



# Facemask Detection by Open CV

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## ABSTRACT

Machine learning has been gaining momentum over last decades: self-driving cars, efficient web search, speech and image recognition. The successful results gradually propagate into our daily live. Machine learning is a class of artificial intelligence methods, which allows the computer to operate in a self-learning mode, without being explicitly programmed. It is a very interesting and complex topic, which could drive the future of technology.

Face detection is an important step in face recognition and emotion recognition, which is one of the more representative and classic application in computer vision. Face is one of the physiological bio-metrics based on stable features.

Face detection by computer systems has become a major field of interest. Face detection algorithms are used in wide range of applications, such as security control, video retrieving, biometric signal processing, human computer interface, emotion detection, face recognition and image database management. Face detection is a challenging mission because faces in the images are all uncontrolled. E.g. illumination condition, vary pose, different facial expressions.

## Motivation

The most useful area in which face recognition is important is the biometrics that is used for authentication process which makes the work mor easier. Face recognition is one of the widely used technologies or systems in which it has the potential to perform tasks such as to have records provided in by the dataset in many areas such as the school and colleges attendance systems, it can also be helpful in catching the thieves or the terrorist, can be helpful in the security of common people and the much-needed security areas in the country. Face

recognition can be used by the government to verify the voters list, find missing persons, find the population or census, immigration process, also provide security over internet scams protecting Ecommerce and highly used in the medicine and healthcare range. This brings in a very high demand or a real time face recognition system for several uses for the people and government. Providing such excellent systems there would be ease in several activities. 1.2 Problem Statement The main aim or objective of this paper is to provide or develop a system that will use the camera of the computer or the system that would detect and recognize the person's face or the face of the individual using the tool in OpenCV called as the Open Face and python programming language in deep learning domai

## Literature survey

This section is a basic overview of the major techniques used in the face recognition system that apply mostly to the front face of the human being. The methods include neural networks, hidden Markov model, face matching done geometrically and template matching. Eigenface is one of the most widely used methods in face recognition and detection which are broadly called as the principle components in mathematical terms. The eigenvectors are ordered to represent different amounts of the variations in the faces. Neural networks are highly used in the face recognition and detection systems. An ANN (artificial neural network) Was used in face recognition which contained a single layer Which shows adaptiveness in crucial face recognition systems. The face verification is done using a double layer of WISARD in neural networks. Graph matching is other option for face recognition. The object as well as the face recognition can be formulated using graph matching performed by optimization of a matching function. Hidden Markov Models is the way by which stochastic modeling of nonstationary vector time series based on HMM model applied to the human face recognition wherein the faces gets divided into parts such as the eyes, nose, ears, etc The face

recognition and correct matching is 87% correct as it always gives out the best and right choice of face detection through stored dataset. Or else the relevant model reveals the identity of the face. The geometrical feature matching is the technique which is based on the geometrical shapes of the face. The geometrical face configuration has sufficient dataset for face detection and recognition system. This is one of the commonly used method of the face recognition and detection. This system apparently gives satisfactory results. Template matching is one of the techniques through which the test image is represented as a two-dimensional array of values which can be compared using Euclidean distance with single template representing the whole face. This method can also use more than one face template from different points of view to represent an individual face.

## Methodologies

The concept of OpenCV was put forth by Gary Bradski which had the ability to perform on multi-level framework. OpenCV has a number of significant abilities as well as utilities which appears from the outset. The OpenCV helps in recognizing the frontal face of the person and also creates XML documents for several areas such as the parts of the body. Deep learning evolved lately in the process of the recognition systems. Hence deep learning along with the face recognition together work as the deep metric learning systems. In short deep learning in face detection and recognition will broadly work on two areas the first one being accepting the solidary input image or any other relevant picture and the second being giving the best outputs or the results of the image of the picture. We would be using dlib facial recognition framework that would be the easy way to organize the face evaluation. The two main significant libraries used in the system are dlib and face recognition. Python being a very powerful programming languages and one of the programming languages that are being used all over the world has proven to give best results in the face recognition and detection systems. Together face recognition and detection becomes very easy and fruitful with the help of the python programming language and OpenCV.

## Need of an automated system

Due to the rising need for the systems which can help in the areas such as surveillance as well as security this kind of individual authentication can no longer be done using simple handmade methods hence there is a rising need of the automated systems

that can easily rectify the faults and process the human face recognition. When the work is done by machines it can perform tasks efficiently in very less duration of time and cuts off the major mistakes occurred by humans. A real time GUI based face recognition system built can ease this work of face detection and can be achieved in various ways.

### 3.2 Graphical User Interface

The graphical user interface (GUI) is the platform that will allow the inputs from the user ends a kind of interaction with the system. GUI's are used in mobiles, media players, games and many others. We can design visual composition and the temporal behaviour of the GUI in any of the software application as well as programming in the areas of the human computer interaction. The GUI for this project will be widely based on the training and the testing phase which in turn will allow the capture and train of the image. The minimum requirements for the software would be python along with OpenCV and the required dataset. The minimum requirements for the hardware would be intel i3 or any processor above it and 4 core CPU. Operating systems of windows 10 will be sufficient and random-access memory 8GB required. From the user end a computer or laptop active internet connection and a scanner optional.

## Proposed Arrangement for system design

In order to create this system first we will have to make the datasets. When the image quality becomes favourable different procedures will take place in the face recognition system the tasks are performed using the python queries "python encode\_faces.py". The input will be taken from the dataset which will be received in the "encodings.py". There will be precision formatting in the system wherein face embedding for each face will occur. Secondly a file "recognize\_faces\_images.py" will contain all the required methods and the techniques for the process of identification of the face of the person from the given image of the dataset. The given file will be executed by the python command "python recognize\_faces\_image.py-encodings". We can resize or turn the image for approximate with the goal for getting the desired output. The present classifier along with OpenCV libraries will enhance the outcome or results in the face recognition system.



**Figure 1: face recognition system design using python and OpenCV.**

## Advantages and Disadvantages

The advantages of the face recognition system include faster processing, automation of the identity, breach of privacy, massive data storage, best results, enhanced security, real time face recognition of students in schools and colleges, employees at corporate offices, smartphone unlock and many more in day-to-day life.

Few disadvantages in this system include the costing, or the funding, very good cameras of high definition are required, poor image quality may limit the effectiveness of this system, size of the image will matter because it becomes difficult to recognize the face in small images, Face angles can limit the face recognition reliability, massive storage is required for this system to work effectively.

## Problem Definition

Over the past decade face detection and recognition have transcended from esoteric to popular areas of research in computer vision and one of the better and successful applications of image analysis and algorithm-based understanding. Because of the intrinsic nature of the problem, computer vision is not only a computer science area of research, but also the object of neuroscientific and psychological studies also, mainly because of the general opinion that advances in computer image processing and understanding research will provide insights into how our brain work and vice versa. A general statement of the face recognition problem (in computer vision) can be formulated as follows: given still or video images of a scene, identify or verify one or more persons in the scene using a stored database of faces.

## Project structure

Our project has four directories in the root folder:

**Dataset/:** Contains our face images organized into subfolders by name.

**Images/:** Contains three test images that we'll use to verify the operation of our model.

**Face-detection-model/:** Contains a pre-trained Caffe deep learning model provided by OpenCV to detect faces. This model detects and localizes face in an image.

**Output/:** Contains my output pickle files. If you're working with your own dataset, you can store your output files here as well. The output files include:

**embedding.Pickle :** A Serialized facial embeddings file. Embeddings have been computed for every face in the dataset and are stored in this file.

**le. pickle:** Our label encoder. Contains the name labels for the people that our model can recognize.

**Recognizer. Pickle:** Our Linear Support Vector Machine (SVM) model. This is a machine learning model rather than a deep learning model and it is responsible for actually *recognizing* faces.

## Conclusions

Face recognition systems are currently associated with many top technological companies and industries making the work of face recognition easier. The use of python programming and OpenCV makes it an easier and handy tool or system which can be made by anyone according to their requirement. The proposed system discussed in this project will be helpful for many as it is user friendly and cost\_ efficient system. Hence by the use of python and OpenCV the face recognition system can





## Acknowledgement

I wish to express my profound and sincere gratitude to, Ms. Harshit Bhardwaj (Assistant Professor), of Computer Science Engineering. School of Computer Science Engineering, Galgotias University, Uttar Pradesh, who guided me into the intricacies of this project non - Chalantly with matchless magnanimity.

## References

Face Detection in Real Time Based on HOG. N. J. Wang, S. C. Chang and P. J. Chou. Taipei, Taiwan: IEEE, DOI:10.1109/ISPACS.2012.6473506, 2012. International Symposium on Intelligent Signal Processing and Communications Systems. pp. 333-337. ISBN: 978-1-4673- 5081-5.

Face Recognition Homepage,

<http://www.face-rec.org/algorithms/>

Seeing with OpenCV, Article,  
[http://www.cognotics.com/opencv/servo\\_2007\\_series/part\\_1/index.html](http://www.cognotics.com/opencv/servo_2007_series/part_1/index.html)

Python with deep learning,  
<https://www.tutorialspoint.c>

Face Detection and Tracking using OpenCV. S.V.Viraktamath, Mukund Katti, Aditya Khatawkar, Pavan Kulkarni. 3, s.l.: SIJ, July-August 2013, The Standard International Journals (The SIJ) , Vol. 1, pp. 45-50. ISSN: 2321 – 2403

<https://www.pyimagesearch.com/2018/09/24/opencv-face-recognition/>

