FACE DETECTION AND RECOGNITION

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Abstract

Face recognition is a popular topic in biometrics. It is used in many public places for video capturing using cameras have their significant value for security purpose. It is widely acknowledged that the face recognition have played an important role in surveillance system as it doesn't need any human cooperation. As, it doesn't require any human asssitance it gives significant accuracy. The actual advantages of face based identification over other biometrics are uniqueness and acceptance. Each human face is unmatchable, that makes face detection a difficult problem in computer vision. In this field, influential factors are accuracy and speed of operation. The goal of this paper is to provide a suitable method for face detection and recognition, that provide a complete solution for image based face detection and recognition with higher accuracy, better response rate. Solution is proposed based on performed tests on various face rich databases .

Index Terms: Face detection, Face Recognition, Haar cascade classifier.

I. INTRODUCTION

Now-days actions are being handled electronically, instead of pencil and paper or face to face which results in great demand for fast and accurate user identification and authentication. Now a days banks and ATMs are using PINS are used to identify and authenticate the user,if the PIN is unable to verify the user then person face detection plays a vital role . There is possibility of unauthorized user who can come up with the correct personal codes when credit and ATM cards are lost. Face recognition technology may solve this problem since a face is undeniably connected to its owner expect in the case of identical twin

The face detection and recognition methods had been developed in large amount last few decades and as it doesn't require any human co-operation so there is no chance any omission. Due to its accuracy, it is hot topic in biometrics detection. Many methods were been introduced in face detection and recognition, which is considered as milestone. Defining facial recognition as, a biometric method of identifying an individual by comparing live capture or digital image data with the stored re cord for that person

Currently, facial recognition systems work with numeric codes called as face prints which identify 80 nodal points on a human face. Here nodal points are used as face points which helps in configuring the parameters such as the length or width of the nose, the depth of the eye sockets and the shape of the cheekbones. These systems captures data for nodal points on a digital image of an individual's face and stores the resulting data as a face print. These face print are used for comparison with data captured from faces in an image or video.

II. SYSTEM WORKING

Principle: In this project we have developed a Haar like Classifier for detection and recognition of face.

In this paper, we will discuss a system for face detection and recognition .System works in four parts and parts are listed as below:

1. Detection of face using developed Haar classifier.
2. Creating dataset of detected face.
3. Training system for detected face.
4. Recognition of detected face.

System Overview:

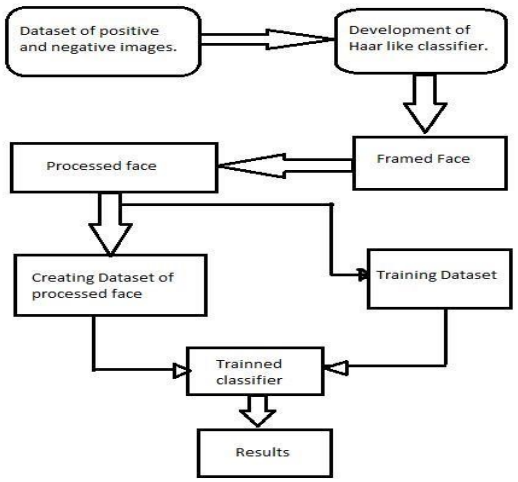


Fig 1.1 System Overview

In this project, we have developed a Haar classifier for frontal face detection using database of positive and negative images. The Positive images are those images which contains object in this case object is face or facial features and Negative images are those which don't contain any objects. More the number of positive and negative (back ground) images will result a more accurate classifier. Face detection is basically defined as computer technology that identifies human faces in digital images which is used in a variety of applications.

Face recognition is use to identify a person by comparing digital image data with the stored record of that person. To enhance the quality of input images we require pre-processing techniques defined as Image Pre-processing techniques. Here we have used color to grey image conversion technique which converts input image into grey scale image.

Haar cascade classifiers: In face detection, initially, the algorithm needs a lot of positive images (images of faces) and negative images (images without faces) to train the classifier. For extraction of features from image we require Haar cascade classifier. Each feature is a single value obtained by subtracting sum of pixels under white rectangle from sum of pixels under black rectangle.

A. Working of System:

Our developed Face detection and Recognition System works in four parts:

1.Detection of Face using developed classifier : By including developed frontal face classifier detection of face is done. We have written a Program for detection of face which creates a Square around face as output.

2. Datset of Detected Face:

Program has been written to create dataset of detected faces which will create 50 samples of each face to get each and e very detail of facial feature.

3. Training:

Program of training is written to create array of samples getting from dataset as output.

4. Recognition :

Recognition of each detected face with their names are given as output .If person is registered with this system then it will give its name otherwise it give its ID as unknown.

III . DEVELOPMENT OF CLASSIFIER

A.Introduction of Haar-like features :

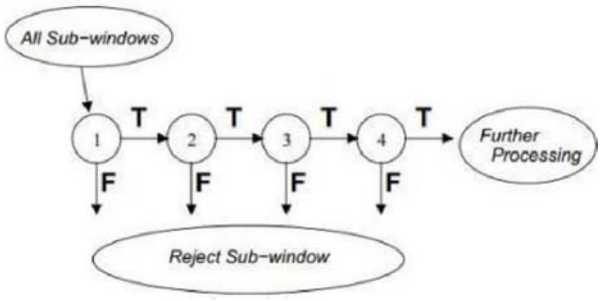
For accurate detection of features of any object we require a sophisticated method. However there are many problems occurred while detection and extraction of features like, working with only image intensities, meaning the RGB pixel values in every single pixel in the image, made feature calculation rather computationally expensive. In addition to it these methods are slow on most of the platforms.

This problem was addressed by the so called Haar-like features, developed by Viola and Jones on the basis of the proposal by Papa Georgiou et. al in 1998. A Haarlike feature sets up a specific location in detection window and considers neighboring rectangular regions, it sums up the pixel intensities in each region and calculates the difference between these sums. . The difference obtained are categorized into subsections. An example of this would be the detection of human faces where in, the areas around the eyes are darker than the areas on the cheeks. One example of a Haar-like feature for face detection is therefore a set of two neighbouring rectangular areas above the eye and cheek regions.

A. Cascade classifier

The cascade classifier consists of a list of stages, and each stage consists of a list of weak learners.

The desired object is detected by moving a window over the image. Specific region are labeled by classifier in each stage defined by the current location of the window as either positive or negative – here positive means that an object was found(e.g. face) or negative means that the specified object was not found in the image. Labeling by classifier yields a negative result, then the classification of that specific region is considered as complete and the window is moved to the next location. If the labeling yields a positive result, then the region moves to the next stage of classification. When all the stages, including the last one, yield a result, the classifier gives a final result of positive, saying that the object is found in the image. A true positive means that the object in question is indeed in the image and the classifier labels it as such – a positive result. A false positive means that the labeling process falsely determines that the object is located in the image, though it is not present in the image. A false negative occurs when the classifier fails to detect the object of interest from the image and a true negative implies that a non desired object was correctly classified as not being the object in question. In order to efficiently work , low false negative rate must be observed by each stage of the cascade, because if the actual object is classified as a non-object, then it leads to disruption of the classification of that branch , and the mistake cannot be corrected . However, each stage may observe a relatively high false positive rate, because even if the n-th stage classifies the non-object as actually being the object, then this mistake can be fixed in n+1-th and subsequent stages of the classifier. [5]



C.Creating Haar-like Classifier:

Development of classifier includes following Steps:

Step 1:

Creating Image dataset of positive and negative images which include 400 Positive Images and 400 Negative Images. The positive images are those images that contain the object (e.g. face or eye), and negatives are those ones which do not contain the object.

Having more number of positive and negative (back ground) images will normally cause a more accurate classifier.

Step 2:

Arranging Negative images in array and computing data from it showing Non-Human part i.e. objects.

Step 3:

In this step we created a data file (vector file) that contains the names of positive images as well as the location of the objects (face)in each image.

Step 4:

Creation of vector file which consist array of objects of Positive Images.

Step 5:

Finally by computing data of Vector arrays of both Positive and Negative Images created in above step and getting Haar-like Classifier file as output.

IV.RESULTS:

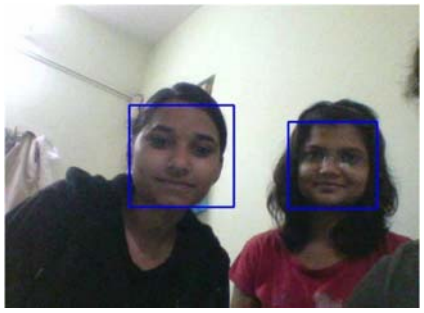


Fig 4.1: Detection of multiple face

Fig 4.2: Recognition of face

V. CONCLUSION

Face recognition is one of the several techniques for recognizing people. We have developed the system to evaluate the face detection and recognition methods which are considered to be a bench mark. There are several methods that can be used for that purpose.

In which we have developed haar like cascade classifier. There are numerous commercial application of face detection and recognition such as face verification based ATM, access control etc.

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