

REAL TIME PROFILE FACE RECOGNITION OPENCV

R. DURGA BHAVANI¹, A. NAGA RAJU²

1.PG student, D.N.R. COLLEGE, P.G. COURSES (AUTONOMOUS), BHIMAVARAM-534202.

Email Id: bhavani6bala@gmail.com

2.Assistant Professor in DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS, BHIMAVARAM-534202

Email Id: nagaraju.dnr345@gmail.com

ABSTRACT

With every passing day, we are becoming more and more dependent upon technology to carry out even the most basic of our actions. Facial detection and Facial recognition help us in many ways, be it sorting of photos in our mobile phone gallery by recognizing pictures with their face in them or unlocking a phone by a mere glance to adding biometric information in the form of face images in the country's unique ID database (Aadhaar) as an acceptable biometric input for verification.

This project lays out the basic terminology required to understand the implementation of Face Detection and Face Recognition using Intel's Computer Vision library called 'OpenCV'.

It also shows the practical implementation of the Face Detection and Face Recognition using OpenCV with Python embedding on both Windows as well as macOS platform. The aim of the project is to implement Facial Recognition on faces that the script can be trained for. The input is taken from a webcam and the recognized faces are displayed along with their name in real time.

This project can be implemented on a larger scale to develop a biometric attendance system which can save the time-consuming process of manual attendance system.

1 INTRODUCTION

A face recognition system could also be a technology which is very capable of matching a personality's face from a digital image or a video frame which it has or use it as a reference to map and identify against an info of faces. Researchers' area unit presently developing multiple ways throughout that face recognition systems work. the foremost advanced face recognition methodology, that is to boot used to manifest users through ID verification services, works by pinpointing and mensuration countenance from a given image.

While at first a kind of laptop application, face recognition systems have seen wider uses in recent times on smartphones and in alternative kinds of technology, like artificial intelligence. as a result of computerized face recognition involves the measuring of a human's physiological characteristics face recognition systems area unit classified as bioscience. though the accuracy of face recognition systems as a biometric technology is a smaller amount than iris recognition and fingerprint recognition, it's wide adopted because of its contactless and non-invasive method. Facial recognition systems area unit deployed in advanced human-computer interaction, video police work and automatic compartmentalization of pictures.

We have a created a face recognition technology capable of identifying faces.

2. LITERATURE SURVEY AND RELATED WORK

Face tracking refers to identifying the features which are then used to detect a Face In this case the example method includes the receiving or we can say that it gets the first image and the second images of a face of a user who is being taken into consideration, where one or both of the images which were used to sort of look for a match have been granted a match by the facial recognition system which also proofs the correct working of the system. "The technique includes taking out a second sub- image coming from the second image, where the second sub-image includes a representation of the at least one corresponding facial landmark, detecting a facial gesture by determining whether a sufficient difference exists between the second sub - image and first sub-image to indicate the facial gesture, and determining, based on detecting the facial gesture, whether to deny authentication to the user with respect to accessing functionalities controlled by the computing" [1]

2.1.1 Face Localization

Face localization process involves detecting the size and location of faces in the image. The output of this face localization

process is the face coordinates where the face is detected in the input image. Many approaches exist for face detection like Face detector by Viola Jones, Histogram of Oriented Gradients (HOG) [26] and CNN based approaches like Multi Cascaded Convolutional Neural Network (MTCNN) [19]. Deep learning-based approaches have achieved extraordinary results. They use CNN for face localization in real time.

2.1.2 Face Alignment

Face alignment is the method which involves processes like the centering of faces in the image so that they lie in the center as much as possible and also scaling of faces present so that all faces present in the dataset are of the same size and making sure that all required facial landmarks on the face can be projected. There are various methods proposed for face alignment purposes like alignment using an ensemble of regressive boost trees [20], 2D/3D face alignment using deep learning and MTCNN [19]. MTCNN [19] uses a cascade of CNNs for face alignment and face landmark estimation where regressive boost trees method works on the pixel intensities and detects high-quality facial landmarks in real time.

2.1.3 Face Representation

Face representation refers to the process of capturing important facial features in the form of a feature vector so that different faces can be distinguished. the computer must represent pixels of the image in the form of a feature vector. Nowadays Deep learning-based approaches are state of the art methods. These approaches generate face embedding. Here deep neural network is first trained on a very large dataset so that it can learn to generate accurate face embedding or feature map. Now after training is completed, the last layer i.e. output layer of the network is removed in order to obtain face embedding for any input face. The weights which are generated by training the model helps in the generation of face embedding. There have been various methods proposed in this field like Deep Face [39] by Facebook, Face net [34, 10] developed by Google etc. All these proposed face recognition models are focusing on improving the accuracy of the model but work is still needed in the areas like improving the efficiency of the model in terms of speed and size. However, some of the recently proposed models have shown extraordinary results in improving the efficiency of the network.

3 EXISTING SYSTEM

There are different methods exists for performing facial recognition. Some of the exist ing methods are:

Principal Component Analysis (PCA) based on Eigenfaces. This is an unsupervised based Machine Learning (ML) technique that works by removing unnecessary data and using necessary data to detect facial patterns accurately. It is basically involved in the reduction of the dimensionality of the data. Here Training data images act as Eigenfaces which are extracted from the large datasets using PCA technique and checked against the target image for face verification.

Linear Discriminant Analysis (LDA) is a supervised ML learning technique which performs pattern recognition on the facial features. Other ML techniques like Viola-Jones[29] Haar cascade classifier also used for facial recognition task. OpenCV [16] is the python [38] module which is used in computer vision related works like facial recognition. There are several methods and algorithms provided in the OpenCV for performing facial recognition like Local Binary Patterns Histograms (LBPH), Eigen and Fisher face. Face recognition can be performed both on digital image and also on video captured by the camera in real time.

4 PROPOSED WORK AND ALGORITHM

In this project, we are proposing a facial recognition and tracking application using deep learning. For performing facial recognition on the digital image or the images taken from a camera we have to perform many sub-processes which includes face localization, face alignment. Face representation and face comparison. CNN based approaches achieve the best result in terms of accuracy for facial recognition but other methods also exist which have achieved good results. For face detection, we are using HOG[26] based approach which does not require GPU and also gives very good result. based method involves first making the image black and white and then it looks at every single pixel and also the surrounding pixel in that image.it determines how dark is current pixel as compared to all those surrounding pixels and it marks arrow in that direction where a pixel is getting darker. So in HOG based method lightness and darkness in the image of the same person does not change the result and do not give the wrong result because it considers the direction where pixel brightness changes. So, both dark and light images will give the same representation. For face alignment purpose we are using aligner and for facial landmark

estimation, we are using Dlib 68 point landmark estimator which is based on an ensemble of regressive boost trees approach which can estimate 194 facial landmarks

5 METHODOLOGIES

MODULES

Recognizing the model by listing out the applications

Face detection is a computer technology being used in a variety of applications that identifies Human faces in digital images. Face detection also refers to the psychological process by which humans locate and attend to faces in a visual scene. Face detection can be regarded as a specific case of object class detection. In object class detection, the task is to find the locations and sizes of all objects in an image that belong to a given class. Examples include upper torsos, pedestrians, and cars. Face detection algorithms focus on the detection of frontal human faces. It is analogous to image detection in which the image of a person is matched bit by bit. Image matches with the image stores in database. Any facial feature changes in the database will invalidate the matching process. Face Detection has found Its application in various fields such as:

Facial motion capture: Facial motion capture is the process of electronically converting the movements of a person's face into a digital database using cameras or laser scanners. This database may then be used to produce CG (computer graphics) computer animation for movies, games, or

real-time avatars. Because the motion of CG characters is derived from the movements of real people, results in more realistic and nuanced computer character animation than if the animation were created manually.

Facial recognition: Facial recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. There are

multiple methods in which facial recognition systems work, but in general, they work by comparing selected facial features from given image with faces within a database. It is also described as a Biometric Artificial Intelligence based application that can uniquely identify a person by analyzing patterns based on the person's facial textures and shape. It is also used in video surveillance, human computer interface and image database management.

- **Photography:** Some recent digital cameras use face detection for autofocus. Face detection is also useful for selecting regions of interest in photo slideshows that use a pan-and-scale Ken Burns effect.
- **Marketing:** Face detection is gaining the interest of marketers. A webcam can be integrated into a television and detect any face that walks by.

6 RESULTS AND DISCUSSION

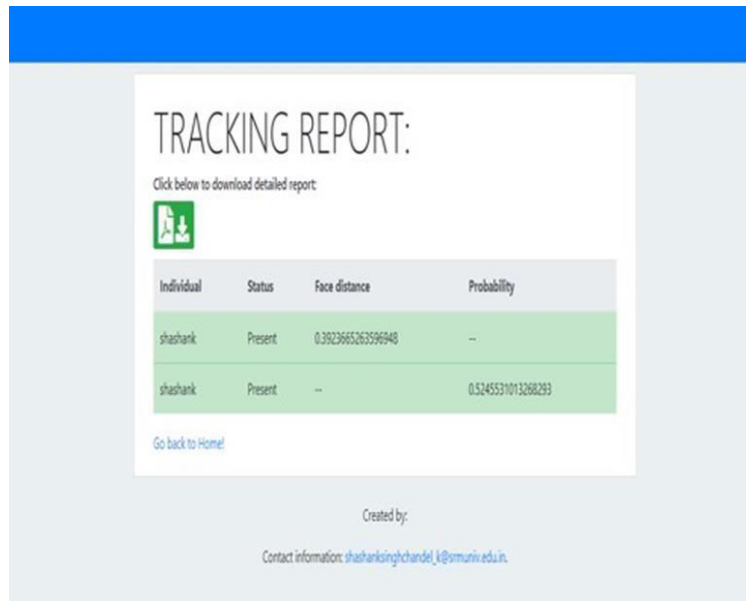


Fig 1: TRACKING REPORT

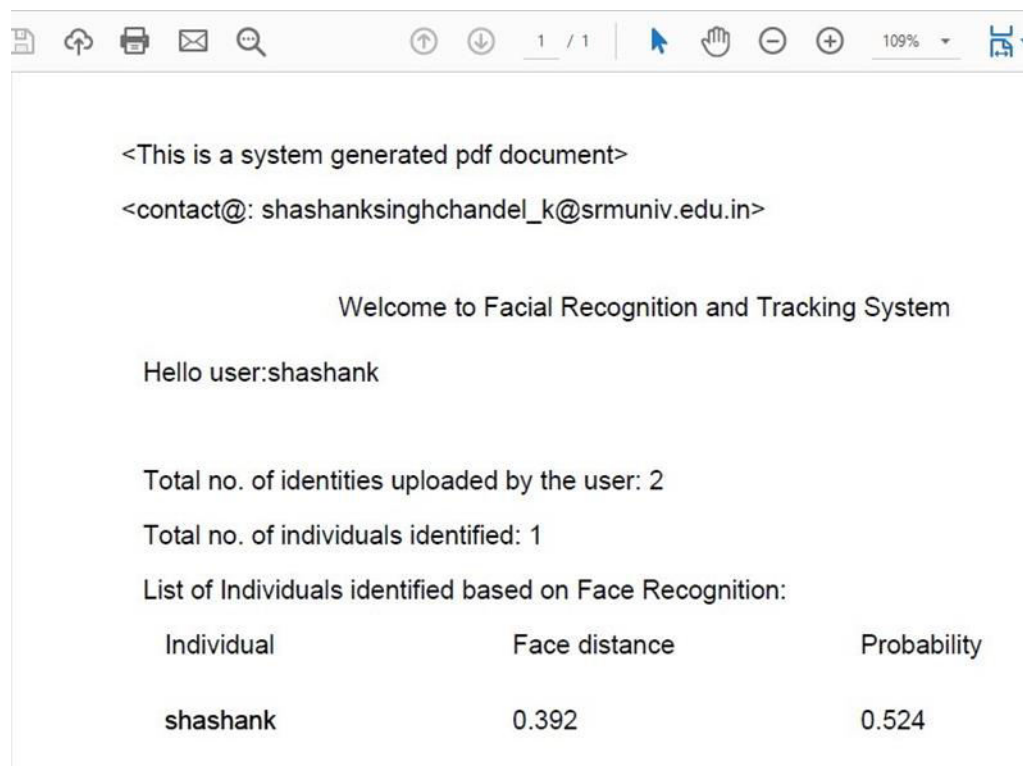


Fig 2: REPORT GENERATED IN PAGE

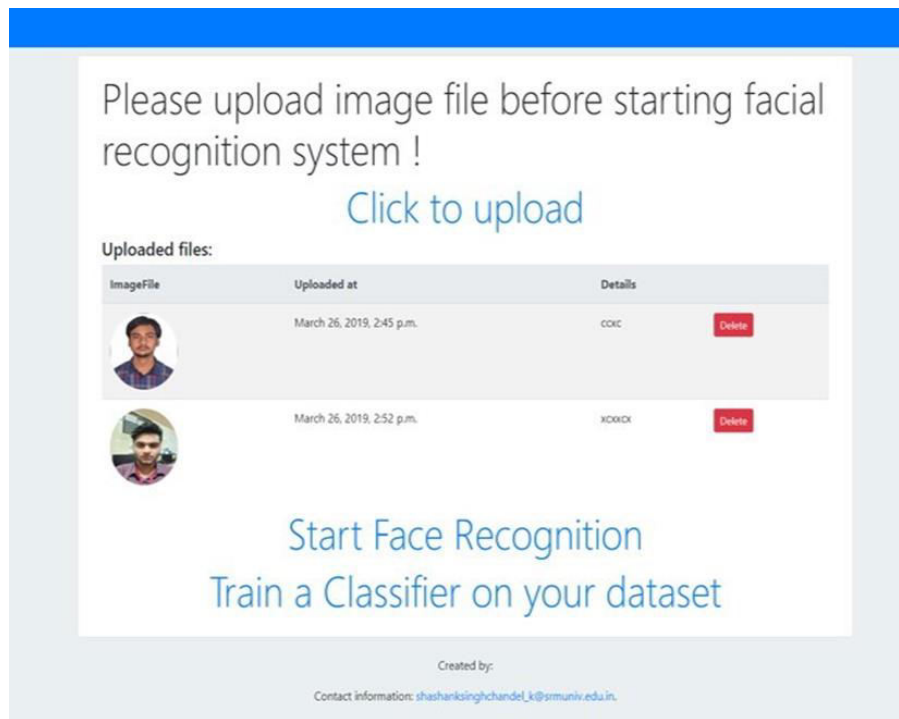


Fig 3: User homepage

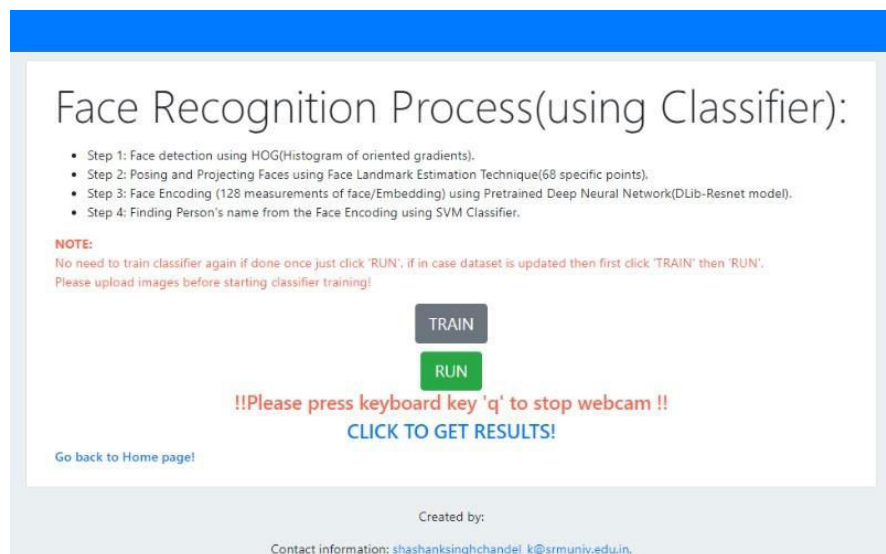


Fig 4: Face recognition by classifier

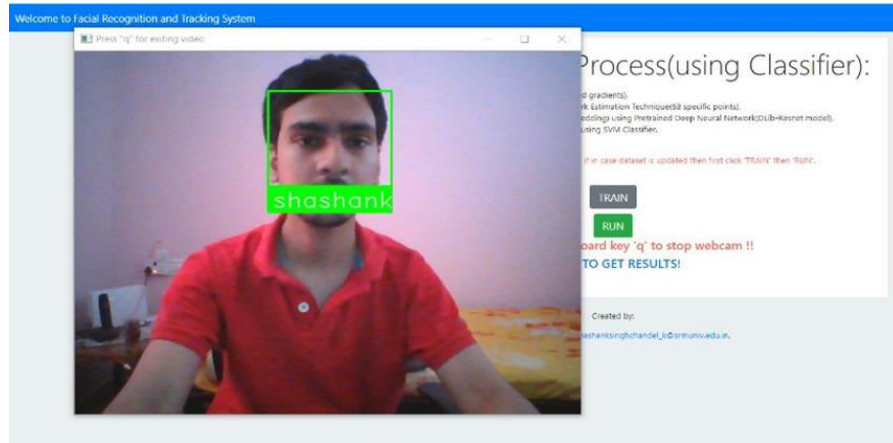


Fig 5: Real time prediction

7. CONCLUSION AND FUTURE SCOPE

Facial Detection and Recognition systems are gaining a lot of popularity these days. Most of the flagship smartphones of major mobile phone manufacturing companies use face recognition as the means to provide access to the user. This project report explains the implementation of face detection and face recognition using OpenCV with Python and also lays out the basic information that is needed to develop a face detection and face recognition software. The goal of increasing the accuracy of this project will always remain constant and new configurations and different algorithms will be tested to obtain better results. In this project, the approach we used was that of Local Binary Pattern Histograms that are a part of the face Recognizer Class of OpenCV.

FUTURE SCOPE

- Government/ Identity Management: Governments all around the world are using face recognition systems to identify civilians. America has one of the largest face databases in the world, containing data of about 117 million people.
- Emotion & Sentiment Analysis: Face Detection and Recognition have brought us closer to the technology of automated psyche evaluation. As systems now a days can judge the precise emotions frame by frame in order to evaluate the psyche.
- Authentication systems: Various devices like mobile phones or even ATMs work using facial recognition, thus making getting access or verification quicker and hassle free.
- Full Automation: This technology helps us become fully automated as there is very little to zero amount of effort required for verification using facial recognition.
- High Accuracy: Face Detection and Recognition systems these days have developed very high accuracy and can be trained using very small data sets and the false acceptance rates have dropped down significantly.

8 REFERENCES

1. Schneiderman. United States of America Patent U.S. Patent No. 8,457,367, 2013.R. J. Baron, "Mechanisms of human facial recognition," International Journal of Man-Machine Studies.
2. M. Nixon, "'Eye Spacing Measurement for Facial Recognition'," International Society for Optics and Photonics., vol. (Vol. 575), (19 December 1985).
3. H. & Y. J. Yu, "A direct LDA algorithm for high-dimensional data—with application to face recognition," 2001.