

# Face Recognition Based Attendance System Using OpenCV Python

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**Abstract** - When it comes to the most productive image processing application, face recognition considered to be the most reliable one and its role in technical field is incredible. Attendance marking system using face recognition is a procedure of marking attendance of student via matching face of a student with their stored biometric facial measurements. This system is developed to remove the pen paper marking attendance to save time, energy and increase accuracy. What method we are using nowadays to mark attendance is tedious and time-energy consuming. Attendance records can be easily manipulated because of lenient security but this system store attendance record in excel sheet in database of computer which is more secure than normal method of marking attendance. Teachers won't be carrying attendance record with them daily; extra burden will be reduced. The system will be tested under various parameter like illumination, variation of the distance between student and camera, head movement etc. After all this testing, accuracy and productivity of system can be finalized. The proposed system provides efficient way of marking attendance. This system can be used mark attendance with mask too. Also, multiple student attendance can be marked, hence reducing time and efforts.

**Keywords** - Python, Face recognition, OpenCV, Dlib, CMake, Numpy.

## I. INTRODUCTION

Many schools and colleges use traditional method of marking attendance which is a tedious task. It provides burden to the faculties who have to mark attendance by manually calling the names of each and every student and this might can take 4 minutes or more time of entire session [1]. This process is very time consuming that's why new technique of marking attendance came into picture by using finger print recognition, RFID and so on. But this system uses to consume more time because its queue based. Better technique is marking attendance by face recognition. Face recognition uses biometric feature which can be easily acquirable [2]. It consists of two categories, face verification and face identification. In face verification, face image is compared among the template of face images. It matches 1:1 face image to 1: N template image. Here we are using face as an input to mark attendance which is more accurate and reliable [3]. Nowadays, marking attendance by face recognition is very popular and can be widely used. After recognition with time in excel sheet. All the inputs of face of students will be found in database. This system consumes way less time as compared to traditional method of making attendance.

## II. PROBLEM DEFINITION

Every day in schools and colleges, attendance will be taken for keeping track of those students who are attending. This is usually taken by teachers manually like an old traditional way using pen and paper. This old way can make teachers miss some student's attendance and even some students can give proxy for their friends. To overcome this issue, we came across face recognition-based attendance system. This technology is based on high-definition monitoring and other information technology. The concept of face recognition is to provide a computer the ability to find and recognize human faces fast and precisely in images or videos. Various algorithms and techniques have been developed for improving the performance of face recognition. Recently for computer vision applications Deep learning has been highly explored.

We know that humans can identify multiple people at the same time, but for computer it is not easy to detect multiple faces like how humans can detect. This project can help the computer to detect and identify multiple faces at the same time. An integral part of biometrics is face recognition [4]. The basic traits of humans are matched to the existing data in biometrics. Through algorithms facial features are extracted and implemented, which are efficient and also some modifications are done to improve the existing algorithm models. Criminal identification, security systems, identity verification etc. are some of the applications of face recognition. The face recognition system generally involves two stages:

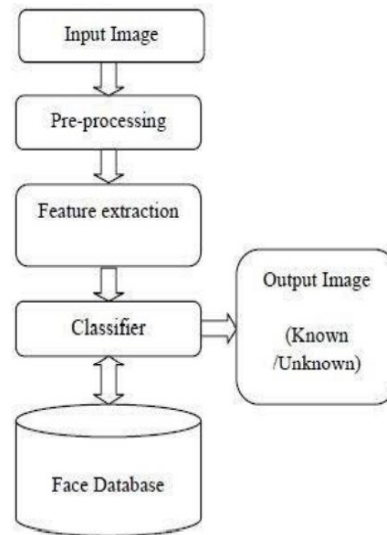
- Face Detection – When the input face is provided, the face is searched to match with any face that is already been provided in the data base. Then the image processing will clean up the facial image for easier recognition.
- Face Recognition – The detected and processed face will be compared to the known faces in the data base and will decide who that person is and displays the information.

### III. DESIGN/IMPLEMENTATION

#### Face Landmark Estimation:

By using Face Landmark Estimation, we can identify some key points on face, for example center of eye, tip of nose, etc. In this estimation 128 different measurement of face will be stored in database as a template of input face and by using this template comparison of different faces will take place [5]. We came across even different estimation model which is based on number of face Landmark estimation points but this model of estimation is more accurate and reliable that's why we are using this in our project Shows Fig 1.

#### Block Diagram



**Fig 1.** Block Diagram

#### Software Used-Python



**Fig 2.** Python

Shows Fig 2 Python is a programming language which is easy to use and understandable. It is object oriented programming language which deals with real world problems and it is high level programming language [6]. Python was developed by Guido Van Rossum. Python is a popular language because of its simplicity and hence million billion user. Using Python it is fun to code and we can easily create Complex game, etc.

#### Applications of Python

- Web development.
- In engineering project.
- Data science and ML.
- Easy and complex gain.
- Data and information visualization.
- Finance.

*Libraries*  
*OpenCV*



**Fig 3.** OpenCV

Shows Fig.3 OpenCV stand for open-source computer vision library and it aimed at real time computer vision. This library is free to use and it is written in C, C++, Python, Java and Assembly language. Website for OpenCV is [opencv.org](http://opencv.org). Open CV applications consists of areas like face recognition system, object detection, motion tracking, gesture recognition, SFM (Structure from Motion), etc. OpenCV is used to provide an infrastructure for computer vision applications [7]. It can support model of ML (Machine learning), AI, etc. This library consists of many optimize algorithm whose functions are to detect and recognize faces, classify human actions in video, track camera movement, etc.

*Dlib*

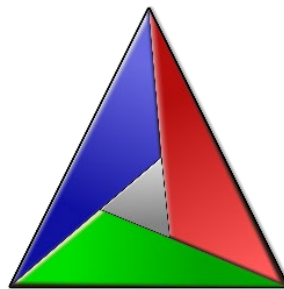


**Fig 4.** Dlib

Shows Fig 4 Dlib is software library that is written in C++ programming language. It is designed from ideas on component-based software engineering. Dlib is open-source software and released in the year of 2002. It is having cross platform operating system. Its official website is [dlib.net](http://dlib.net). Dlib includes a wide variety of tools and deals with different fields like:

- Data mining.
- Image processing.
- Data structure.
- Numerical optimization.
- Linear algebra.
- Networking.
- GUI (Graphical user interface)

*CMake*



**Fig 5.** CMake

Shows Fig 5 CMake is free open source software which is used to build automation, for packaging, for testing and for installation of software by using a compiler [8]. It is used to generate another system build files. It's been released in the year

of 2000 and written in programming language like C and C++. It is a software development tool. Cmake is a cross platform operating system. It's official website is cmake.org. Cmake feature include multiple builds from same source tree.

### Face recognition

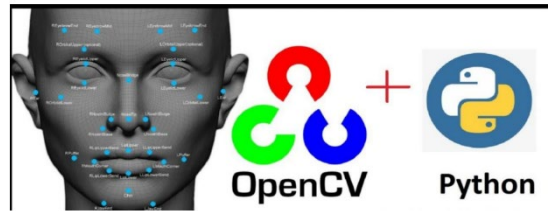


Fig 6. Face recognition

Shows Fig.6 Face recognition library is capable for recognizing face of human as an input and compare or matches from template of faces that is stored in database of system. Face recognition use to manipulate faces from Python programming language. By importing face recognition module in program, we can use features of face recognition.

### Numpy



Fig 7. NumPy

Shows Fig.7 NumPy is a Python programming language library. It is used to support multidimensional arrays and matrices. It consists of large collection of mathematical functions which can be operated on arrays. Author of NumPy is Travis's Oliphant. It is a cross platform operating system [9]. It is the type of numerical analysis library. Its official website is numpy.org. NumPy in Python is having functionality somewhat same as MATLAB i.e., Matrix laboratory because it allows user to write code on mathematical operations on array or matrices [10].

## IV. RESULTS

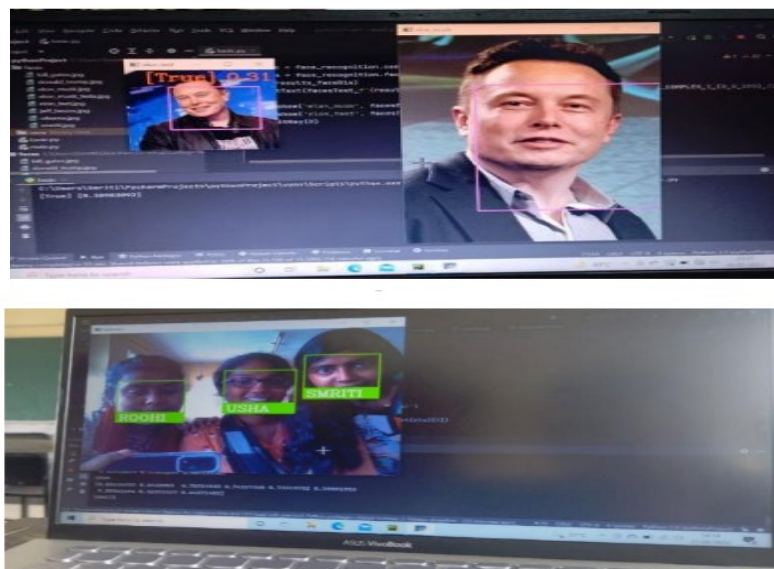


Fig 8. Face Recognition Through Webcam

	A	B	C
322	SMRITI	14:13:22	
323	SMRITI	14:13:23	
324	SMRITI	14:13:24	
325	SMRITI	14:13:25	
326	SMRITI	14:13:25	
327	SMRITI	14:13:26	
328	SMRITI	14:13:27	
329	SMRITI	14:13:28	
330	USHA	14:13:28	
331	SMRITI	14:13:30	
332	USHA	14:13:30	
333	SMRITI	14:13:32	
334	SMRITI	14:13:32	
335	SMRITI	14:13:34	
336	ROOHI	14:13:34	
337	USHA	14:13:34	
338	SMRITI	14:13:35	
339	ROOHI	14:13:35	
340	SMRITI	14:13:37	
341	ROOHI	14:13:37	

**Fig 9.** Attendance marking in excel

## V. CONCLUSION AND FUTURE ENHANCEMENT

Shows Fig 8 and Fig 9 this system is built to reduce the wastage of time and increase accuracy during the time of attendance marking via face recognition technique. This system works on the basis of different libraries which consist of different functions and it will be able to mark attendance by matching faces with template images stored in database i.e., face ID. It will detect face using webcam that is present in laptop and then recognition of face will take place. After recognition of face, system has to mark attendance in excel sheet with time. Future scope of the system includes in the field of government offices, corporates, colleges, military, etc. for verification and detection of faces. From airports to banks or malls - the possibilities are endless! Facial scanning can be applied across all industries for improved efficiency across different segments within your workplace environment as well.

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