioural characteristic that can be used for human identification . Security plays an increasingly important role in our daily life , and biometric technologies are becoming the solution to highly secure recognition and verification of identity. Biometrics explores ways to distinguish between individuals using physical characteristics and personal traits . The most common physical characteristics explored and used are facial features , eyes(iris and retina), finger prints and hand geometry.

Voice and handwriting are examples of personal traits which could be used to distinguish between individuals. The described characteristics and traits can be used to identify different individuals, because they all satisfy specific requirements they are all universal and unique. Which means that everybody has them and that the characteristics or traits are different for any two individuals? In addition to that they are all more or less permanently, which means that the characteristics or traits should not change with time.

1. Types of bio-metrics

There are number of different ways of biometric authentication. Some of them are listed as given below.

- **Eyes- iris recognition:-** iris has its unique features which help in authentication of the individual. The use of features found in the iris to identify an individual.

- **Eyes- retina recognition:-** retina has a pattern of vein in the back of the eye which is used for the individual recognition.
- **Finger print:-** the uses of ridges and valley found on the surface tips of human finger to identify an individual
- **Hand geometry recognition:-** the use of geometric features of the hand such as length of fingers and width of hand to identify an individual,
- **Odour:-** the use of an individual’s odour to determine identity
- **Signature recognition:-** the authentication of an individual by the analysis of hand writing style, in particular the signature
- **Vein recognition:-** it is a type of biometrics that can be used to identify individuals based on the vein patterns in the human finger or palm
- **Voice recognition:-** the se of voice as a method of determining the identity of a speaker for access control
- **Ear :-**the idetification of an individual using the shape of the ear

2. USES

Biometric different from use of other forms of authentication, such as passwords or tokens. Biometric identification provides a strong link between an individual and a claimed identity. Reliable user authentication is essential. In a banking or corporate environment the consequences of insecure authentication can be catastrophic, with loss of confidential information,

money, and compromised data integrity. User authentication require, to many applications in everyday life also including physical access control to offices or buildings ,healthcare, immigration and border control, etc.

3. Advantages of Biometrics

- **Increase security**-Biometrics proves to be a promising feature for security. It proves to be confidential and trustworthy also it is low cost a additional tier for security.
- **Fraud**- there are almost no changes of forging the biometric data of an individual therefore the chances of fraud are completely reduced e.g. Id fraud are minimised.
- There cant be any misuse of biometric data as the loss of biometric aspect doesn't comes in picture e.g. Unauthorised use of id, password will be prevented.
- It becomes very difficult to remember many password or sometimes difficult passwords as well sometimes we also tend to forget the password biometrics solves this issue by its uniqueness and also prevents sharing of passwords.
- Eliminate problems caused by lost ids or forgotten password by using physiological attributes.
- Replace hard to remember password which may be shared or observed.
- Biometrics help us to verify automatically, to know who did what ,where and when
- It is the highest level of security till date because of uniqueness.
- It helps in positive and accurate identification of the individual.

II. INTRODUCTION TO HUMAN EAR

As other physical parts of the body are used as a biometric system, like that ear is also use for biometric system due to its uniqueness and measure ability. every individual have different structure of their ear and due to this the ear is now a days used in biometric system. It has a special characteristics and advantages over other biometric system. Ear detection has collect little attention match up to other popular biometrics such as face, finger prints. Ear is a workable new class of biometrics since the ear has desirable properties such as universality, distinctiveness and stability.

Previous research has suggested the use of ears as a biometrics for human identification. Researches have advocated that the shape and appearance of the outer ear for humans is unique, and relatively unchanged throughout the life time of an individual. Although no one has proved that each person's ears are unique, studies in gave empirical supporting evidences, face changes based on radically based on expressions, that problem does not exist with ears. Unlike iris, retina, or finger print

capture which are contact biometric, the ear does not require close proximity to achieve capture. "procedure of biometric authentication using human ear".

1.Data Acquisition- Minolta vivid 910 range scanner was used to acquired data . One 640x480 3d scan and one 640x480 colour images are obtained near simultaneously. From 365people that participated in two or more image particularly acquisition sessions, there were 302 who had good 2d and 3d ear images in two or more sessions. Participants were Not specially instructed to make the ear images particularly suitable for this study, and 823 out of 2,342 images were dropped for various quality control reasons: 265 instances with hair obscuring the ear, 124 cases with artifacts due to motion during the scan, 91 with the person wearing earrings, and 343 cases with poor images quality. Using the minolta scanner in the high resolution mode that researcher used may make the motion artifact problems more frequent, as it takes 8 second to complete a scan.

2. Preprocessing-The purpose of the preprocessing is to minimise the variation in the acquired image, while keeping the characteristic features of the subject. For 2d intensity data and 3d range data. Different pre processing methods were applied.

3. 2d Data Normalization- Research performed the 2d data normalization in twp steps. First is the geometric normalization. Ears were aligned using two manually identified landmark point. The distance between the two points was used for scale, which means that all the extracted ears have the same distance between the triangular fossa and the incisures intertragica similarly, the orientation of the line between the two points is used for rotation. After normalization, the line between these to points is vertical in the xy plane. The second step is histogram equalization, which is used to compensate for lightning variation between images. These preprocessing steps are entirely analogous to those standard used in face recognition from 2d intensity images and those used in previous pca based ear recognition using 2d intensity images.

4. 3d Data Normalization- The Normalization Discussed Next Applies To Preparing The Range Images From The 3D Data For The 3D PCA And 3D Aged-Based Approaches. No Preprocessing Is Applied For The 3D ICP.

5. Landmark Selection

Research have investigated three different landmark selection methods. In a study of "eigen-ears" with 2d intensity images the two-point landmark is described. The upper points is the triangular fossa and the lower point is the antitragus.

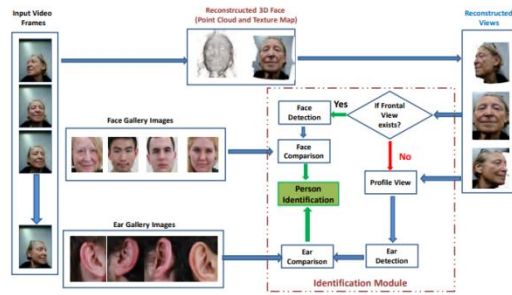


Fig. 1 landmark selection methods.

However, research found that these two points are not easily detected in all images. For instance, many ears in solve this problem , two other landmark methods were conducted. The second is similar to the first method point landmark, but researchers use the incisures intertragica instead of antitragus as the second point, as shown in image. The orientation of the line connecting these two points is used to determine the orientation of the ear, and distance between then is used to measure the size of the ear. The third method uses a two-line landmark promises to find the most part of the ear.

6. Ear Extraction - Landmark locations on the original images is important factor for Ear extraction.. The original ear images are cropped to (87x124) for 2d and (68x87) for 3d ears. The normalised images are masked to “gray out” the background and only the ear is kept.

7. Why Ear Over Other Biometrics ?????- Finger print authentication has some drawbacks. Sometimes the cuts on the fingers may lead to changes in ridge thus effecting the verification. Also there are many privacy concerns of criminal implications. Also there may be many obstructions in some biometrics like face can be obstructed by hair, glasses, hats, etc. Also it is very sensitive to change in lighting, expression, and pose. Face also change with time. Consistency plays a very important role in biometrics authentication. As a result, individuals who do not sign their names in a consistent manner may have face the difficulty in enrolling and verifying in signature verification. Convenience is also a key aspects to be considered while authentication. The palm print scanners are usually bulkier and expensive since they need to capture a larger area than the finger prints scanners. Large size of hand geometry device is needed and it not highly unique.

III.CONCLUSION

Our work extensively investigated the possibility of using ear as a biometric. The focus of the work is on the improvement of performance and reducing the computation time. The experiment results suggest the potential power of ear biometric. The automatic system proposed demonstrated its effectiveness and efficiency.

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