JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue

JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

FACE RECOGNITION BASED ATTENDANCE SYSTEM

Shaikh Mohd Ashfaque, Mohammed Mubashir Khan,Zaid Khan,Mohammad Juned Shaikh,Kumhar Pappu
mhdashfaque@eng.rizvi.edu.in, mubashir.khan5059@ eng.rizvi.edu.in, zaid22@eng.rizvi.edu.in, msjunaid@eng.rizvi.edu.in, pappu9702@eng.rizvi.edu.in
B.E Computer Engineering,
Rizvi College of Engineering, Mumbai, India.

Abstract: Automatic face recognition (AFR) technologies have made many improvements in the changing world. Smart Attendance using Real-Time Face Recognition is a real-world solution which comes with day to day activities of handling student attendance system. Face recognition-based attendance system is a process of recognizing the students face for taking attendance by using face biometrics based on high - definition monitor video and other information technology. In my face recognition project, a computer system will be able to find and recognize human faces fast and precisely in images or videos that are being captured through a camera. Numerous algorithms and techniques have been developed for improving the performance of face recognition but the concept to be implemented here is Machine Learning. It helps in conversion of the frames of the video into images so that the face of the student can be easily recognized for their attendance so that the attendance database can be easily reflected automatically.

Keywords: Face recognition, Face detection, Machine Learning, attendance system.

1. Introduction

Student attendance is an essential aspect of the learning process on the university. By attending class, student able to get valuable information from the lecturer, so that the student able to improve knowledge and understanding towards a particular field or even some skills. The technology aims in imparting a tremendous knowledge oriented technical innovations these days. Machine Learning is one among the interesting domain that enables the machine to train itself by providing some datasets as input and provides an appropriate output during testing by applying different learning algorithms. Nowadays Attendance is considered as an important factor for both the student as well as the teacher of an educational organization. With the advancement of the deep learning technology the machine automatically detects the attendance performance of the students and maintains a record of those collected data.

In general, the attendance system of the student can be maintained in two different forms,

- Manual Attendance System (MAS)
- Automated Attendance System (AAS).

Manual Student Attendance Management system is a process where a teacher concerned with the particular subject need to call the students name and mark the attendance manually. Manual attendance may be considered as a time-consuming process or sometimes it happens for the teacher to miss someone or students may answer multiple times on the absence of their friends.

So, the problem arises when we think about the traditional process of taking attendance in the classroom. To solve all these issues we go with Automatic Attendance System (AAS).

Automated Attendance System (AAS) is a process to automatically estimate the presence or the absence of the student in the classroom by using face recognition technology.

a. Literature Review:

2.1 A Counterpart Approach to Attendance and Feedback System using Machine Learning Techniques:

In this paper, the idea of two technologies namely Student Attendance and Feedback system has been implemented with a machine learning approach. This system automatically detects the student performance and maintains the student's records like attendance and their feedback on the subjects like Science, English, etc. Therefore the attendance of the student can be made available by recognizing the face. On recognizing, the attendance details and details about the marks of the student is obtained as feedback

2.2 Automated Attendance System Using Face Recognition:

Automated Attendance System using Face Recognition proposes that the system is based on face detection and recognition algorithms, which is used to automatically detects the student face when he/she enters the class and the system is capable to marks the attendance by recognizing him. Viola-Jones Algorithm has been used for face detection which detect human face using cascade classifier and PCA algorithm for feature selection and SVM for classification. When it is compared to traditional attendance marking this system saves the time and also helps to monitor the students

2.3 Face Recognition-based Lecture Attendance System

In this paper, Kawaguchi introduced a lecture attendance system with a new method called continuous monitoring, and the student's attendance marked automatically by the camera which captures the photo of a student in the class. The architecture of the system is simple since two cameras equipped with the wall of the class. The first one is a capturing camera used to capture the image student in the class and the second camera is sensor camera is used to getting the seat of a student inside the class and the camera capturing will snap the image of the student. The system compares the picture taking from a camera capturing images and faces in the database done much time to perfect the attendance.

2. Methodology

Analysis/Framework

1. MediaPipe
2. Face Recognition module
3. Open Cv
4. Firebase Admin

Tools required:-

1. Python
2. OpenCV
3. MediaPipe
4. NumPy
5. Firebase_admin

1.MediaPipe:

MediaPipe Face Mesh is a solution that estimates 468 3D face landmarks in real-time even on mobile devices. It employs machine learning (ML) to infer the 3D facial surface, requiring only a single camera input without the need for a dedicated depth sensor. Utilizing lightweight model architectures together with GPU acceleration throughout the pipeline, the solution delivers real-time performance critical for live experiences. ML pipeline consists of two real-time deep neural network models that work together: A detector that operates on the full image and computes face locations and a 3D face landmark model that operates on those locations and predicts the approximate 3D surface via regression. Having the face accurately cropped drastically reduces the need for common data augmentations like affine transformations consisting of rotations, translation and scale changes. Instead it allows the network to dedicate most of its capacity towards coordinate prediction accuracy. In addition, in our pipeline the crops can also be generated based on the face landmarks identified in the previous frame, and only when the landmark model could no longer identify face presence is the face detector invoked to relocalize the face. For 3D face landmarks we employed transfer learning and trained a network with several objectives: the network simultaneously predicts 3D landmark coordinates on synthetic rendered data and 2D semantic contours on annotated real-world data. The resulting network provided us with reasonable 3D landmark predictions not just on synthetic but also on real-world data.

The 3D landmark network receives as input a cropped video frame without additional depth input. The model outputs the positions of the 3D points, as well as the probability of a face being present and reasonably aligned in the input. A common alternative approach is to predict a 2D heatmap for each landmark, but it is not amenable to depth prediction and has high computational costs for so many points. We further improve the accuracy and robustness of our model by iteratively bootstrapping and refining predictions. That way we can grow our dataset to increasingly challenging cases, such as grimaces, oblique angle and occlusions.

2.Face Recognition Module:

Contents of Face Recognition Module:-

face_recognition.batch_face_locations(images)-It returns an 2d array of bounding boxes of human faces in a image using the cnn face detector If you are using a GPU, this can give you much faster results since the GPU can process batches of images at once. If you aren't using a GPU, you don't need this function.

face_recognition.compare_faces(known_face_encodings,face_encoding_to_check, tolerance=0.6)-It compare a list of face encodings against a candidate encoding to see if they match.

Parameters:

known_face_encodings – A list of known face encodings

face_encoding_to_check – A single face encoding to compare against the list

tolerance – How much distance between faces to consider it a match. Lower is more strict. 0.6 is typical best performance.

Returns:

A list of True/False values indicating which known_face_encodings match the face encoding to check

face_recognition.face_encodings(face_image, known_face_locations=None)-Given an image, It return the 128-dimension face encoding for each face in the image.

Parameters:

face_image – The image that contains one or more faces

known_face_locations – Optional - the bounding boxes of each face if you already know them.

Returns:

A list of 128-dimensional face encodings (one for each face in the image)

3.Open Cv:

Computer Vision: It is a process by which we can understand the images and videos how they are stored and how we can manipulate and retrieve data from them. Computer Vision is the base or mostly used for Artificial Intelligence. Computer-Vision is playing a major role in self-driving cars, robotics as well as in photo correction apps.

OpenCV is the huge open-source library for the computer vision, machine learning, and image processing and now it plays a major role in real-time operation which is very important in today's systems. By using it, one can process images and videos to identify objects, faces, or even handwriting of a human. When it integrated with various libraries, such as NumPy, python is capable of processing the OpenCV array structure for analysis. To Identify image pattern and its various features we use vector space and perform mathematical operations on these features.

4.Firebase

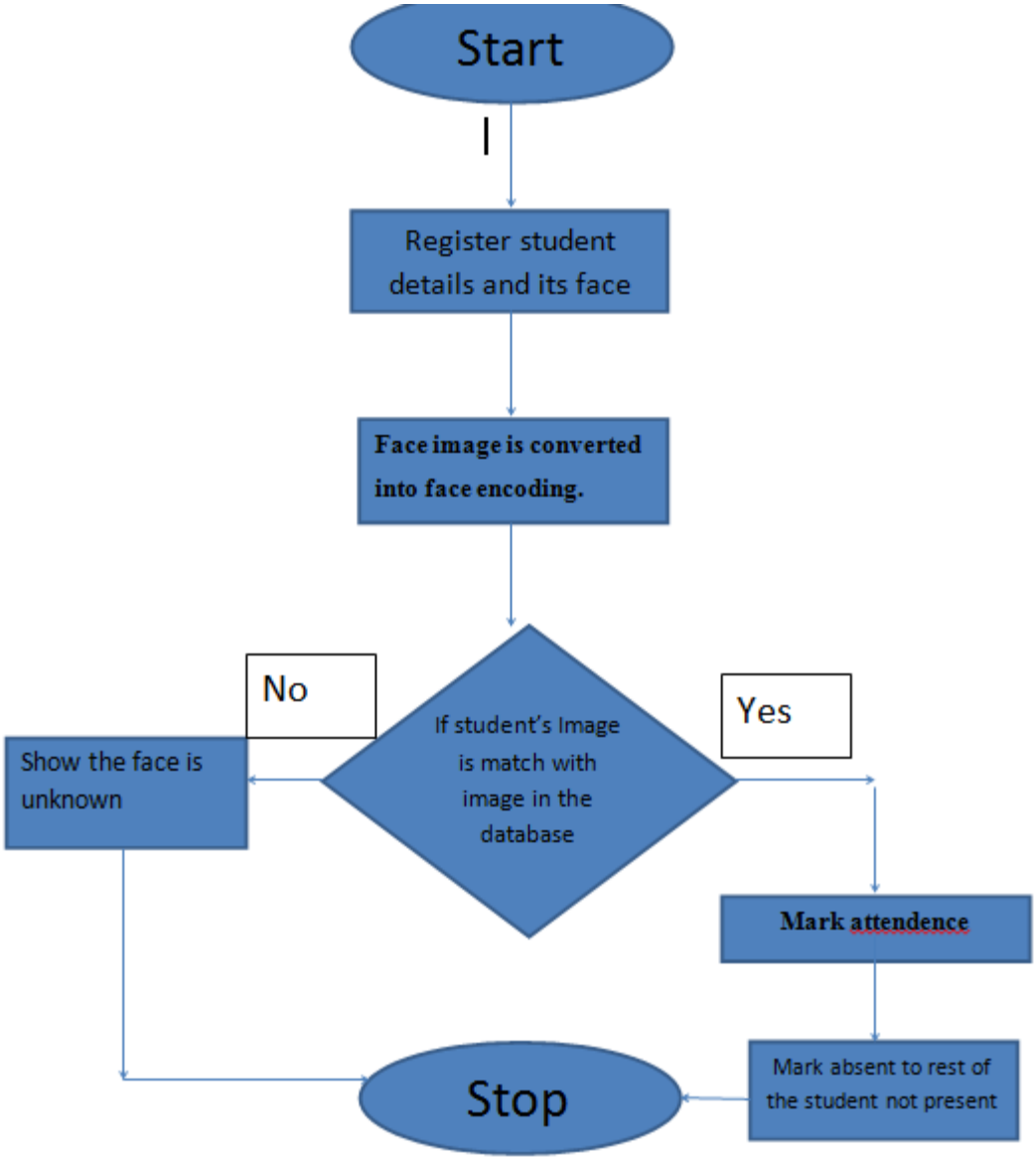
Firebase is a backend platform for building Web, Android and IOS applications. It offers real time database, different APIs, multiple authentication types and hosting platform. This is an introductory tutorial, which covers the basics of the Firebase platform and explains how to deal with its various components and sub-components.

Features of Firebase:
Real-time Database − Firebase supports JSON data and all users connected to it receive live updates after every change.
Authentication − We can use anonymous, password or different social authentications.
Hosting − The applications can be deployed over secured connection to Firebase servers.
Advantages:
It is simple and user friendly. No need for complicated configuration.
The data is real-time, which means that every change will automatically update connected clients.
Firebase offers simple control dashboard.
There are a number of useful services to choose.

3. 3.2 Algorithm

Step 1: Start
Step 2: First student details is store in the database and his face training image is store
Step 3: Then Face image is converted into face encoding.
Step 4: Now Face is recognized by Comparing the face encoding of the student stored in the database with the face of the student in the webcam.
Step 5: If the face encoding is matching, then the attendance of the student is marked in a CSV file and if the face encoding is not matched then unknown warning is shown.
Step 6: Mark Absent to the rest of the student not present.

4. Flowchart



5. Conclusion:

This system aims to build an effective class attendance system using face recognition techniques. The proposed system will be able to mark the attendance via face Id. It will detect faces via webcam and then recognize the faces. After recognition, it will mark the attendance of the recognized student and update the attendance record.

6. References:

7. Naveed Khan Balcoh, M. Haroon Yousaf, Waqar Ahmad and M. Iram Baig "Algorithm for Efficient Attendance Management: Face Recognition based approach" IJCSI International Journal of Computer Science
8. B. Anusha, G. Shiridi Venkata Sai, B. Radhika, A. Vineeth "ATTENDANCE SYSTEM BASED ON FACE RECOGNITION USING LBPH" ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT
9. Smitha, Pavithra S Hegde, Afshin "Face Recognition based Attendance Management System" International Journal of Engineering Research & Technology (IJERT)
10. Kaneez Laila Bhatti1,* , Laraib Mughal1 , Faheem Yar Khuhawar1 , Sheeraz Ahmed Memon1 1Dept. of Telecommunication Engineering, MUET, Jamshoro, PK "Smart Attendance Management System Using Face Recognition"
11. Taiping Zhang, Yuan Yan Tang, Bin Fang, Zhaowei Shang, Xiaoyu L

12. iu. Face Recognition Under Varying Illumination Using Gradient faces. In Image Processing, IEEE Transactions, Nov. 2009..
13. JA.C. Weaver, “Biometric authentication”, Computer, 39(2), pp 96-97 (2006).
14. J. Ortega-Garcia, J. Bigun, D. Reynolds and J.GonzalezRodriguez, “Authentication gets personal with biometrics”, Signal Processing Magazine, IEEE, 21(2), pp 50-62 (2004).
15. Anil K. Jain, Arun Ross and Salil Prabhakar,” An introduction to biometric recognition”, Circuits and Systems for Video Technology, IEEE Transactions on Volume 14, Issue 1, Jan. 2004 Page(s):4 – 20.
16. Rowley, H. A., Baluja, S. and Kanade, T. (1998). "Neural network-based face detection." Pattern Analysis and Machine Intelligence, IEEE Transactions.
17. Osuna, E., Freund, R. and Girosit, F. (1997). "Training support vector machines: an application to face detection." 130-136.
18. Schneiderman, H. and T. Kanade (1998). Probabilistic Modeling of Local Appearance and Spatial Relationships for Object Recognition, in: Proc. IEEE Conf. Computer Vision and Pattern Recognition, pp 45-51.
19. Viola, P. and M. J. Jones (2004). "Robust Real-Time Face Detection." International Journal of Computer Vision 57(2): 137-154.