# FACIAL RECOGNITION USING HAARCASCADE

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**ABSTRACT: Human face is an important biometric object in imageand video databases of surveillance system. Detecting andlocating human faces and facial features in an image or image sequence are important tasks in dynamic environments, such as videos, where noise conditions, illuminations, locations of subjects and pose can vary significantly from frame to frame. We want to identify the fake person based on face database which we have already created in own data. After that we want start identification of face using HAAR cascade classifier. Finally, we will do comparison with database and we willsay whether that person is authentic or unauthentic**

## INTRODUCTION

Face recognition is the technique in which the identityof the human being can be identified using one'sindividual face. The objective of the project is to providea simpler and easy method in machine technology. This method is useful in many fields such as the military, for security, schools, collages and universities, airline, banking, web application, gaming etc. This system uses powerful python algorithm through which the detection and recognition of face is very easy and efficient. The identification of objects in an image and this process would probably start with image processing techniques such as noise removal, followed by (low-level) feature extraction to locate lines, regions and possibly areas withcertain textures. The pixels that constitute an image are ordered as a grid (columns and rows); each pixel consistsof numbers representing magnitudes of brightness and color. The inherent subjective appeal of pictorial displaysattracts perhaps a disproportionate amount of attention from the scientists and also from the layman. And the sensor could be monochrome or color TV camera that produces an entireimage of the problem domain every 1/30 sec. enhancement is among the simplest and most appealing areas of digital image processing.Segmentation procedures partition an image into its constituent parts or objects. On the other hand, weak or erratic segmentation algorithms always guaranteeeventual failure. Digital image is defined as a two dimensional function f(x, y), where x and y are spatial (plane) coordinates, and the amplitude off at any pair of coordinates (x, y) is called intensity or grey level of the image at that point. Digital image compression addresses the problem of reducing the amount of data required to represent a digital image. From the mathematical viewpoint, this amounts to transforming a 2d pixel array into a statically uncorrelated data set. Image transmission applications are in broadcast television; remote sensing viasatellite, air-craft, radar, or sonar; teleconferencing; computer communications; and face smile transmission. Incompression ration it consist of two types of ration. Lossy image compression is useful in applications such as broadcast television, videoconferencing, and facsimile transmission, in which a certain amount of error is anacceptable trade-off for increased compression performance. These results are also qualitative valid for our pgf test set and they are characteristic for aerial ortho- photos and natural images. Lossless image compression is the only acceptable amount of data reduction. this result isdifferent to the result in [sea+00], where the best performance for a similar test set has been reported for jpeg- ls. pgf seems to be the best compromise between encoding and decoding times. There are 3 types of imagesused in Digital Image Processing. A binary image is a digital image that has only two possible values for each pixel. gray scale images of this sort, also known as black- and- white, are composed exclusively of shades of gray(0-255), varying from black(0) at the weakest intensity to white(255) at the strongest. Grayscale images are distinct from one-bit black-and-white images, which in the contextof computer imaging are images with only the two colors, black, and white (also called bi-level or binary images).The decomposition of a color in the three primary colors is quantified by a number between 0 and 255.For example, white will be coded as R = 255, G = 255, B = 255; black will be known as (R,G,B) = (0,0,0); and say, bright pink will be : (255,0,255) Literature survey

The main purpose of the research is to analyze the solutionsgiven by others and considering the shortcomings of their proposed systems, bring out a better solution. The solution to this is as proposed by Naveed et al. Afterwards the skin is classified and the detected face is matched with it the image stored in the face database. They fixed the seating arrangement of the students, to detect thefaces of the students and mark theattendance. Moved on to a better technique for face recognition by using statistical techniques (PCA) Principal Component Analysis &( LDA) Linear Discriminant Analysisplus also matching the imagetaken and the stored image for attendance marking. They proposed a system computing the images in a certain process so that match scoring can be done.They extracted the features from the images. for example outline of face, nose and eyes etc. all fixed the camera in the classroom which took a snap shot and did the face matching at the backend using PCA algorithm and calculating Eigen values and Eigen Vectors.in addressed the orthodox problem of marking attendance.in argued that as the number of employeesis large in the companies mostly so to mark their attendance isnot an easy job to do. The camera captures the image, removesbackground and noise and after that matches the image with the previously stored image to mark attendance once done the attendance is marked.

**Data Flow Diagram**

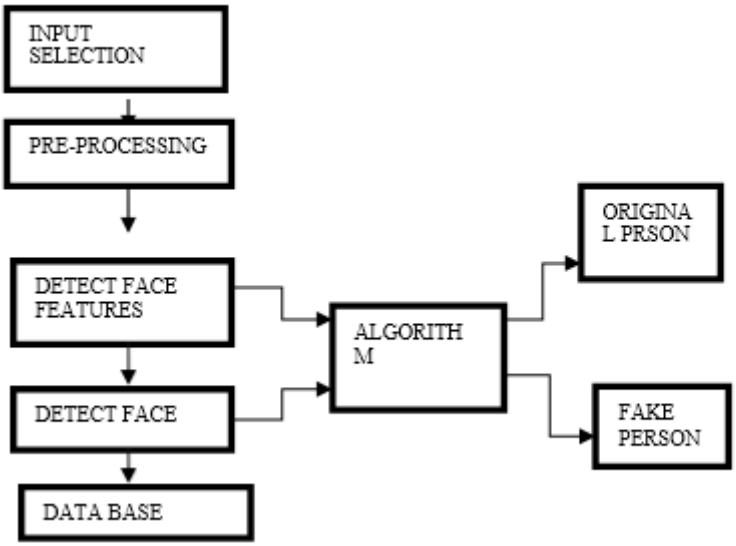



**Fig:1** Data Flow Diagram

Video streaming technology is one way to deliver video over the internet using streaming technologies, the delivery of audioand video over the internet can reach many millions of customerusing their personal computers, pdas, mobile smart phones or other streaming devices. The content file is completely downloaded and then played. This mode requires long downloading time for the whole content file and requires hard disk space. Pre-processing is a common name for operations with images at the lowest level of abstraction -- both input and output are intensity images. N computer graphics and digital imaging, image scaling refers to the resizing ofa digital

image. When scaling a vector graphic image, the graphic primitives that make up the image can be scaled using geometric transformations, with no loss of image quality. The gimp imagesoftware has three algorithms. The average method simply averagesthe values: (r + g + b) / 3. After that based on Haar cascade classifierwill detect the features of the human being.

**HAAR-CASCADE CLASSIFIER**

Haar Cascade classifier are an effective way for object detection.This method was proposed by Paul Viola and Michael Jones in their paper Rapid Object Detection using a Boosted Cascade ofSimple Features. Haar Cascade is a machine learning-based approach where a lot of positive and negative image are used totrain the classifier.

- Positive Image – These images contain the images whichwe want our classifier to identify.
- Negative Image – Image of everything else, which do notcontain the object we want to detect.

Using software to parse the world's visual content is as big of arevolution in computing as mobile was 10 years ago, and will provide a major edge for developers and businesses to build amazing products. Computer Vision is the broad parent name for any computations involving visual content – that means images, videos, icons, and anything else with pixels involved. Outside ofjust recognition, other methods of analysis include: Video motion analysis uses computer vision to estimate the velocity of objects in a video, or the camera itself. Jeff Hawkins has an entire book on this topic called On Intelligence. The same paradox holds true for computer vision – since we're not decided on how the brain and eyes process images, it's difficultto say how well the algorithms used in production approximateour own internal mental processes.

Machines interpret images very simply: as a series pixels, each with their own setof color values.

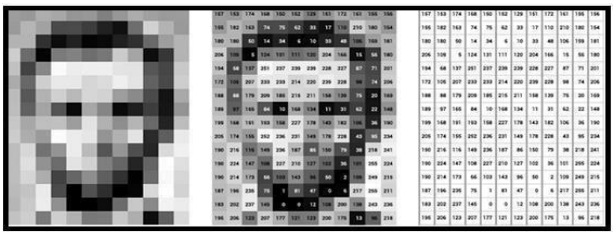


**Fig:2** Pixel Information

Think of an image as a giant grid of different squares,or pixels. When we start to add in color, things get more complicated.Now, each pixel actually has 3values for the computer to store in addition to its position. A normal sized 1024 x 768 image x 24 bitsper pixel = almost 19M bits, or about 2.36 megabytes.Even if you were to use Transfer Learning to use the insights of an already trained model, you'd still need afew thousand images to train on.

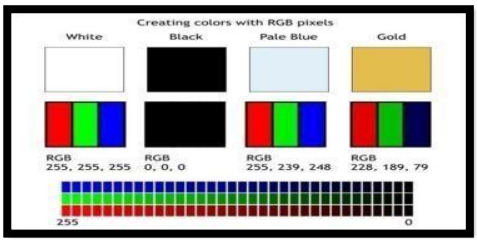



**Fig:3** Creation of colors

**Methodology**

*Face detection*

In the field of technology Face detection is treated as thedemanding and practically applied approach. The identificationof each face present in an image is the major task of the face detection. Here the implementation is done using OpenCV.

1. Loading the input images.
2. Converting the input images into gray scale images.
3. Applying the Haar cascade classifier.
4. Comparing both classifier based on the accuracy andtime.

A. Importing the required libraries

B. Taking the images which are captured by thecamera.

C. To process the image through the classifiers it isconverted into gray scaleimage.
D. Image will be loaded using OpenCV
E. By default, image will be loaded into BGR color spaceHaar cascade classifier.

Loading the input image using built in function cv2.imread(img_path),here the passing the image path as an input parameter Converting it to gray scale mode and then displaying itLoading the haar cascade classifier**Fig.4** representsthe Haar like feature. It consists of edge feature and line feature.In the gray-scale image the white bar represents the pixels that are closer to the light source Haar value calculation: Pixel value = (Sum of the Dar k pixels⁄Number of Dar k pixels)− ( Sum of theLight pixels⁄Number of Light pixels)

Haar Classifier is an object detection algorithm. In order to detect the object and to identify what it is; the features will be extracted from the image. Using haar pixel value can be calculated.

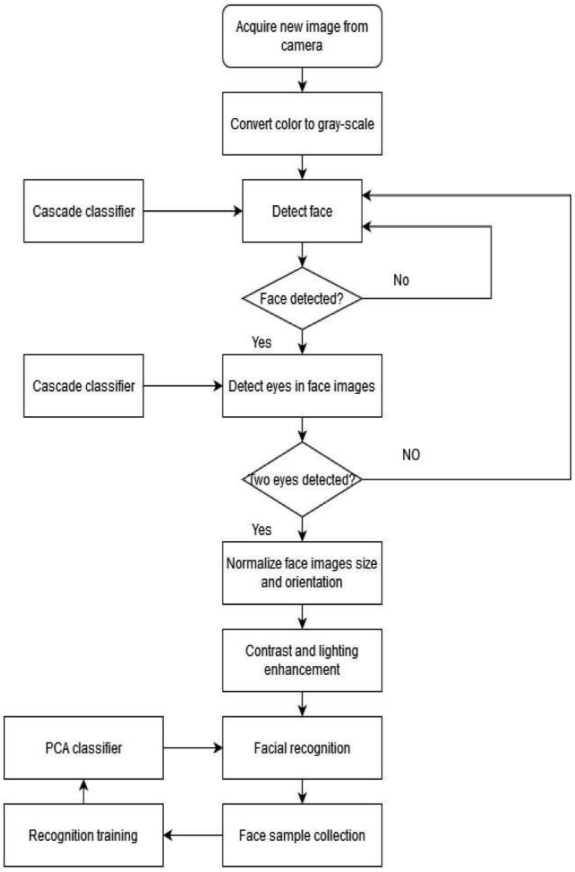



**Fig:4** Haar cascade Flow Chart

**Fig:4** represents the flowchart of the Haar cascade classifier. Once the camera acquires the image it converts the image into gray-scale. The cascade classifierdetects the face, if the face is detected then the classifier once again checks for the both eyes in the detected face and if two eyes are detected it normalizes the face imagessize and orientation. Then the image is processed for facerecognition where the image is compared with the face sample collection.

Importance of Haar Cascade classifier is that the Perception precision is more and the Positive rate is less

**Accuracy calculation**

- True positive (TP): It is an actual object of interest that is correctly identified. The correctly classified faces can be calculated as True positives rate (TPR) =TP/(TP + FP)
- False-positives (FP): It is a non-object of interest whichis falselyi- dentified as the true object.
- False-positives (FP): It is a non-object of interest whichis falselyi- dentified as the true object.
- False-negatives (FN): It is an actual object of interestfalsely identi- fied asnegative. False negatives rate (FNR) = FN/(FN + TP)

Accuracy =( TP + TN) ⁄(TP + TN + FP + FN)

Where,

TP: True Positive FP:

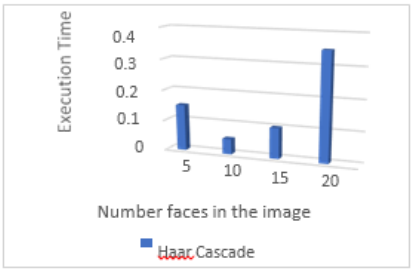
False Positive TN: TrueNegative FN: False Negative

The Accuracy is obtained for the Haar cascadeIs 96.24%.

**TABLE**

Haar cascade Classifier

| No.of Facesin an image | Execution time(mins) | No. of Faces Detected | Accuracy(%) |
|---|---|---|---|
| 5 | 0.141 | 5 | 100 |
| 10 | 0.055 | 9 | 90 |
| 15 | 0.11 | 12 | 80 |
| 20 | 0.369 | 19 | 95 |



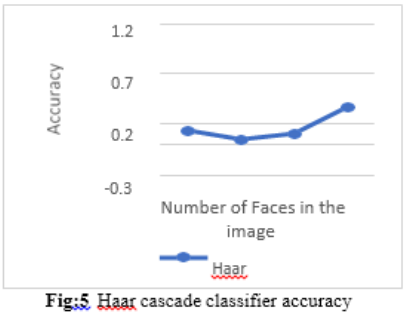




**Fig:5** Haar cascade classifier accuracy

**RESULT**

The execution is performed on Haar cascade by using number of images. As a result, Haar cascade hasmore accuracy but Haar cascade take less time. And detects more number of faces in an image. Finally the accuracy will be 96.24%.

**FUTURE SCOPE**

The main theme of the project is to identify the person is authentic or unauthentic. For the next generation we can add hardware part and assign voice note at output side and can implement this. We can alsoanalyze more at any type of domestic applications, in public areas and forensic applications to find out the person we can use hardware equipment.

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