Emergency Service Assistance Using Face Recognition

Prof . A.K Talele[1], Aayush Deshmukh[2], Prajyot Mehta[3]
[2, 3] Dept of Electronics Engineering
[1]Professor
[1, 2, 3] Vishwakarma Institute of Technology , Pune

Abstract- *Face detection is important aspect of computer vision. It is being widely used as an authentication measure in unlocking devices .Face recognition can also be employed in noble cause of providing disaster relief to affected people, by allowing easy identification and personalized treatment. Detecting a face and localization from images is a challenging task .This paper aims to localize and extract the face region from the background precisely .The system used in sea rescue operations, in a natural calamity such as earthquake. This data linked with national identification system can provide great details help identify the person, if the authorities are experiencing difficulty in doing so. The system can be extended to all private , public hospitals to help reduce number of unrecognized victims and provide easy identification even before DNA analysis.*

Keywords- Face Detection, Face Recognition, Biometrics, Face Identification .

I. INTRODUCTION

Biometric-based techniques are emerging as the most promising option for recognizing individuals in recent years since, instead of certifying people and allowing them access to physical and virtual domains based on passwords, PINs, smart cards, etc . They work by examining a predefined number or object in order to determine and ascertain his/her identity. Passwords and PINs are difficult to remember and can be stolen or guessed; cards, tokens, keys and the like can be misplaced, forgotten, or duplicated; magnetic cards can become corrupted and unclear. But it is nearly impossible that an individual's biological traits to be misplaced, forgotten, stolen or forged [1]. Facial Recognition system is an application that identifies a person from a digital image or a live video from a video source. One of the methods to do this is by matching selective facial features from a facial database and the image.

We have used haar cascade method for face detection. The captured images which we have used to train the database are uniform in terms of lighting conditions of environment.

Various feature based methods are available for face recognition .They uses facial features to construct feature vectors. These vectors are then compared to the sample images and the match is identified or recognized. The method relies on face detection and localization of the person's facial features and calculating their geometrical likeness. A lot of companies are now commercially developing and refining face recognition methods.

Using face recognition in hospitals, we can take picture of the victim and feed it into central database through software. The software will be able to show identification of the patient and his contact information. When the person inquiring about the victim calls he will be asked to send a picture of the victim which when showed to the camera, the software will show the details after matching it with the face of the victim taken before hence reducing the need for id proofs and facilitating the process which gets tedious during disasters involving hundreds of people.

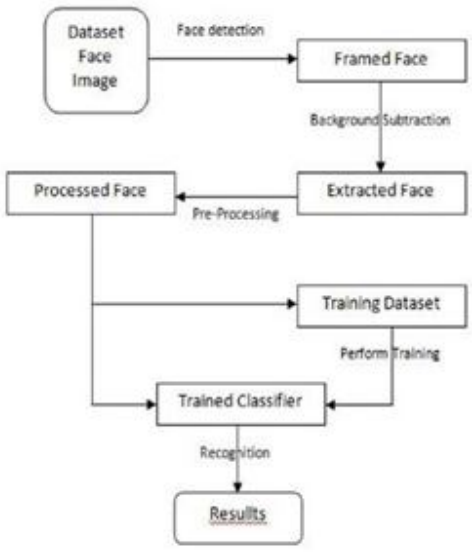


Fig.1. Working of software

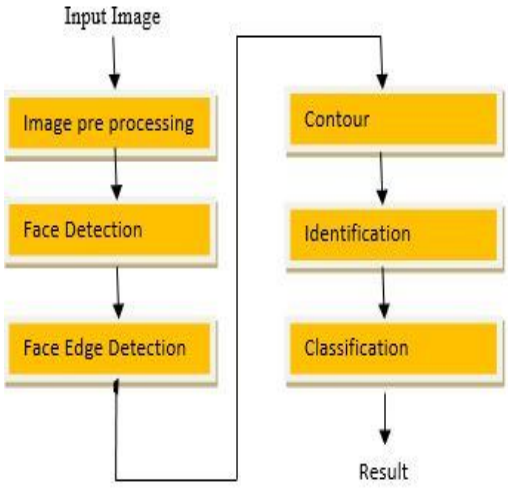


Fig.2. Steps in Face recognition

I. FACE DETECTION

A. Basic Theory [2]

Faces in the picture is searched by machine learning algorithm. There is no simple test that will let you know if the face has been found or not, if there is something like face. We have different patterns/feature in thousand that is used for match. This algorithm makes identifying the face simple by breaking it into thousands of smaller, bite sized tasks. This procedure is called classifier. For face, you should have 5,000 or more classifiers, which can be used to detect face. Here lies a problem, the algorithm of face detection starts from top left of the image and moves block by blocks. As there are 5000 plus test per small block, there will be hundreds of calculation to do and your system can hang or stop. For this cascades are used by Open CV. Cascades is series of water fall. So like series, detecting faces is breaked into many stages by cascade of OPEN CV. quick and very rough test is done for every block. If it is passed next test is performed. There are more than 40 such test, when passed it will detect face. Main advantage is most of the pictures will return negatives, which will save time as it won't check all 5000 plus features. So now it requires less time as compared to first. Haar cascade classifiers is used for object detection, thousands of positive and negative images are trained in classifier and used to detect object.

B. Haar Cascade

There are thousands of positive (i.e. face images) and negative (i.e. background images) images. Features are extracted from it. Haar feature is like convolution kernel. Every feature has its own single value obtained from subtraction of sum of pixels under black and white rectangle. To calculate features, all size and location of every kernel is used. For calculation, sum of every pixels under white and black rectangle is done. Integral images are introduced as is makes calculation easy of sum of pixels.

Most of these features are irrelevant, as given below in two features in top row, the first feature selected focuses on the fact that the region of the eyes is darker than the region of the nose and cheeks. The second feature selected relies on the property that the eyes are darker than the bridge of the nose.

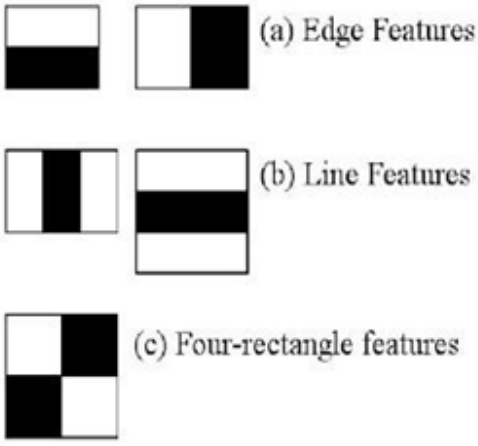


Fig.3. Types of Features

C. Adaboost

Adaboost is a principle that is responsible for selecting the most suitable parameter from the hundreds of parameters that are available. It applies each and every feature on all training images. For every feature, it finds the most suitable threshold which will segregate the faces to positive and negative. But there are errors in classifications. Hence features with least error rates are chosen which means they are the features that are most suitable to classify the face and non-face images. In this process each image is given an equal weight at the start. After each segregation, weights of wrongly classified images are increased. The same process is carried out again. After this the new error rates are calculated along with the new weights. This process is carried on again and again until the accuracy or error rate which is required is achieved or the number of features that are required are found. Usually in any given image most of the region in the image belongs to the non-face region. So it is advisable to have a simple method to check whether a window is not a face region. If it is not, it is discarded at once and it should not be processed again. Instead the focus should be on the region where there is a possibility of finding a face. We can find more time to check a possible face region.

II. FACE RECOGNITION

A. Basic Theory

OpenCV has various machine learning algorithms to look for faces within any given image. For an object which is complicated, we do not have only one simple test which will tell you if in an image it found a face or not. Let alone a single feature, instead there are hundreds of small patterns or features which have to match. The algorithms divide the task of finding the face into various small tasks. Classifiers is the name given to these tasks.

For a face, we might have six thousand or even more classifiers. Out of these thousands of features, all must match in order for a face to be detected. But for face detection, the algorithm starts at the top left of an image. It then navigates down across small blocks of data, looking at each block looking for a face. Since there are six thousand or more tests per block, we might have millions of calculations to do, which will halt your computer.

To overcome this, cascades are used. The cascade of OpenCV disintegrates the detection of faces into various stages. A test is carried out for every block. The algorithm has approximately forty of these cascades and if all stages pass, the face will be detected. It has an advantage that the pictures will return negative during the initial stages. This means the algorithm will not test all the features and thus time will be saved. Face detection can now be done in real time without wasting a lot of time. The cascades are nothing but a bunch of XML files that contain OpenCV data. This data helps us to detect objects. The code is started with the desired cascade and then the task is completed.

FRS is an application that mechanically identifies a person from a digital image or a video outline from a video source. One of the behaviours to do this method is by matching chosen facial features from a facial database and the image[3] .

B. Database

Using this we are capturing the faces of the person of whom we want to recognize. Firstly, we use the xml file to detect the face on the screen. Once detected we are prompted enter the unique Id. After this it will start capturing certain no. of frames of that person. Once the desired no. of frames have been captured the program will be terminated.

C. YML file Generation

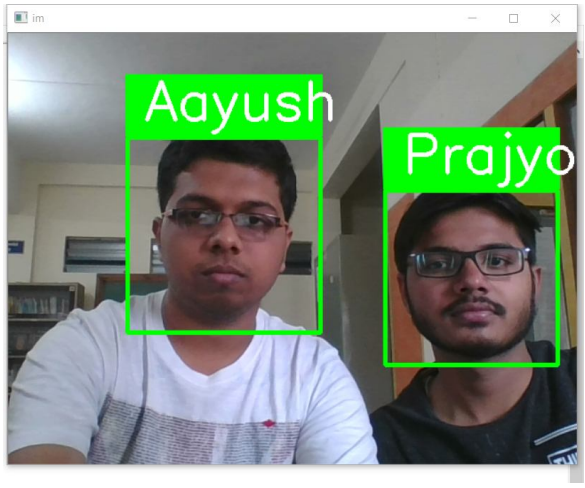
Using haar cascade we detect faces. To generate trainer we follow the following steps: Firstly, get the path of all files in the folder. Then create empty face list and Create empty ID list. Once the image has been loaded it will be converted into grey scale. Now PIL image will be converted into numpy array. Get ID from that image. Extract the face from the training image sample. If face is detected append that in the list as well as the Id of it.

III. FUTURE SCOPE

This technology can be deployed in wearable devices will be able to sense and recognize faces. In the future this technology will concentrate on overcoming the restrictions of the detection of only frontal views and single faces, on automatic model creation and on transformation parameter optimization [4]. Security today more than ever, a primary concern at airports and for airline staff office and passengers. Airport security systems that use face recognition technology have been implemented at many airports around the world [5].It can also be used in hospitals where a person inquiring can send the image to the authorities which have access to data from all the hospitals and it can be used in identification purpose . It can also be used in tracking missing people , identifying high risk individuals , reduce human trafficking and overall creating safer communities .

IV. RESULT

The results of Face Detection and Face Recognition are as follows:



V. RESULT ANALYSIS

By this system two people were identified based on their previous preloaded database. Names can be replaced with National Identification Number to recognize each face

uniquely. The system was capable of recognizing multiple face and assigning unique ID to them, in live video .

VI. CONCLUSION

This project has its application in various areas such as security, biometrics, paramedics ,etc. Proper integration of this technology with day to day technologies will help mitigate society problems and help reduce human effort .It can prove to be a very cost saving technological resource.

REFERENCES

[1] R. Jafri, H. R. Arabnia, "A Survey of Face RecognitionTechniques", Journal of Information Processing Systems,Vol.5, No.2, June 2009.
[2] Faizan Ahmed, Aaima Najam, Zeesham Ahmed, Image-based Face Detection and Recognition: "State Of The Art", IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 6, No 1, November2012.
[3] Oliver Jesorsky, Klaus J. Kirchberg and Robert W. Frischholz,"Robust Face Detection Using the Hausdorff Distance", In Proc. Third International Conference on Audio- and Video-based Biometric .
[4] S.V. Viraktamath, Mukund Katti, Aditya Khatawkar and Pavan Kulkarni, Face Detection and Tracking using OpenCV, The SIJ Transactions on Computer Networks and Communication Engineering (CNCE), Vol. 1, No. 3, July-August 2013.
[5] S.T. Bhosale , Miss. Tejaswini Patil , Miss. Pooja Patil, SQLite: Light Database System, International Journal of Computer Science and Mobile Computing, IJCSMC, Vol. 4, Issue. 4, April 2015, pg.882 885.