Volume 6, Issue 3, March 2016 ISSN: 2277 128X

International Journal of Advanced Research in Computer Science and Software Engineering

Research Paper

Available online at: www.ijarcsse.com

The Human Identification System Using Geometrical Feature Extraction of Ear

[1]Yashomati Dhumal, [2]Madhuri Karkud, [3]Pooja Shinde, [4]Varsha Alhat

[1] Project Faculty Member, [2, 3, 4] Student

[1, 2, 3, 4] E&TC Department, BVCOEW, Pune, Maharashtra, India

Abstract: ***Biometric technique is the study of methods for differentiating human beings. The human beings can be distinguished on the basis of physical or behavioral characteristics. In recent years finding good biometric technique has been researched extensively. Among various biometric attributes, ear is quite beneficial because it does not change with age. The reference line cut point, corresponding angles and height of the ear are the main parameters for the recognition of ear. The captured ear images can be improved by surrounding noise appropriate filter and so the accuracy can be increased. This paper gives easy and stable way to identity person. We have identified the outer curve of the ear from the given image and determined the shape. We have performed Canny Edge Detection by setting threshold value. We have found out the midpoints using distance formula. Using Canny Edge Detection gives better performance than the method to other algorithm. We used the ANN classifier for classification of ear. A neural network is a simplified method of the biological neuron system. The implemented method consists of three stages. In the first step, pre-processing of ear is done. In the second step, features are extracted. In next step, matching is done and the person is identified.***

Keywords: ***Biometric attributes, Reference line cut point, Ear height line, Angles. Canny edge detection, Threshold value, ANN classifier***

I. INTRODUCTION

Biometric exploits as identification or verification by considering personality features that relates to an individual. Biometric involves two types which are physical and behavioral. Biometric refers to an automated system that can identify an individual by measuring their physical and behavioral uniqueness or patterns and comparing it to those on records. In other words, instead of requiring personal identification cards, magnetic cards, keys or passwords, biometric can identify fingerprints, face, iris, palm prints, signature, DNA, or retina of an individual for easy and convenient verifications. Physical Biometrics focuses upon examining the biological and the physiological features of the human being.

Ear recognition technology is a potentially valuable tool in the biometric arsenal. An ear Biometric system can be viewed as a typical pattern recognition system that reduces an input image to a set of features and then compares this against the feature set of other images to determine its identity. Ear recognition can be accomplished using either a 2D digital image of the ear or a 3D point cloud that captures the ear's surface. The proposed Technique is able to detect ear of the individual. Image has been captured with high resolution camera and it is in JPEG format. The cropped ear image may be of varying size so the feature set of images can be vary. Hence the images are normalized to a constant size by resizing technique used for database. Each file in the database has images of the left ear taken image resize 200*150.Five images per person have been taken and stored for better accuracy. The image firstly goes in pre-processing step. This includes gray scale conversion, median filtering to remove unwanted noise. Then canny edge detection is carried out on these images. The canny edge detector was applied to identify the main edges on the ear image. We can get outer curve by setting the threshold value. Since the ear has quite a lot of ridges, it seemed like a suitable choice. We have used ANN classifier.It is classifier based on Artificial Neural Network.

MATLAB has been used for completing the method to extract features and match the images to the database. The ear is verified based on parameters extracted from the ear using various image processing techniques. The ear Recognition and Verification is implemented using MATLAB. This work has been tested and found suitable for its purpose.

II. METHODOLOGY OF EAR RECOGNITION

1. Block Diagram

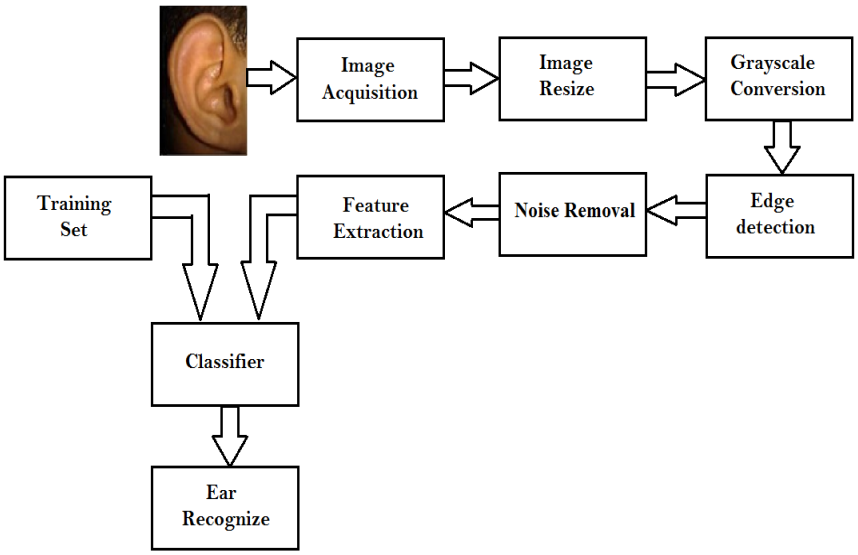

Figure 1. Block diagram

2. Block Diagram Description

1) Image Acquisition

- Image has been captured with high resolution camera and it is in JPEG format.
- We have captured all the ear images at a distance of 8-10cm.
- The images are captured in the same direction and same intensity of light to get proper image.
- By increasing number of ear images of same person, the accuracy level of identification will be increased.
- We have collected all database of left ear. We have taken 5 images of each person to get a better accuracy.
- Image has been resized with pixel value 200*150 and it is further preprocessed for feature extraction.

Figure2. Samples of Ear Database

2) Pre-processing

- Gray scale conversion
- Filtering
- Canny edge detection
- Noise Removal

Gray scale conversion

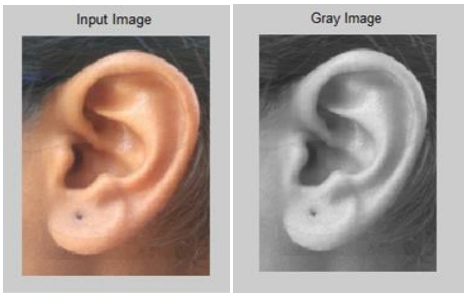

Figure 3.a) Figure 3.b)

- In this technique, the given true color RGB image is converted into the gray scale intensity image.
- Gray scale image carries only intensity information. It has many shades of gray in between.

- It eliminates the Hue and saturation information while retaining the luminance.
- Hue is the color in the image and saturation is the intensity or richness of that color.

Filtering

- Filter is used to remove noise from the gray scale image.
- Median filter is used to remove unwanted information, somewhat like mean filter. However, it often does a better job than the mean filter of preserving useful detail in the image.

Figure 4

- This class of filter belongs to the class of edge preserving smoothing filters which are non linear filters. These filters smoothes the data while keeping the small and sharp details.
- Consequently median filtering is very effective at removing various kinds of noise.

Canny Edge detection-

- We stored the highest value of the brightness and the lowest value of the difference. If difference between the highest and lowest value is greater than a particular threshold, then that particular pixel is considered to belong to an edge.
- Canny edge detection is used to detect a wide range of edges in images**.**
- It is most powerful edge detector as compared to other algorithm**.**
- Canny uses thresholding**.** It significantly reduces the amount of data and filters out useless information, while preserving the important structural properties in an image.
- Edges in images are areas with strong intensity contrasts.

Figure 5.a)

Figure 5.b)

Noise Removal

- After applying canny edge we can see there are several small connected components in an image,to remove this we set the particular threshold value.
- The pixel which is having value greater than threshold is eliminated.
- The pixel which is having value less than threshold is considered. So we get the larger connected component.

Figure 6

3) Feature Extraction

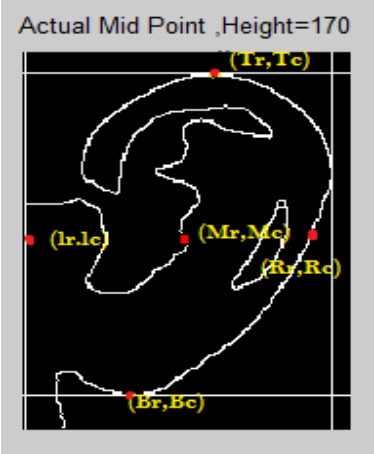

Figure 7.a) To find mid-point

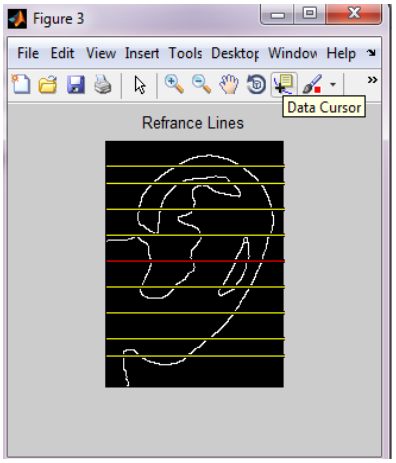

Figure 7.b) Draw Reference lines

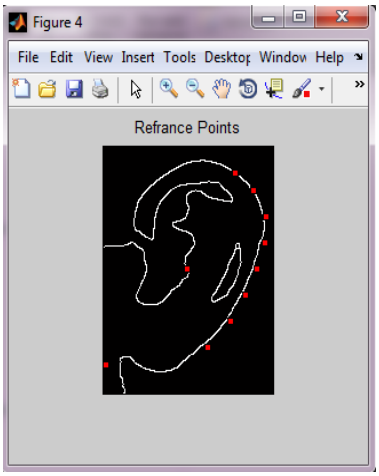

Figure 7.c) Find Reference points

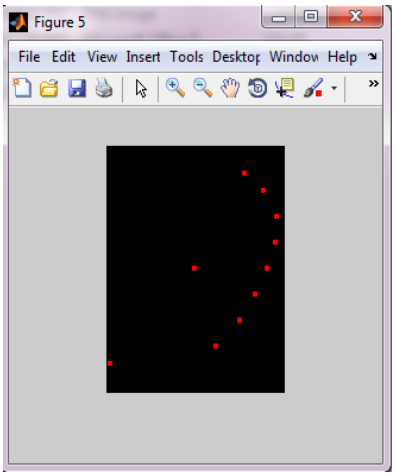

Figure7.d) To find all angles

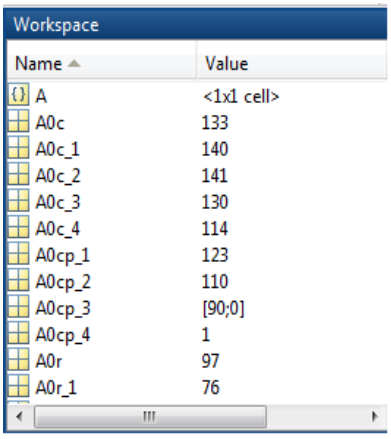

Figure 7.e) Find angles

- As shown in **Figure 7.a),** By scanning from top to bottom the first white pixel which is detected is considered as top point of the ear. i.e. (Tr,Tc).Similarly, scanning from bottom to top first white pixel is detected to get bottom point. i.e.(Br,Bc).Then dropping a line through top point and bottom point we will get height of the ear.

  Mr = fix ((Br-Tr)/2)+ Tr, (Mid of Row)
  Mc = fix ((Rc-lc)/2)+ lc, (Mid of column)
  Ht = Br-Tr, (Height of ear)
- As shown in **Figure 7.b),**Ear height line is the height of ear ,reference line are the lines which are parallel to the width of the ear image which divides the image cell into (n+1) parts, where n is positive integer.
- As shown in **Figure 7.c),**The reference lines which intersect the edge of the ear are considered as reference points.
- As shown in **Figure 7.d),** The angles from centre to each reference point is calculated. The number of angles is same as number of reference points. The calculated angles are unique for each person.

4) Classification

- Input image is taken and compared with the each saved images.
- For this purpose classifier is used, it is used to calculate the difference in Percentage between the input image and the saved data.
- If the comparison results in less difference that means match is found and the person is identified.
- We have used ANN classifier.
- It is classifier based on Artificial Neural Network.
- In Machine learning ANN is a family of models inspired by biological Neural Network.
- ANN is generally presented as systems of interconnected "neurons" which exchange messages between each other.

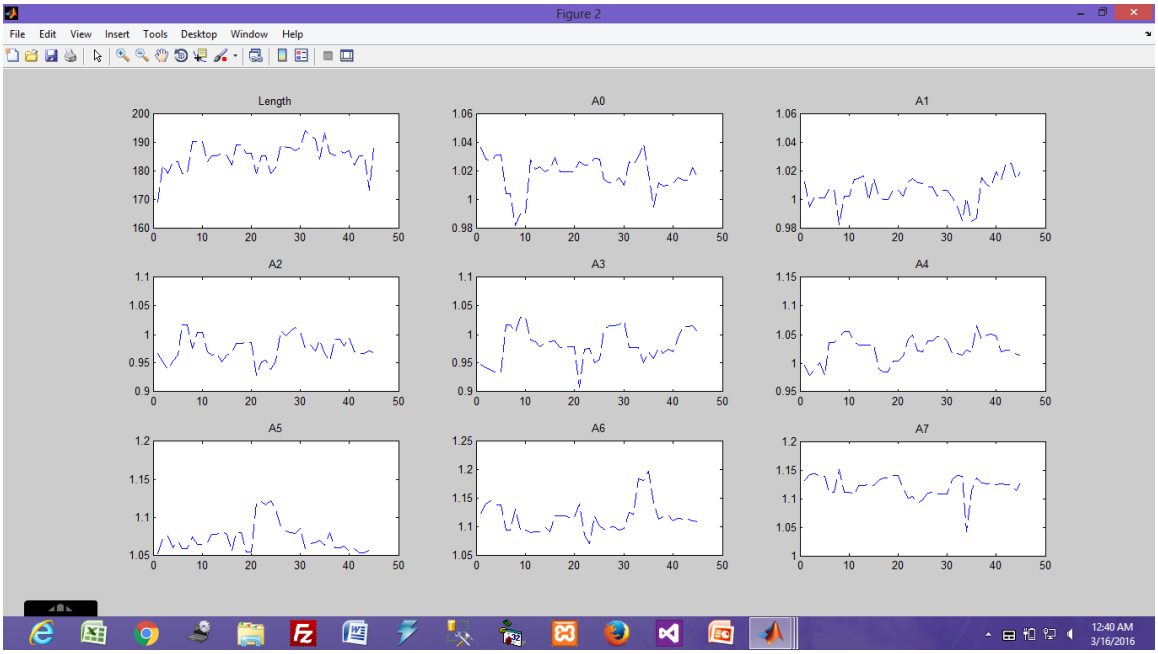

Figure 8. Graph of Length and Angle variation

III. RESULT

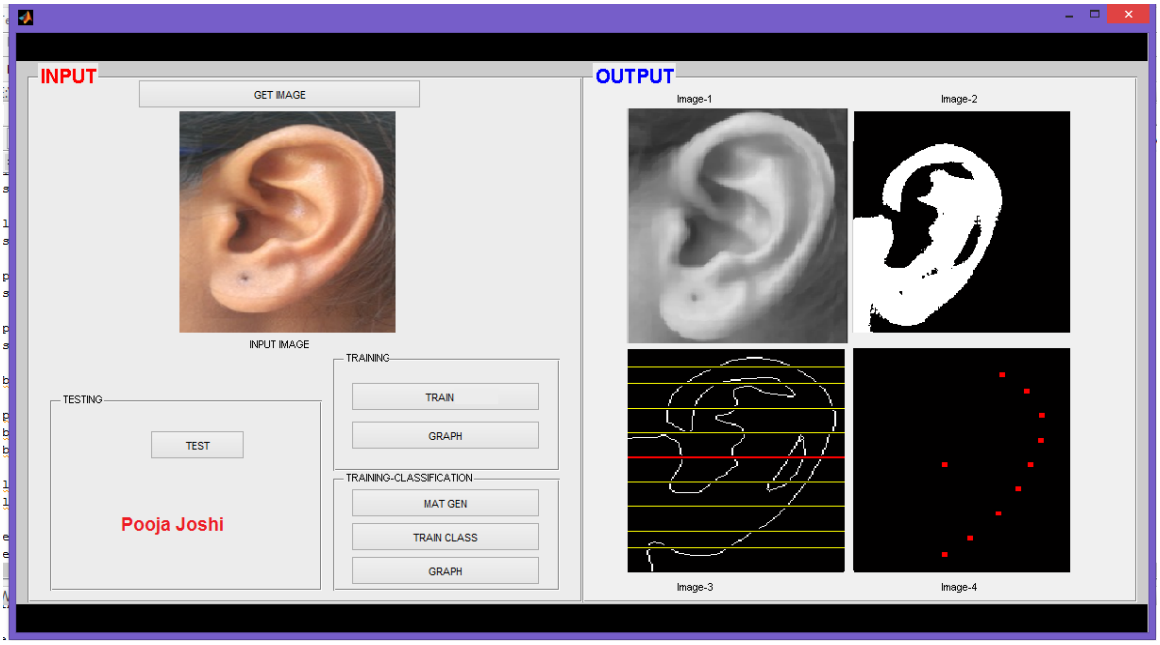

Figure 9. GUI Window.

IV. CONCLUSION

In our project, consists of five stages such as image acquisition, pre-processing, feature extraction, and classification. This process includes determining larger outer curve of the ear without applying curve fitting and the threshold value is set using canny edge. ANN classifier is used which aims at improving the ear recognition and optimization system expected to have higher accuracy and optimized results. The ear detection algorithm is simple and, hence, has low computation complexity in MATLAB.

REFERENCES

[1] Md ZahidHassanPolin,A.N..M.EnammulKabir, Muhammand Sheikh Sadi," 2D Human-ear Recognition Using Geometric features", in *Proc.IEEE Int.Conf.on Electrical and Computer Science,Dec.2012.*

[2] Mostafizur Rahman, Muhammad Sheikh Sadi, Md. Rezwanul Islam," Human Ear Recognition Using Geometric Features", 2013 International Conference on Electrical Information and Communication Technology (EICT).

[3] Devesh Narayan, Sipi Dubey," A Survey Paper on Human Identification using Ear Biometrics", International Journal of Innovative Science and Modern Engineering (IJISME) ISSN: 2319-6386, Volume-2 Issue-10, September 2014.

[4] Jitendra B. Jawale1, Dr. SMT. Anjali S. Bhalchandra2," The Human Identification System Using Multiple Geometrical Feature Extraction of Ear –An Innovative Approach", International Journal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, Volume 2, Issue 3, March 2012).

[5] Ajay Kumar n, ChenyeWu," Automated human identification using ear imaging", www.elsevier.com/locate/pr.

[6] Dr H. B. Kekre1, Unnati Thapar2, Neil Parmar3," Human Ear Identification using Vector Quantization Algorithms", International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 12, December 2013.

[7] Ms. Aradhana Singh1, Mr. Sonu Agrawal2 , Ms.Pooja Kamavisdar3," A STUDY ON HUMAN EAR DETECTION FORBIOMETRIC IDENTIFICATION", International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 1, January 2013.

[8] Akshay Sanjay Borse, Ammen Sanjay Siingh, Arshad Harun Attar, Nuzhat F Shaikh," EAR Recognition using Artificial Neural Networks", International Journal of Soft Computing and Engineering (IJSCE)ISSN: 2231-2307, Volume-4 Issue-5, November 2014.

[9] K Kokila, I Laurence Aroquiaraj," Ear Biometrics for Automatic Index Segmentation Using Canny Edge Detection", International Journal of Computational Intelligence and Informatics, Vol. 4: No. 3, October - December 2014.

[10] A. Iamarelli. Ear identification. Series. Paramount publishing company,1989

[11] M. Burge, and W. Burger, Ear biometrics for Computer vision, In 23rd Workshop Austrian Association for Pattern Recognition, 2000.

[12] Michał Chora´s and Ryszard S. Chora´s, Geometrical Algorithms of Ear Contour Shape Representation and Feature Extraction, Proceedings of the Sixth International Conference on Intelligent Systems Design and Applications (ISDA'06)

[13] Dasari Shailaja and Phalguni Gupta, A Simple Geometric Approach for Ear Recognition, 9th International Conference on Information
Technology (ICIT'06).

[14] R. C. Gonzalez, R.E. Woods and S. L. Eddins, Digital Image Processing Using MATLAB.

[15] T. Theoharis, G. Passalis, G. Toderici, I. Kakadiaris, Unified 3d face and ear recognition using wavelet on geometry images, Pattern Recognition 41 (2008) 796–804.

[16] IITDelhiEarDatabaseVersion1, /http://webold.iitd.ac.in/_biometrics/ Database_Ear.htmS. .

[17] J. Daugman, How iris recognition works, IEEE Transactions on CSVT I (2004) 21–30.

