Ear Biometric Detection For Identification of Any Person

Prof. S. T. Khot, Apurva Pednekar, Renuka Swami, Anita Waditake

E&TC, Bharati Vidyapeeth's College of Engineering For Women,

SPPU,Pune,India

Abstract:- Biometric systems are becoming more popular with an increase in the need for strong security systems. The ear is a biometric trait whose structure cannot change in the course of human life. The main aim of the system is to develop a biometric authentication system using the ear. The process will involve several steps from acquisition of the image to the point where a positive identification can be made using the system.The image was acquired using a digital camera. The photo is then processed, stored and used for the identification process. For every individual, there are some distinct features that can be used for identification. The portion or segment that contains these unique features is known as the Region of Interest. After the raw data is obtained, the Region of Interest (ROI) which is the area containing the ear image is chosen.Feature extraction filters the unique data out of the raw data and combines them into the biometric feature The method applied for this is Edge detection.When all the external conditions such as lighting are effectively controlled and remain constant, the system produces a perfect performance with accurate results all the time.

Keywords-Biometrics, Ear Biometrics, Feature Extraction, Image Processing, Segmentation.

I. INTRODUCTION

Biometric is a recognition system that operates by acquiring biometric data from an individual. The image that is extracted from an individual is compared with template sets in the database to find a match. Currently, most widely used biometric techniques are identified by iris, fingerprint, face and hand geometry etc. While selecting a biometric feature it is necessary to give due consideration to acceptability[3].The detailed structure of the ear is not only unique but also permanent, that is it does not change over the course of a human life. Additionally, the acquisition of ear images does not necessarily require a person's cooperation. Because of these qualities, the interest in ear recognition systems has grown significantly in recent years[6]

The ear doesn't have a completely random structure. The figure shows standard features of the ear. No expression changes, make up effects the human ear[3]

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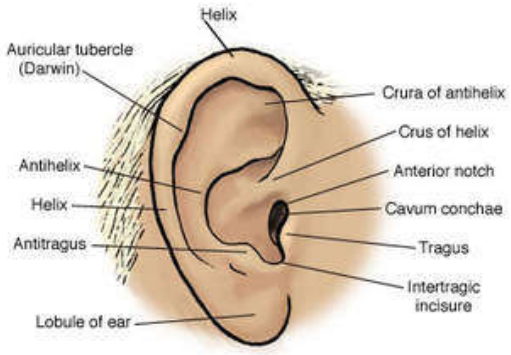


Figure1:-Ear Anantomy [7]

The ear has prominent features like rim, helix, antihelix or the ear lobe which are distinctive and unique for every individual [6]. The human ear is the unique and clearly visible trait that is permanent.Biometric technology has now become a more reliable alternative to traditional authentication systems in many government applications. The ear is one of the most suitable candidates to be used for biometrics. It does not

change with emotions, states of mind, sadness, fear etc. The ear can be easily captured at a distance, even if the subject is not fully cooperative. This makes ear recognition especially interesting for smart surveillance tasks and for forensic image analysis. It has standard parts as other biometric traits like face[5]

II. STAGES IN FEATURE EXTRACTION

The success of identification is mainly based on the features extracted from the biometrics. Before feature extraction, the acquired raw biometrics need to be passed through several key processing stages. [5] The common stages in human identification base on ear biometrics are:

1) Image Enhancement
2) Image Segmentation
3) Feature Extraction

A] Image Enhancement:

The main objective of image enhancement is to process a given image so that result is more suitable then original image. It sharpens image features such as edges, boundaries, or contrast to make graphics display more helpful for display and analysis. It undergoes grayscale conversion.

B] Image Segmentation:

In image segmentation, the digital image is partitioned into multiple segments i.e. it is set to pixels, also known as superpixels. The main goal is to simplify or change the image representation into something more meaningful and easier to analyze.

Image segmentation can be classified as follows:-
1)Threshold method
2)Edge-Based method
3)Region-Based method
4)Clustering Based method

C] Feature Extraction:

In machine learning, pattern recognition and in image processing, feature extraction starts from an initial set of measured data and builds derived values (features) intended to be informative and non-redundant, facilitating the subsequent learning and generalization steps, and in some cases leading to better human interpretations. Feature extraction is related to dimensionality reduction[6].
When the input data to an algorithm is too large to be processed and it is suspected to be redundant (e.g. the same measurement in both feet and meters, or the repetitiveness of images presented as pixels), then it can be transformed into a reduced set of features (also named a feature vector). Determining a subset of the initial features is called feature selection.The selected features are expected to contain the relevant information from the input data so that the desired task can be performed by using this reduced representation instead of the complete initial data[4].

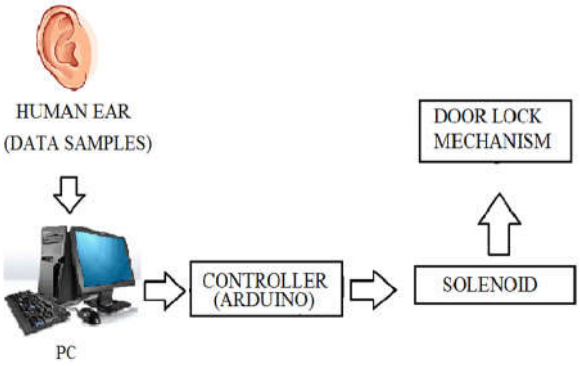
III..PROPOSED SYSTEM

Many biometrics based human identification systems are available. Some of them are fingerprint-based human authentication system. Also, other types are Iris feature based and face feature based human identification systems.

In this proposed method, the main aim is to use simple algorithms to minimize the complexity.

Template matching is done by using masking method. The ear is segmented based on active contour based detection. Localization and segmentation are both fully automated process. The edges of the segmented ear are found using canny edge detector. After that, the feature extraction process is carried out and template matching is done.

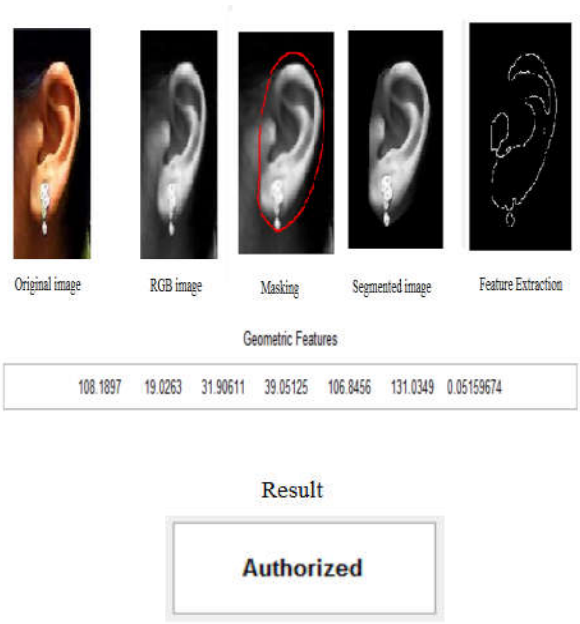
IV. SYSTEM DESIGN & IMPLEMENTATION



The above block diagram shows the different module and interaction between them for the proposed human identification system based on ear biometrics. First will be taken data sample of the images of the ear or real-time images. This images will be captured to the high quality of the camera. Then this image will be given to the Matlab as an input image. Matlab will perform various operations on the image of the preprocessing.After preprocessing the output will be shown that are features of that image will be displayed on the Arduino.And the feature of the input image will be compared with the stored database then if high matched found then the door will be open else the door will be closed.[6]

V. ADAPTIVE BLOCK FORMATION AND FEATURE EXTRACTION (MASKING)

Any characteristics or primitive of an object that helps to distinguish or discriminate an object from other objects is called an image feature[6].The purpose of image featuring is to describe the object in a meaningful manner so as to aid the recognition process and to help in the discrimination of these objects. Features are required for image recognition. Feature extraction is a process of extraction and generation of features to assist the task of object classification. This phase is critical because the quality of the features influences the classification task. The extended set of features is stored as a vector called the feature vector.



The distance between the minimum and maximum location of the pixels in horizontal and vertical lines drawn to form a block are considered as a feature vector. This process is related to masking of the ear segmentation[3].

The main requirement of the ear biometric system is segmentation of ear region from the ear image. This module is suitable for segmenting the ear region from the cropped ear image. This cropped ear segment system is known as masking process.

VI.CONCLUSION AND FUTURE ENHANCEMENT

Identification of the human based on Ear Biometrics is the main aim of this system.In this system database images as well as Real-time images are used but, database images has more accuracy as compared to the real-time image. In database image, images are more clear and the possibility of data loss is less. Using template matching and canny edge detection algorithm human ear has been segmented automatically. Adaptive Blocks are applied. The distance between vertical and horizontal intersecting lines are extracted as features. During feature

extraction, the shift and orientation of acquired images are not considered currently. But in future work, shift and orientation of ear in the acquired image will be considered using suitable algorithm so that prominent features from acquired and corrected image will be extracted. The Identification of human based on ear biometrics will be implemented by the suitable and robust classification algorithm. The human with respect to the extracted features and classification will be matched.

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