

## FACE RECOGNITION IN JAVA ENVIRONMENT

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### ABSTRACT

*In today's world, face recognition has its application in many fields incorporating: Automotive sector, image enhancing, robotics, gaming & manufacturing.*

*It is an exciting field with hurdles. Such as limited hardware, poor visualisation or quality & connectivity. This paper demonstrates a face recognition system in JAVA environment. The aim is to have high recognition rate*

**Keywords:** Face Recognition, Image Processing, JAVA environment, Open CV

### I. INTRODUCTION

Image processing is a field that deals with manipulation of image with intent to carry out to enhance image and to extract some useful information from it. It usually deals with treating images at 2D signals and applying signal processing methods to them. It can be generally defined as a 3 step process starting by importing the image. Continuing with its analysis and ending with either an alter image or an output.

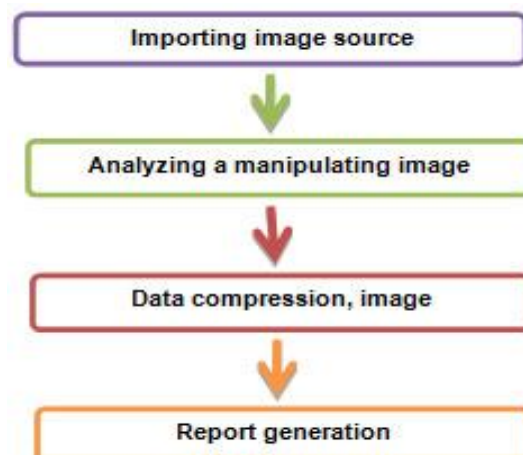


Fig-1

The application of in processing can be classified into five groups. The 5 groups are shown in fig 2

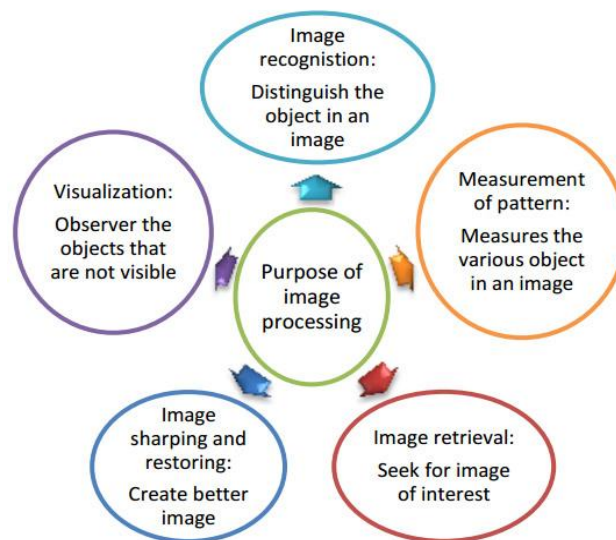


Fig-2

## II. FACE RECOGNITION TECHNIQUES

This section is about different techniques that are used in recognizing the face, detecting the face and tracking the video object in general. It also briefly describes the algorithms available in the market for the above. We have expressed different face recognition techniques in the tabular format in table 1

Face detection is a computer technology that determines the locations and sizes of human faces in digital images. Face tracking is an extension of face-detection when applied to a video image.

There are certain face-detection techniques which are actually Feature-based methods, which include detection of blinking eye pattern in a video stream and template-based matching or finding the face segments by using colour of skin as a basic parameter. In Feature based technique, features are basically the content of a given region of an image that is transformed into features, after which a classifier trained on example faces decides whether that particular region of the image is a face, or not.

## III. IMPLEMENTATION OF FACE RECOGNITION

In this work we used JAVA programming language in our aim to develop successful face recognition with a high recognition rate. There are various reasons for using JAVA.

We aim to develop a simple but robust and efficient system for implementation in various domains. JAVA has various advantages over other languages and environments which is the reason for choosing it for a programming task;

It is easy to learn, easy to use, write and compile. Furthermore it allows us to create object oriented modular programs and usable code. Moreover the language probability feature highlights as one of the most significant advantage.

Being platform independent at source & binary level, the language help to succeed us in our aim to result a robust system that can be implemented in JAVA. Building applications in JAVA environment. In our proposed application we performed face detection using JAVA.

The general steps used for developing this application are as following:

- 1) To detect and access camera hardware if present.
- 2) Create a class that can display live image data. Coming from camera so that one can view or capture a desired.
- 3) To develop a preview pane for the camera class that contains image source captured through camera and the UI controls that can be used for carrying out desired operations.
- 4) To connect actions to the listeners interface controls to excite response to user actions such as clicking on the pause button.
- 5) To save files that could be used further processing.
- 6) To develop a database of images that could be used a source for comparison with the image obtained from the previous pane.
- 7) To develop a report generation function that generates an output report with desired contents.

### **3.1 An example of face identification system implemented in java:**

As a part of this research work, we have developed a prisoner detection system, application software implementing face identification

This software is aimed to identify the criminals in any investigation department. Here the technique is we already store some images of the criminals in our database along with his details and that images are segmented into many slices say eyes, hairs, lips, nose, etc. These images are again stored in another database record so to identify any criminals; eyewitnesses will see the images or slices that appear on the screen by using it we develop the face, which may or may not be matched with our images. If any image is matched up to 99% then we predict that he is only the criminal. Thus using this project it provides a very friendly environment for both operator and eyewitness to easily design any face can identify criminals very easy.

It is intended to identify a person using the images previously taken. The identification will be done according the previous images of different persons.

## **IV. EXISTING SYSTEM**

The development of face identification has been past from the year to years. In recent years to identify any criminal face they used to make a sketch or draw a image based on the eyewitnesses. It used to take more amount of time and it was very difficult task for any investigation department to easily catch the criminals within a stipulated time. In order to catch the criminals first they used to search their record whether to find out is there any record about that particular person in the past. In olden days each and every record was maintained in the books or registers or files which used to contain information about previous criminals with their names, alias name, gender, age, crime involved, etc. Here each and every task used to take the help of the person because they used to write in them and it needed very much of manual effort.

There are three major research groups, which propose three different approaches to the face recognition problem. The largest group has dealt with facial characteristics. The second group performs human face identification based on feature vectors extracted from profile silhouettes. The third group uses feature vectors extracted from a frontal view of the face. The first method is based on the information theory concepts in other words on the principal component analysis methods. In this approach, the most relevant information that best describes a face is derived from the entire face image. The second method is based on extracting feature vectors from the basic parts of a face such as eyes, nose, mouth and chin.

## V. PROPOSED SYSTEM

To overcome the drawbacks that were in the existing system we develop a system that will be very useful for any investigation department. Here the program keeps track of the record number of each slice during the construction of Identifiable human face and calculate maximum number of slices of the similar record number. Based on this record number the program retrieves the personal record of the suspect (whose slice constituted the major parts of the constructed human face) on exercising the “locate” option.

## VI. FIGURES AND TABLES



Fig.3

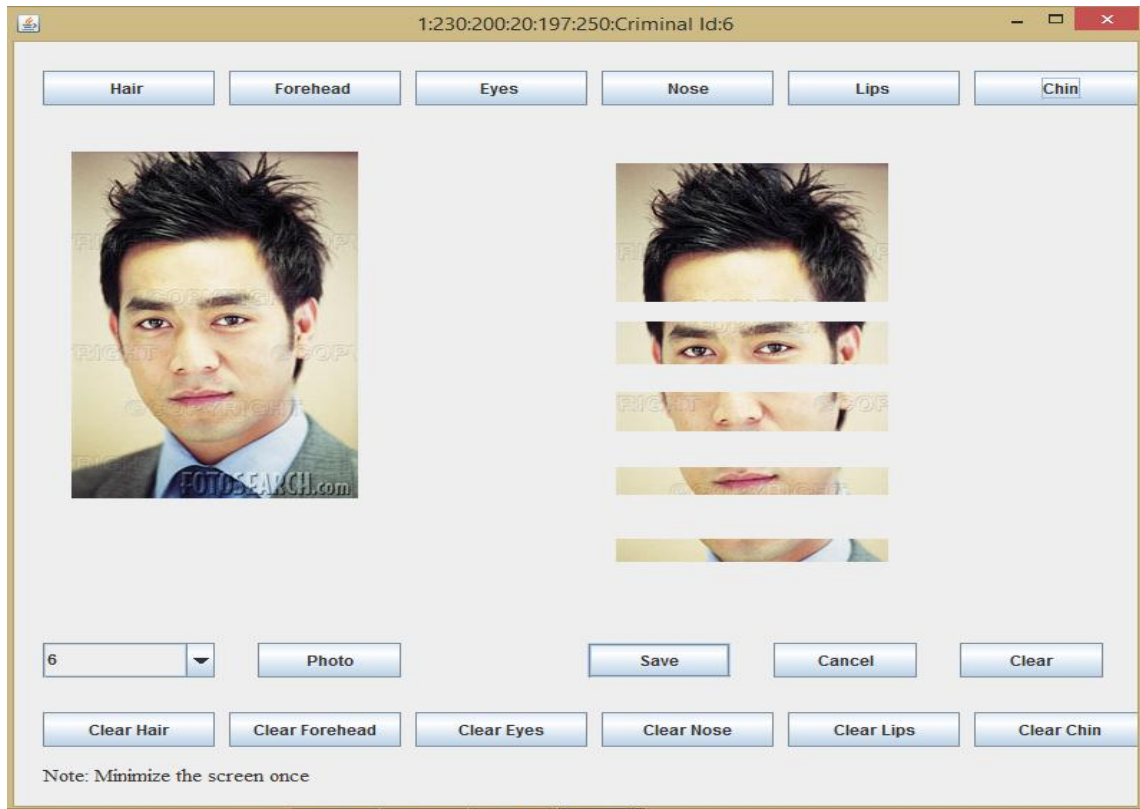


Fig4

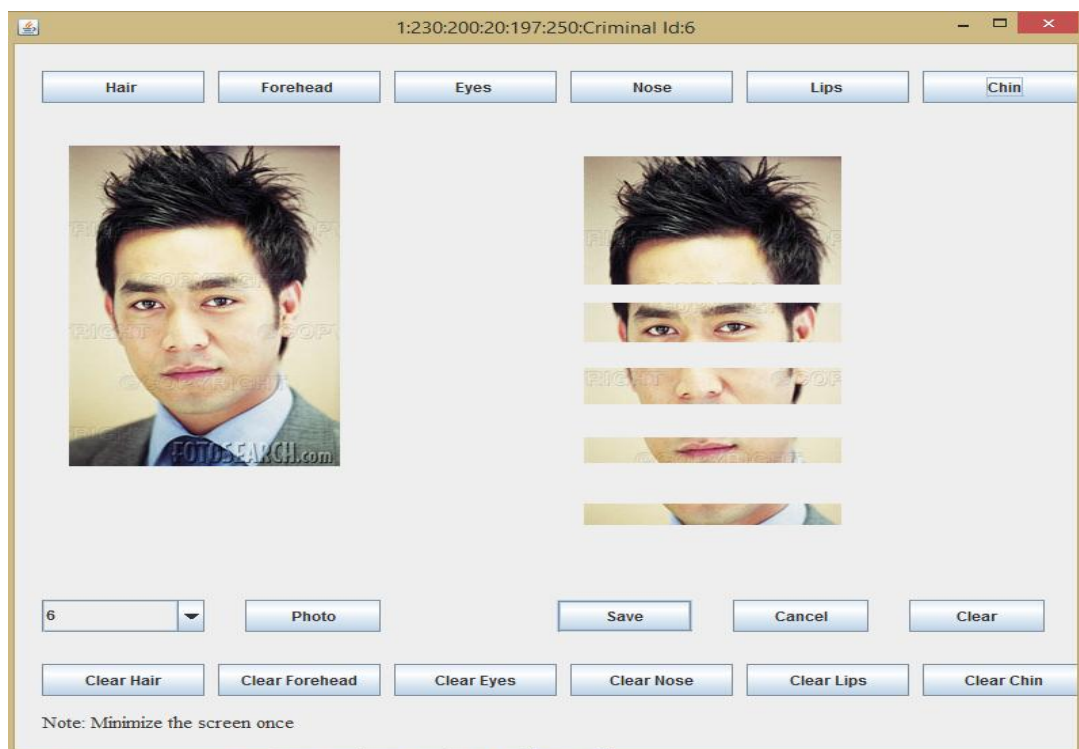


Fig 5

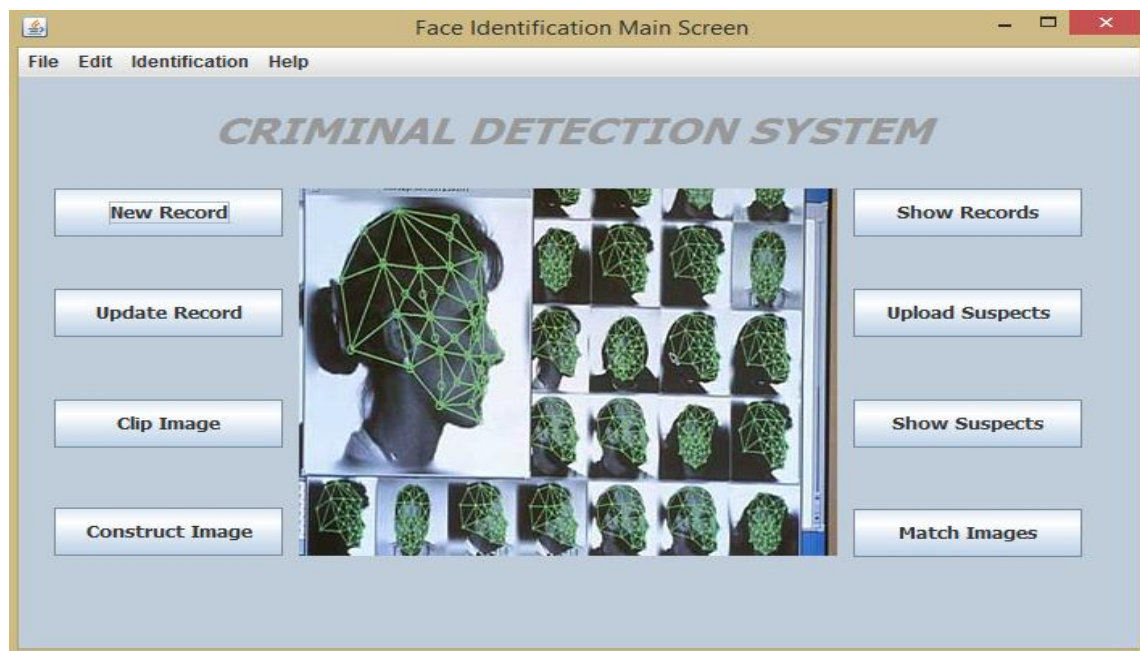
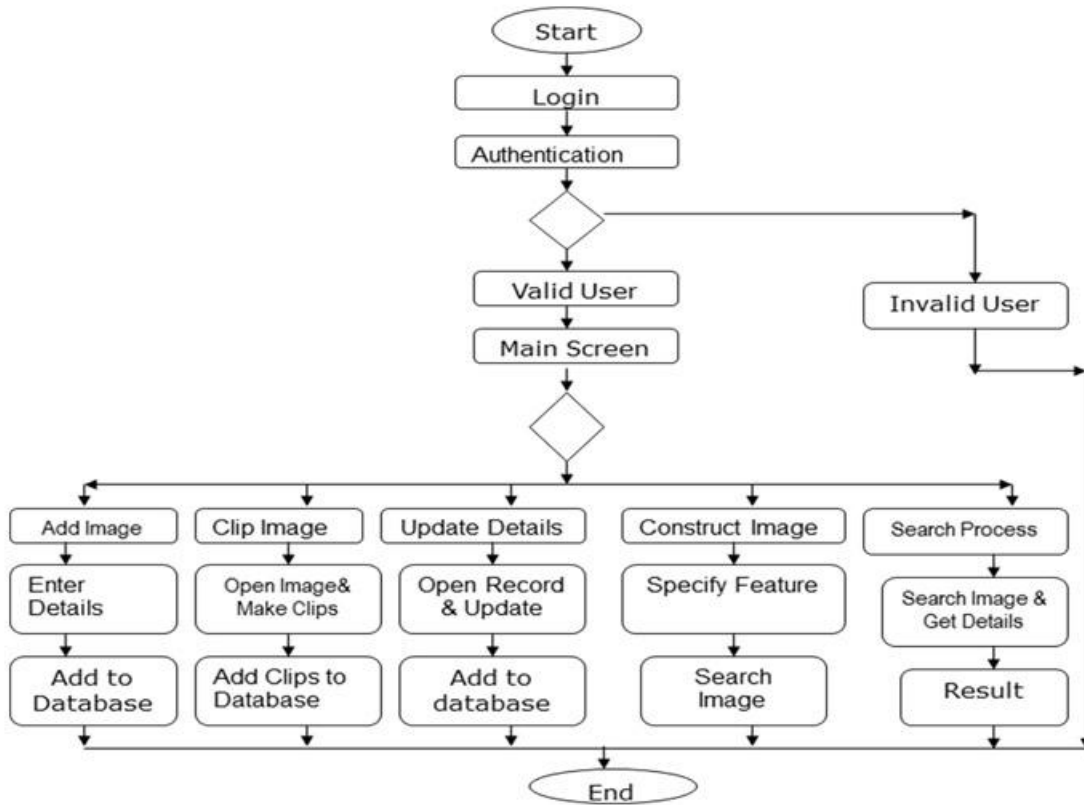


Fig 5

Sno.	Name	Description
1	Gaussian weighting	We apply Gaussian weighting to the centre of the face. it is a part of Face recognition by feature matching method. Here We have to locate points in the face image with high information content. We don't have to consider the face contour or the hair. We have to concentrate on the centre of the face area, as most stable and informative features are found there. The high informative points in the face are considered around eyes, nose and mouth.
2	Linear Discriminate Analysis algorithm	Discriminant Analysis is a classic method of classification that has stood the test of time. Discriminant analysis often produces models whose accuracy approaches (and occasionally exceeds) more complex modern methods. Here we look for the linear combinations of the variables which explain the given data well. LDA explicitly attempts to model the difference between the classes of data. Linear discriminant analysis is primarily used here to reduce the number of features to a more manageable number before classification. Each of the new dimensions is a linear combination of pixel values, which form a template. The linear combinations obtained using Fisher's linear discriminant are called Fisher Faces.
3	Principal Component Analysis with Eigen faces	It is one of the popular algorithms for face recognition. Principal component analysis is a mathematical procedure that uses orthogonal co-ordinates to convert a set of observations of possibly correlated variables into a set of values of uncorrelated variables called principal components. PCA is then applied on the Eigen faces

4	Wavelet sub-bands	Wavelet sub-bands with PCA algorithm uses wavelets. This method decomposes the image into several smaller images. This is faster as well as accurate compared to other methods. . Our focus here is on two methods of face recognition that is Eigen face recognition using Principal Component Analysis (PCA) and Face recognition using wavelet sub-bands
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Table 1



**VII. CONCLUSION**

In this paper, we have presented the implementation of and robust and efficient face recognition system in JAVA environment. We have demonstrated the general steps that could be used for its implementations. Our implemented system is customised for its applications into prisoner detection system however the generalised steps can be customised to adapt to various applications in various different environments. We have also listed the techniques which can be deployed in JAVA environment in this domain

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