

# Face Recognition At Multiple Angles

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## ABSTRACT

*In present times, face recognition has become one of the best technologies for computer vision. Face recognition is always a very difficult task in computer vision, illumination, pose, facial expression. Face recognition tracks target objects in live video images taken with a video camera. In simple words, it is a system application for automatically identifying a person from a still image or video frame. In this paper we proposed an automated face recognition system. This application based on face detection, feature extraction and recognition algorithms, which automatically detects the human face when the person in front of the camera recognizing him. We used KLT Algorithm, Viola-Jones Algorithm face detection which detect human face using Haar cascade classifier, however camera is continuously detecting the face every frame, PCA algorithm for feature selection. We apply a model combining to match the geometric characteristics of the human face.*

**Keywords**—Face Recognition, Face Detection, PCA

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## 1. INTRODUCTION

Human Face always play crucial role in application such as security system, credit and debit card verification surveillance on identify criminal public places. The main objectives of the system are to create a facial recognition system that can be emulated and eventually overcome this capacity of human. This system focuses especially on the human frontal faces. Multiple face recognition algorithms have been developed and each has its own strength. Most of the time we look at a face and are able to recognize it instant if we are already familiar with the face. This natural ability, if possible, can be justified and can be used for real life applications. That time there are many face detection algorithms. The first one is a local face recognition system, which uses facial features of a face to intimacy the face with a person. The second approach or global face recognition system use the entire face to recognize a person. The above two process have been implemented one to another way by another algorithms. The neural network and its feasible applications in the field of research. The complications of a facial features that take place over time. Unconcern of those changes can easily identify a person. So, the idea of emulate this skill is that human beings can be very rewarding.

## 2. LITERATURE REVIEW

[1] This section gives an overview on the major human face recognition techniques that apply mostly to frontal faces, advantages and disadvantages of each method are also given. The methods considered are eigenfaces (eigenfeatures), neural networks, dynamic link architecture, hidden Markov model, geometrical feature matching, and template matching. The approaches are analyzed in terms of the facial representations they used.

[2] In recent years, the techniques based on the biological properties of human beings having the much significant in the identification of individuals where the other techniques like pass codes, OTP generation and other types of

security modes having the possibilities of getting stolen, misused and forged etc. Hence the biological properties like identification of face finger prints, Palm, ear, Iris, retina and signature can be used which are not easily accessed by anyone.

[3] Face detection is defined as the procedure that has many applications like face tracking, pose estimation or compression. Face detection is a two-class problem where we have to decide if there is a face or not in a picture. This approach can be seen as a simplified face recognition problem.

### 3. METHODOLOGY

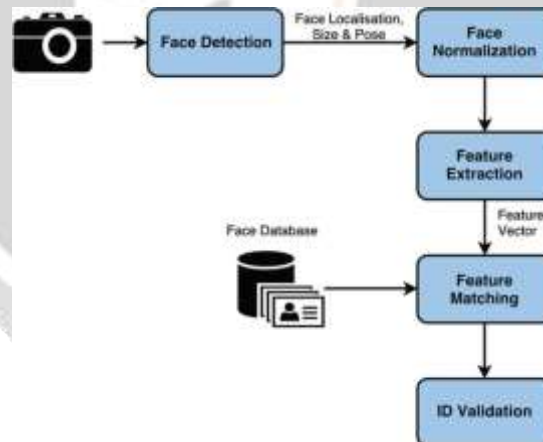
#### 3.1 DATASET

To emulate these cognitive abilities, computer vision algorithms make heavy use of collections of images called datasets. A dataset in computer vision is a curated set of digital photographs that developers use to test, train and evaluate the performance of their algorithms. In this project when capture the images with the help of Ohk-D camera. After capturing the images we train this images and save this images, and then we create our own dataset. The dataset are created automatically after saving the images.

Steps:

1. Capture the images through the high resolution Ohk-D camera.
2. After capturing the images we train this images.
3. Save this images with the help of main.py -name command.
4. After that the dataset are created.

#### 3.2 SYSTEM ARCHITECTURE



**Fig -1:**System Architecture

- Capture images
- Face Detection
- Face Normalization
- Feature Extraction
- Automatically Genarate Dataset
- Face Matching
- Result (face match or not)

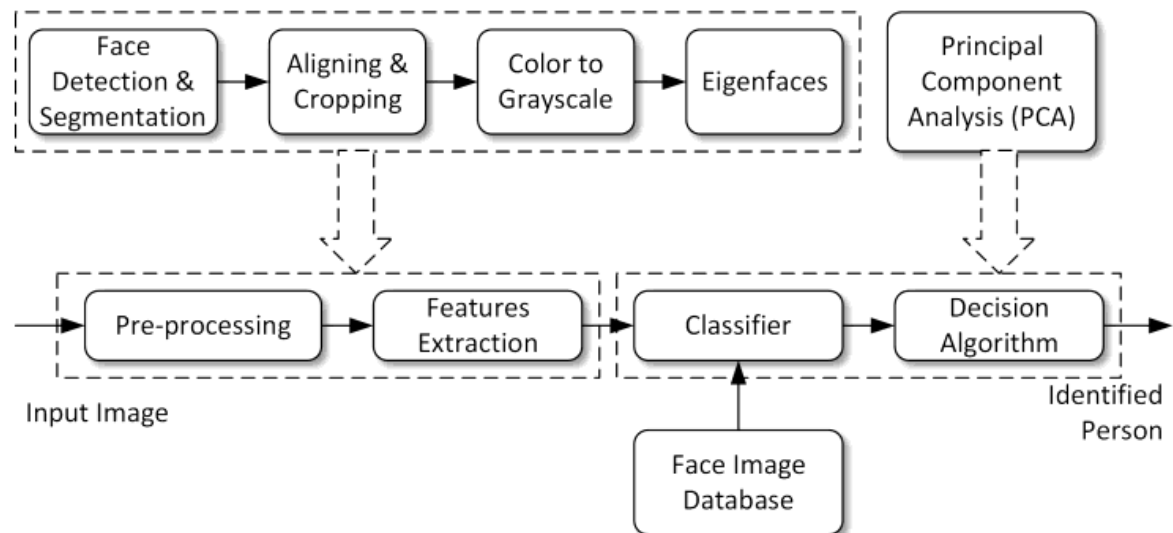
### 4. PROPOSED WORK

#### 4.1 IMAGE CAPTURE

A camera is placed away from the entrance to capture an image of the front of the person or crowd of person. And a further process goes for face detection.

#### 4.2 FACE DETECTION AND FACIAL FEATURES

The appropriate and effective facial detection algorithm constantly improves facial recognition. Several facial algorithms such as face-to-face geometry, construction methods, Face geometry-based methods, Feature Invariant methods,



**Fig -2:**Flow of Face Recognition System

Machine learning based methods. Out of all these methods Viola and Jones proposed a framework that gives a high detection rate and is also fast. Viola-Jones detection algorithm is fast and robust. So we chose Viola-Jones face detection algorithm, which uses Integral Image and AdaBoost learning algorithm as classifier. We have observed that this algorithm yields better results in a variety of lighting conditions.

#### 4.3 PRE-PROCESSING

Extracting the face features it is called pre-processing. This pre-processes step involves specifying the extracted facial image and transforms to 100x100. Histogram Equalization is the most commonly used Histogram Normalization technique. This improves the contrast of the image as it extends beyond the intensity of the image, making it even more clear and constraint.

#### 4.4 DATABASE DEVELOPMENT

As we choose biometric based system every individual is required. This database development phase consists of an image capture of each individual and extracting the biometric feature, and then it is enhanced using preprocessing techniques and stored in the database.

#### 4.5 POST PROCESSING

In the proposed system, after recognizing the faces of the person, the names are show into a video output. The result is generated by exporting mechanism present in the database system. These generated records can be seen in real time video. This ensures that person whose faces are not recognized correctly by the

system have to check in database. And thus, giving them the ability to correct the system and make it more stable and accurate.

#### 4.6 PROPOSED ALGORITHM

1. Capture the Person's Image.
2. Apply Face detection algorithms to detect face.
3. Use viola Jones and KLT Algorithm Extract the Region of interest in Rectangular Bounding Box.
4. Convert to gray scale, apply histogram equalization and Resize to 100x100 i.e. Apply pre-processing.
5. **if** Enrollment Phase  
    **then** Store in Database  
    **else** Apply PCA (For feature Extraction)  
    **end if**

#### 5. RESULT AND DISCUSSION

In this section, we provide the results we obtained in the experiments. Some of these results will be presented as diagrams, which present the relation between the performance and some of the parameters previously mentioned. With this method, the computers are taught to recognize the visual elements within by relying on large databases and noticing emerging patterns, the computers can make sense of images. If the similarity is below a threshold, you can return 'not matched' as well. The use of neural networks for face recognition has been shown by and we can see the suggestion of a semisupervised learning method that uses support vector machines for face recognition. The Recognition system is simple and works efficiently. The performance of this method is compared with other existing face recognition methods and it is observed that better accuracy in recognition is achieved with the proposed method. Face Recognition using KLT algorithm and Fusion of PCA and recognition plays a vital role in a wide range of applications. It is high rate accuracy applications in identifying a person is desired. Therefore, it could be said that the image of the original face can be reconstructed from the own interfaces if the proper characteristics (faces) are added in the correct proportion. Each face represents only certain features of the face, which may not be present in the original image.



**Fig -3:**Face Recognition



**Fig -4:**Face Recognition At Multiple Angles

## 6. CONCLUSION

In this paper, after experimenting several techniques all technique is working well face recognition. Face Recognition Systems is based on face recognition. This system can be used to identify unknown person. In real time scenarios, PCA outperforms other algorithms. The future work is for the recognition of the algorithm. In the system developed by recognizing the all angle variations. Gait recognition can be fused with face recognition systems. Poor lighting conditions. Our system will perform well but it is not a perfect solution.

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