

# Result Paper for Image Base Ear Biometric System with Smartphone App

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**Abstract** - We represent result paper for Ear Biometric by using smartphone app. This paper will discuss about which methods for feature extraction are used. Biometric is used for identification. There many biometric methods are used for eg.fingerprint biometric, Iris biometric, etc. This app will be very useful for medical purpose. This app is mainly developed by considering public health problem. We are using here a smartphone camera image, Ear photograph will be captured without uncomfortable procedure. We are using IIT Delhi database. This paper will discuss how the app has developed.

**Keywords:** Biometric, Ear Biometric, Smartphone app, Image processing

## 1. INTRODUCTION

Biometric is used for human characteristics identification. It is basically technical term for body measurement and calculation. Biometric defines the physiological characteristics related to the shape of body. For example, fingerprint, face recognition, retina, iris recognition, DNA, Palm print, hand geometry etc. These characteristic hope human body are different and does not match with each other. Though it looks same but the pattern is different.

Here we are using ear as a biometric. As the pattern of ear remains same between the age of 7 to 70.By using ear we are making an app which will record the information. Here basically we capture the ear image by smartphone. Then we identify them by using image processing

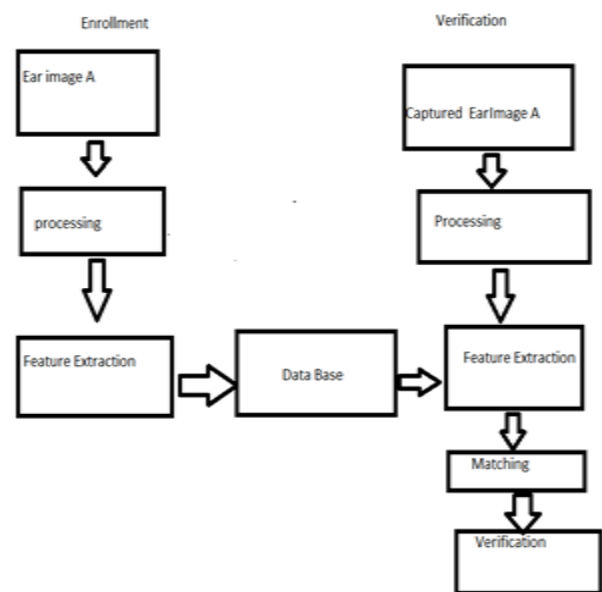
### 1.1 Review

Nowadays smartphone is easily available to us at very cheap cost. So this app will be useful to everyone for authentication. There are mainly three methods for authentication

- Knowledge based
- Token based
- Biometric based

Password may be forgotten and token may be lost, but biometric information does not changed. As I have mentioned earlier, we already have face, iris, retina, palm biometric system but face changes more significantly than any other part of the body because of cosmetics, beard, mustache, etc. Also colour distribution is more uniform in ear as compare to face, ear, retina, iris etc.

## 2. The basic flow of biometric system:



1. Fetch Image
2. Pre-processing over image (Morphological /filtering operation)
3. Feature extraction over patch of Image
4. For feature extraction we use LBP+LDP (Local directional pattern)
5. Use of distance algorithm to find match and rank of match from database

### 2.1 TOOLS CAN USED

1. Android app to capture Image
2. Send image over server
3. Matlab for Image processing and algorithms
4. Display results on system

First step is to capture the image. We are using IIT Delhi base dataset. Pre-processing i.e. filtering operation will be perform to achieve high accuracy.

## 2.2 EAR IDENTIFICATION

Each image is subjected to pre processing, which consist of smoothing with filter which will reduce the image noise, followed by histogram equalization. The resulting image is used for ear identification. Then we perform morphological operation. Morphological operation basically compare the ear image with the other object which is called structuring element. The shape and size of the structuring element is already determined during training phase.

## 2.3 FEATURE EXTRACTION

The accuracy of the automated ear identification is highly dependent on this feature extraction and matching process. The next step will be feature attraction. For feature extraction we are using LBP (Local Binary Pattern) and Gabor filter. The reason why we use LBP is it shows the key point of the image. Gabor filter is used for pattern analysis.



Fig.1.1 Ear images in subject 1 and subject2 respectively

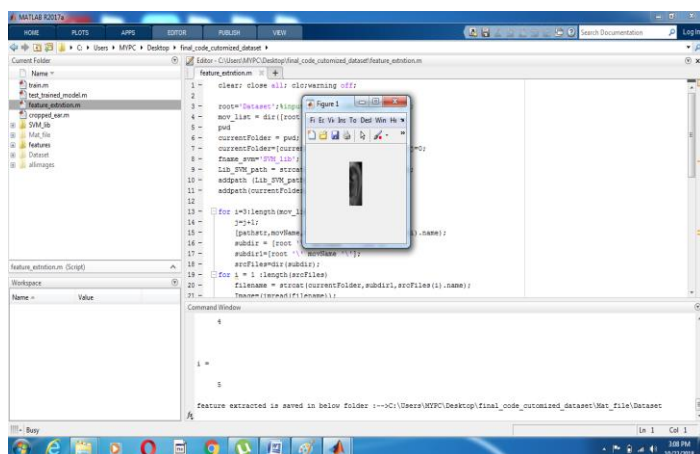


Fig 1.2 result for feature extraction

There are some techniques for feature extractions:

- 1) Histogram of oriented gradients (HOG)
- 2) Speeded-up robust features (SURF)
- 3) Local binary patterns (LBP)

- 4) Haar wavelets
- 5) Color histograms
- 6) Gabor filter

## AJ LOCAL BINARY PATTERNS:

In the LBP approach for texture classification, the occurrences of the LBP codes in an Let's first discuss how to calculate the LBP Descriptor. Firstly, we convert the input color image to grayscale, since LBP works on grayscale images. For each pixel in the grayscale image, a neighborhood is selected around the current pixel and then we calculate the LBP value for the pixel using the neighborhood. After calculating the LBP value of the current pixel, we update the corresponding pixel location in the LBP mask (It is of same height and width as the input image.) with the LBP value calculated. Basically we used LBP filters to show key points from the image.

## BJ GABOR FILTER

Gabor filter is also known as linear filter. This is used for texture analysis and face recognition. Gabor filters are used for pattern analysis. For example, it has been used to study the directionality distribution inside the porous spongy trabecular bone in the spine. The Gabor space is very useful in image processing applications such as optical character recognition, iris recognition and fingerprint recognition.

We have used LBP filters and Gabor filter for Ear detection.

**CJ SVM Library:** We have used SVM library here. LIBSVM is a library for Support Vector Machines. This is used to apply SVM to the applications. This is used for two purposes. First, training a data set to obtain a model and second, using the model to predict information of a testing dataset.

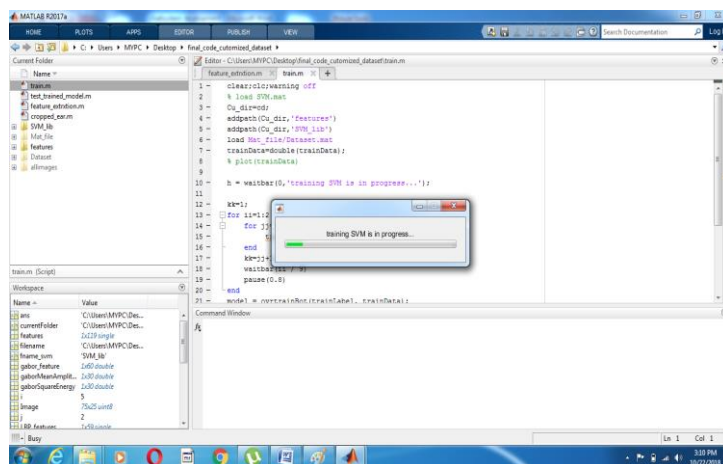


Fig.1.3 Train model under SVM library

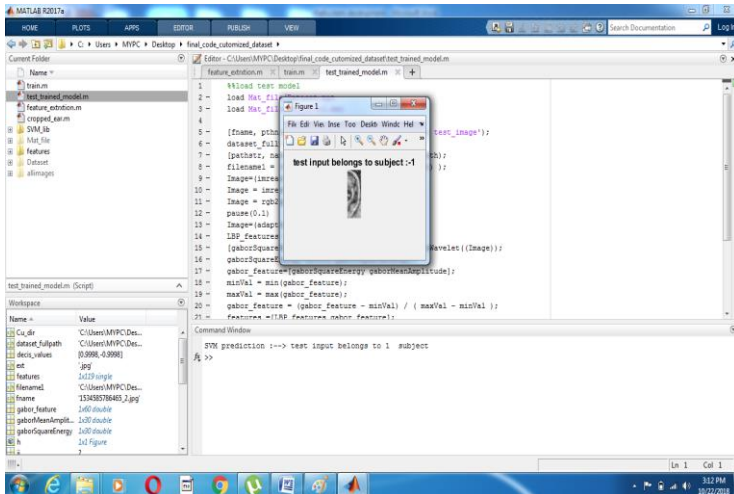


Fig1.4. Identification of image

### 3. CONCLUSIONS

The images are captured from different age group. We are taking 9 subjects in dataset. Each subject contains six images. So total we have 54 images. Among these we are taking one image from each subject for testing purpose. Now there are 5 images in each subject and 9 images in testing dataset. After this Feature extraction is done .We train the model and run the matlab program, Ear get detected. We get 90% accuracy.

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