Smart Attendance System using Face Recognition

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Abstract **- Keeping track of attendance at daily activities is a difficult task. The conventional method of appeal Each student's name takes time and there is always the possibility that a representative will attend. The following system is based on facial recognition to track student attendance. The daily attendance of pupils is recorded by subject. which is already stored by the administrator. As the time of the corresponding subject arrives, the system will automatically start to take snapshots, then apply the face detection and recognition technique to the given image and recognize that the students are marked as present and their presence updated with the corresponding time and subject identification.**

We used deep learning techniques to develop this system, the histogram of the oriented gradient method is used to detect faces in images and in-depth the learning method is used to calculate and compare the facial features of students to recognize them. Our system is capable of identifying multiple faces in real-time.

Index Terms **- Face Detection, GSM, Image Capture, Extraction, Pre-processing.**

I.INTRODUCTION

very association requires a vigorous and stable System to record the participation of their understudies. furthermore, every association has their technique to do as such, some are gauging participation physically with a piece of paper by calling their names during address hours and some have embraced biometrics System like finger impression, RFID card per user, Iris System to check the participation. The regular technique for calling the names of understudies physically is a tedious occasion. In the RFID card System, every understudy relegates a card with their relating character however there is the possibility of card misfortune or an unapproved individual may abuse the card for counterfeit participation. While in other biometrics, for example, finger impression, iris, or voice acknowledgment, they all remain imperfect, and likewise, they are not 100% precise Utilization of face acknowledgment with the end goal of participation stamping is the brilliant method of participation the board System. Face acknowledgment is a more precise and quicker method among different strategies and decreases the possibility of intermediary participation. Face acknowledgment gives detached ID that is an individual who is to be recognized doesn't have to make any move for their character [2]. Face acknowledgment includes two stages, the initial step includes the identification of appearances and the second step comprises distinguishing proof of those recognized face pictures with the existing data set. There are several face identification and acknowledgment strategies presented. Face acknowledgment works either in the type of appearance-based which covers the highlights of the entire face or highlight based which covers the mathematical component like eyes, nose, eye foreheads, and cheeks to perceive the face [3]. Our System utilizes a face acknowledgment way to deal with diminish the imperfections of the existing System with the assistance of machine learning, it's anything but a decent quality camera to catch the pictures of understudies, the location cycle is finished by the histogram of situated angle. What's more, perceiving perform through profound learning. The frontend side (customer side) comprises GUI which depends on electron JS and the backend side comprises rationale and python (worker side), an IPC (Inter-Personal Communication) connect is created to impart these two stacks. The pictures catch by the camera is shipped off the System for additional investigation, the info picture is then contrasted and a bunch of reference pictures of every one of the understudies and imprint their participation.

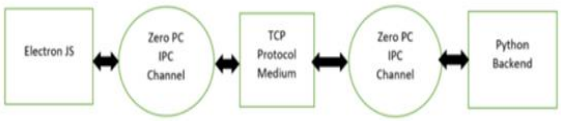

Figure 1. Communication between frontend and backend

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II.PROPOSED WORK

The proposed system is intended for computerizing the participation of the diverse association and lessens the imperfections of the existing manual system. The System figures the participation subject astute, that is the information of understudies and subjects are added physically by the director, and at whatever point time for comparing subject shows up the System consequently begins taking snaps and discover whether human countenances are shown up in the given picture or not. We have utilized Histogram of Oriented Gradient for face location and profound learning procedures to ascertain and think about 128-d face highlights for face acknowledgment. Once faces are distinguished and perceive with the current information base, the System computes participation for the perceived understudies with the individual subject id progressively. What's more, a dominant sheet is produced and saved by the System consequently. Our System parts into two sections, First the front-end side comprises GUI which depends on Electron JS this JavaScript stack which is filling in as a customer and the second is the backend side which comprises rationale, and because of Python which is filling in as a worker. What's more, we realize that both the dialects can't speak with each other straightforwardly, so we have utilized IPC (Inter Personal Correspondence) methods with zero libraries as an extension to convey these two dialects. The Electron JS calls the python capacities and trade information through TCP with help of Zero PC Library.

III.METHODOLOGY

A. Data Acquisition

1. Image acquisition:

Image is acquired using a high-definition camera which is placed in the classroom. This image is given as input to the system.

2. Dataset Creation:

The dataset of students is created before the recognition process. Dataset was created only to train this system. We have created a dataset of 5students

which involves their name, roll number, department, and images of students in different poses and variations. For better accuracy minimum of 15 images of each student should be captured. Whenever we register student's data and images in our system to create a dataset, deep learning applies to each face to compute 128-d facial features and store in student face data file to recall that face in the recognition process. This process is applied to each image taken during registration.

3. Storing:

We have used JSON to store the student's data.

JavaScript Object Notation (JSON): To address, organized information dependent on JavaScript object sentence structure, a standard content-based configuration is presented. JSON is utilized for communicating information in web applications. It's anything but an ideal answer for putting away transitory information that is devoured by the substance that makes the information. JSON can store information in String, Number, Object, Array, Boolean, Null structure which implies it has the impediment of putting away information in capacities, dates, and undefined data form.

B. Face recognition process

1. Face Detection and Extraction:

Face detection is significant as the picture taken through the camera given to the System, face identification calculation applies to recognize the human faces in that picture, the quantity of picture preparing calculations is acquainted with identifying faces in pictures and the area of that identified countenances. We have utilized the HOG technique to recognize human appearances in the given picture.

2. Face Positioning:

There are 68 explicit focuses on a human face. At the end of the day, we can say 68 face tourist spots. The fundamental capacity of this progression is to identify tourist spots of countenances and to situate the picture. A python script is utilized to naturally recognize the face milestones also, to situate the face however much as could reasonably be expected without twisting the picture.

3.Face Encoding:

Once the appearances are recognized in the given picture, the following stage is to remove the one of a kind recognizing facial element for each picture. Fundamentally at whatever point we get restriction of face; the 128 key facial points are separated for each picture given info which is profoundly exact and these 128-d facial focuses are put away in information document for face acknowledgment.

4. Face coordinating:

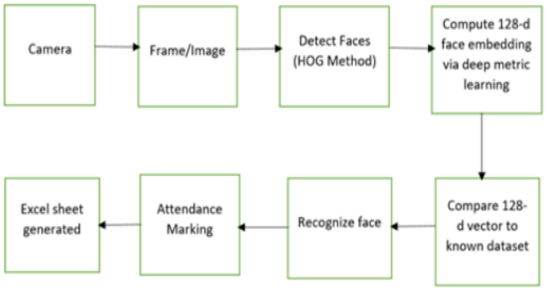


Figure 2. Face recognition process

This is the last advance of face acknowledgment measure. We have utilized the extraordinary compared to other learning procedure that is profound measurement realizing which is exceptionally precise and fit for yielding genuine worth component vector. Our System endorses the countenances, building the 128- d inserting (confirmation) for each. Inside compare faces work is utilized to register the Euclidean distance between the face in the picture and all countenances in the dataset. If the current picture is coordinated with the 60% edge with the current dataset, it will move to participation checking.

C. Attendance Marking

When the face is related to the picture put away in JSON document, python produces roll quantities of present understudies and return that, when information is returned, the System produces a participation table which incorporates the name, roll number, date, day, and time with relating subject id. Furthermore, then, at that point passes the information to python to store the table into a dominant sheet naturally. Each sheet is saved concurring to the subjects which previously entered by the overseer, for instance when the System creates a dominant sheet by sending the gathered sheet in a cluster to python, the python first checks whether there leaves any dominant sheet of that date, assuming indeed, it makes separate worksheet by subject id, so participation is separated for various subjects.

IV. RESULTS AND EXPERIMENTS

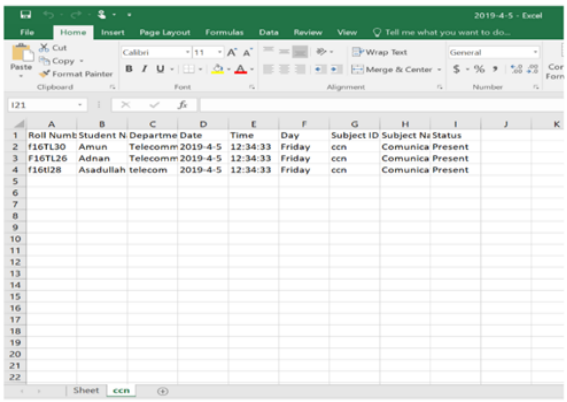
To initialize this system, the administrator first registers their student data along with their name roll number, and department. We have created a training dataset of 6 students (a total of 120 images for each) for testing purpose.

Figure 3. Addition of Subjects

This is the subject organizer, subjects are to be filled as per timetable once the time shows up for the comparing subject, the System begins catching pictures, recognizes the faces, contrasts the appearances and existing data set, marks participation, and creates a dominant sheet for the perceive understudies.

Figure 4. Test Image of students

The attendance system proved to recognize images from different angles and light conditions. The faces which are not in our training dataset are marked as unknown. The attendance of recognizing images of students is marked in real-time. And import to excel sheet and saved by the system automatically. Excel sheet generated by the system automatically with the corresponding subject id, date, and time.



Roll Numb	Student N	Departme	Date	Time	Day	Subject ID	Subject Na	Status
f16TL30	Amun	Telecomm	2019-4-5	12:34:33	Friday	ccn	Comunica	Present
F16TL26	Adnan	Telecomm	2019-4-5	12:34:33	Friday	ccn	Comunica	Present
f16tl28	Asadullah	telecom	2019-4-5	12:34:33	Friday	ccn	Comunica	Present

Figure 5. Excel sheet

Several experiments are performed with varying distances, angles, and persons, we keep vary one value and constant the other two. The system accuracy effects as the variation in angle increases

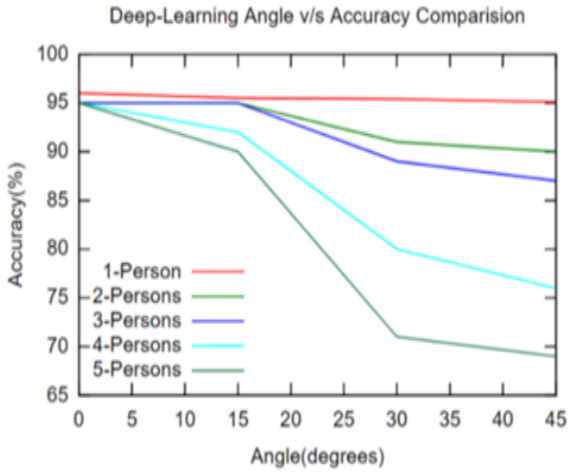


Figure6.Accuracy of graph in terms of angles

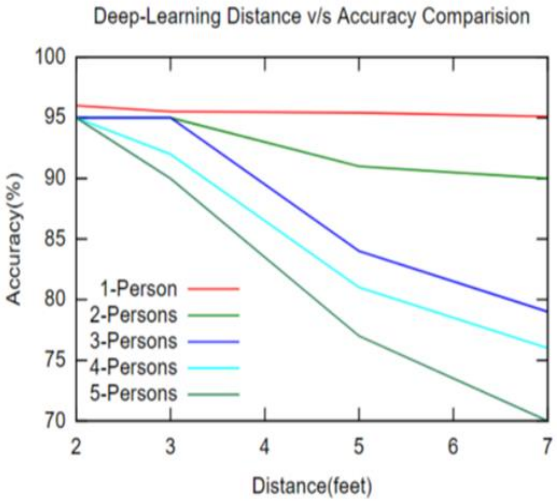


Figure 7. Accuracy graph in terms of distance

V. CONCLUSION

The smart attendance management system is designed to solve the issues of existing manual systems. We have used the face recognition concept to mark the attendance of students and make the system better. The system performs satisfactorily in different poses and variations. In future this system needs to be improved because these systems sometimes fail to recognize students from some distance, also we have some processing limitation, working with a system of high processing may result in even better performance of this system.

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