

Student Attendance System with Face Recognition using Machine Learning

Priyanka Chilap¹, Nikita Chaskar², Vaishnavi Amup³

1-3 Student, Department of Computer Engineering Jaihind College of Engineering, Kuran, Pune

Abstract – In today's modern world, education system introduces the concept of smart classroom which involves the smart attendance system. In this project we are going to describe the student attendance system with face recognition that uses the machine learning algorithms. This project contains two main parts of attendance system that is face detection and face recognition. In this proposed system we use the OpenCV library along with python that provides various functions or algorithms related face recognition. The main objective of this project is to make the attendance management system reliable, efficient, simple, time saving and easy.

Key Words: machine learning, face detection, face recognition, OpenCV, python, attendance

1. INTRODUCTION

Face recognition is the technique in which the identity of a human being can be identified using ones individual face. Such kind of systems can be used in photos, videos, or in real time machines. The objective of this article is to provide a simpler and easy method in machine technology. With the help of such a technology one can easily detect the face by the help of dataset in similar matching appearance of a person. The method in which with the help of python and OpenCV in deep learning is the most efficient way to detect the face of the person. This method is useful in many fields such as the military, for security, schools, colleges and universities, airlines, banking, online web applications, gaming etc. this system uses powerful python algorithm through which the detection and recognition of face is very easy and efficient[1].

In recent years, with the rapid development of artificial intelligence, deep learning and other technologies, face recognition also ushered in the outbreak period. Face recognition technology has been an important subject in the field of computer vision for a long time, and it was mainly used in the field of public security in the early stage. With the popularity of face attendance, face passing and other applications in recent years, face recognition is widely used in intelligent transportation, intelligent medical treatment, building intercom, financial education, safe city construction and other fields; it can also unlock mobile phones and log in payment accounts by face[3]. Face recognition takes an image from a video or a camera as input and outputs the identified image topic. Facial features may include regions in the face, variations in the face structure, face cuts and angles that have been formatted and styled. Face extraction includes grabbing of the features from camera. Face detection includes removal of the background and focusing on the foreground eliminating any other elements apart from the face region, however the system still pertains a few drawbacks as it cannot detect the head count which may be present due to overlapping of faces

or improper recognition of two faces having similar facial features[2].

2. OpenCV/ dlib/ Face_recognition

A. OpenCV

OpenCV is a video and image processing library and it is used for image and video analysis, like facial detection, license plate reading, photo editing, advanced robotic vision, and many more.

B. dlib

The dlib library contains our implementation of 'deep metric learning' which is used to construct our face embeddings used for the actual recognition process.

C. Face_recognition

The face recognition library has many methods (functions) to deal with faces in images and one of them known as face_locations that will find the face's locations inside a particular. Recognize and manipulate faces from Python or from the command line with the world's simplest face recognition library. Built using dlib's state-of-the-art face recognition built with deep learning.

3. RELATED WORK

Face recognition involves three basic steps which include face detection, face recognition, and face extraction. Any system needs to encapsulate the image and then manage as well as record the vital features to determine the location of the face. For the recognition of the captured image it keeps records of various features such as skin color, skin tone etc[2].



Fig-1: A generic face recognition system

A. Face detection

Face detection can be such a problem where we detect human faces in an image. There might be slight differences in human faces, but after all, it is safe to say that there are specific features that are associated with all human faces. Face detection is generally the first step towards many face-related applications like face recognition or face verification. But, face detection has very useful applications. One of the most successful applications of face detection is probably "photo-taking".

B. Feature extraction

As we know a neural network takes an image of the face of the person as input and outputs a vector that represents the most important features of a face! In machine learning, this vector is nothing but called embedding and hence we call this vector face embedding. When we train the neural network, the network learns to output similar vectors for faces that look similar. Let us consider an example, if I have multiple images of faces within different timelapse, it's obvious that some features may change but not too much. So in this problem, the vectors associated with the faces are similar or we can say they are very close in the vector space.

C. Face recognition

Facial recognition is a way of identifying or confirming an individual's identity using their face. Facial recognition systems can be used to identify people in photos, videos, or in real-time. Face recognition is a kind of biometric technology based on the facial feature information. Using camera or camera to collect the image or video stream containing face, and automatically detect and track the face in the image, and then carry out a series technologies for the detected face. The process mainly includes face image collection and detection, face image preprocessing, face image feature extraction, matching and recognition. For the collection and monitoring of face image, in the dynamic monitoring environment of the airport, the face recognition technology must be able to meet the dynamic recognition, because in the real environment, except for the mandatory stay in the security inspection, in other cases, people are basically mobile. Therefore, in order not to miss the face capture, the algorithm requirements for face recognition are correspondingly high to ensure the operation speed and detection and capture speed of the face recognition system[3].

4. EXISTING SYSTEM

Traditional attendance marking techniques i.e, pen and paper or signing attendance sheets are easy to bypass and trick as giving proxies or false signatures is a common practice among students nowadays, students take an unfair advantage of this at most times. But a facial recognition system is unassailable and cannot be fooled as each person has a set of unique and individual features common to that person and cannot be replicated or changed, it all comes down to one simple truth that is, unless you are physically present in the lecture your attendance will not get marked[4].

Table-1: Existing systems and their limitations.

Existing system	Limitations
Pen and paper	False signatures and proxies
RFID tags	Can be used by anybody, no guarantee.
Biometric, fingerprint	Is a costlier approach.

5. PROPOSED SYSTEM

In this section, we implement the use of Haar-cascades which is included in the OpenCV library. OpenCV uses two types of classifiers, Local Binary Pattern (LBP) and Haar Cascades (Haar Classifier). OpenCV-Python will be used to access the Haar Cascade and LBPH algorithms and their libraries that are required for training, recognition and matching of the captured images against the stored images available in the previously acquired data sets.

A. Haar Cascade

The Haar Cascade algorithm is a set of classifiers used for object detection. Haar Cascade is a machine learning-based approach where a lot of positive and negative images are used to train the classifier. The images which we would like to be classified by the classifier are known as positive images and the images we would not want our classifier to classify are known as negative images.

B. Local Binary Pattern Histogram

The Local Binary Pattern is used for face recognition, which means identifying the captured image against the image already stored in the database. The algorithm makes use of four main parameters to recognize a face. The Local Binary Pattern is applied to the image and compared against the central pixel of the image, then we calculate the histogram value for the image. The value of the newly calculated histogram is then compared against the already pre-processed histogram value of the already stored image in the database. This is how the Local Binary Pattern Histogram carries out facial identification of images

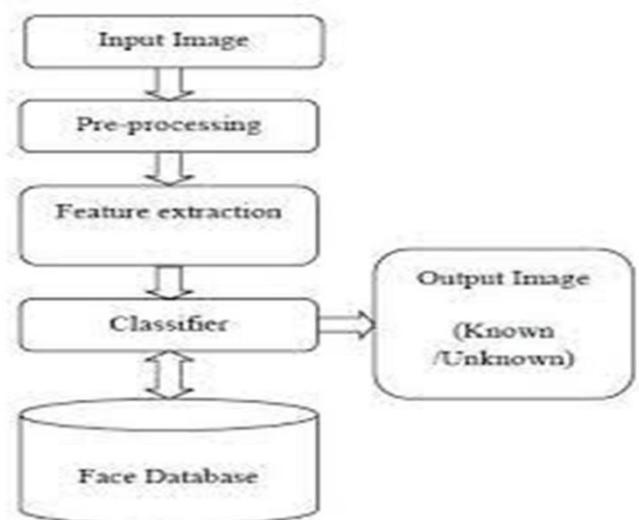


Fig-2: Block diagram of proposed system

6. CONCLUSIONS

Face recognition technology is one of the most popular application of artificial intelligence which is used in several places for security purpose. In this project we describe the student attendance system will be helpful for many as it is simple, efficient, time saving and cost effective. The use of machine learning algorithms makes it an easier and reliable system which can be made by anyone according to their requirement.

ACKNOWLEDGEMENT

We would like to sincerely thank our project guide Miss. Supriya mam for guiding throughout this project work also would like to thank our other faculty members from the computer engineering department at Jaihind College of Engineering, Kuran for allowing us to perform our project work.

REFERENCES

1. Face Detection and Recognition using OpenCV and Python
Tejashree Dhawle¹, Urvashi Ukey², Rakshandha Choudante³
2. Face Detection and Tracking Using OpenCV Kruti Goyal,
Kartikey Agarwal, Rishi Kumar
3. Face Detection in Security Monitoring Based on Artificial
Intelligence Video Retrieval Technology
4. Class Attendance Management System using Facial Recognition
Clyde Gomes^{1,4,*}, Sagar Chanchal^{2,**}, Tanmay Desai^{3,***}, and
DiptiJadhav^{4,*}Department of Computer Engineering Premier
Automobiles Road Kurla(W) Mumbai – 400700
5. An Improved Model for Imperfect Facial Recognition using
Python-Open CV
6. Face Detection and Face Recognition Using Raspberry Pi
Shrutika V. Deshmukh¹, Prof Dr. U. A. Kshirsagar
7. Online Attendance using Facial Recognition
8. Real Time Facial Recognition Using Opencv Python Techniques
Sachin Wakurdekar¹, Aman Rikhra², Melind Sharma³, Sagarika
Singh⁴
9. Face Detection and Face Recognition Using Raspberry Pi
Shrutika V. Deshmukh¹, Prof Dr. U. A. Kshirsagar²
10. Visual Person Identification Device using Raspberry Pi
11. Student Smart Attendance Through Face Recognition using
Machine Learning Algorithm Nandhini R, Kumar P
12. Development of Face Recognition on Raspberry Pi for Security
Enhancement of Smart Home System
13. Facial Recognition using OpenCV
14. Face Recognition using Machine Learning Arun Alvappillai,
Peter Neal Barrina