

Non-Stop Camera Vision And Face Recognition Attendance System For Virtual Classroom

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Abstract- This report created by online meeting platforms is embraced as the only alternative for face-to-face interaction in physical classrooms. In this regard, managing student attendance in virtual classes is a major challenge for teachers. Student attendance is a measure of their involvement in a course, which is a directly related to their active learning. However, during virtual learning, it is exceptionally difficult to monitor student attendance. Calling students' names in virtual classrooms to take attendance is both trivial and time-consuming. In this project, we are responding to the crucial pandemic-induced need for an innovative approach. In order to achieve a highly efficient and robust attendance management system for virtual learning, we are introducing the Random Interval Query and Face Recognition Attendance Management System (hereafter, AI Present).

Keywords- Attendance System, College Management, Face Recognition, Virtual Classroom.

I. INTRODUCTION

A virtual classroom is an online teaching and learning environment where teachers and students can present course materials, engage and interact with other members of the virtual class, and Work in groups together. The major distinction of a virtual classroom is that takes place in a synchronized and live environment. Online classes can consist of watching pre-recorded and asynchronous material, but virtual classrooms require live interaction between instructors and participants.

II. LITERATURE SURVEY

Shubham Mishra, Chandan Kumar, Ahmad Ali, Jeevan Bala(2021):- The framework eliminates the requirement for physical attendance records via automation. The system contains two interfaces, one for the student and another for the teacher. The primary and important interface is the teacher's interface. The QR codes will not be static it will be dynamic, it will keep on changing in every 30 seconds, so that no one can click the photo and send to his friends or colleague to get a proxy attendance. After scanning the QR codes successfully

the attendance will get punched automatically, but it does not mean that this will be the final submission, the teacher still will have an option to mark someone present or absent according to his wish like, if someone's mobile or PC is not responding then the teacher can give his attendance manually. For better accuracy of face-log generation, we employed face tracking technique like node face recognition API and libraries.

Huimin Zhang; XinleiFeng; Hongyu Liu; Ping Guo; Sujatha Krishnamoorthy; Changjiang Zhang(2019):- The system called CBCA System is proposed which can provide 100% accuracy in recognition which is a big challenge for many systems built on their own (Deep Neural Networks). In order to get the accuracy, Baidu cloud AI is used to do face training/registration and recognition, instead of building our own DNN. Unlike other similar systems proposed in China, which take the whole classroom picture as an input image and try to recognize all the faces in the picture, our system catches each student face via a video camera, one at a time. It can eliminate light conditions effect, a different angle, etc. on the quality of the image captured, greatly improve the recognition rate. The whole process takes just takes a couple of seconds only. This CBCA system based on face detection offered a more efficient and more accurate method to help students to sign in and analysis the data for teachers. The system has been put into use and met with the design requirements.

III. EXISTING SYSTEM

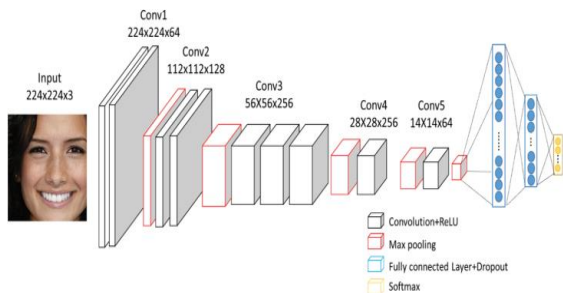
Zoom, Google Meet, Microsoft Teams, and Cisco WebEx Meetings are used to create virtual classrooms. Manual attendance calling, self-reporting attendance systems, video calling, student's short quizzes or polls, questions and discussions by selecting random students and timed assignments are included in the system. In the case of physical classrooms, biometric-based attendance monitoring systems are essentially based on face, fingerprint, and iris recognition technologies. Facial recognition is a technology that is capable of recognizing a person based on their face. It employs machine learning algorithms which find, capture, store and

analyses facial features in order to match them with images of individuals in a pre-existing database.

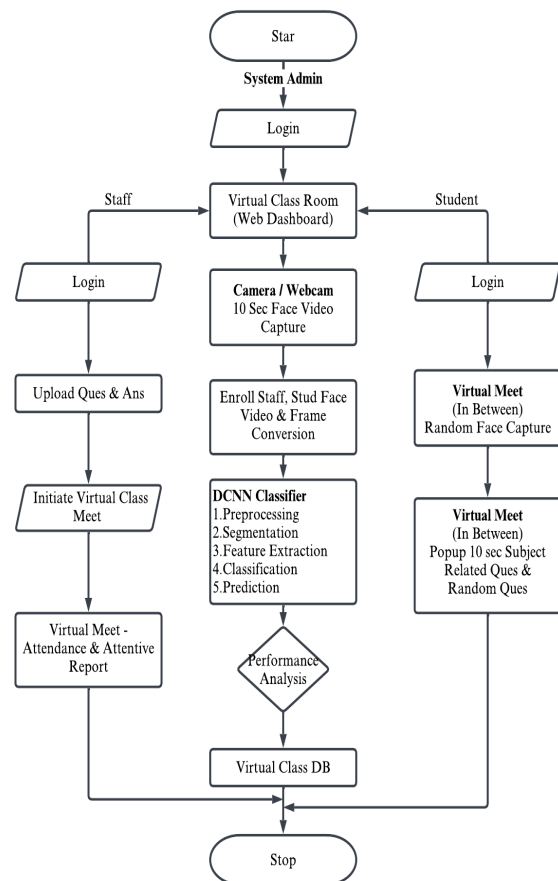
Early approaches mainly focused on extracting different types of hand-crafted features with domain experts in computer vision and training effective classifiers for detection with traditional machine learning algorithms. Such methods are limited in that they often require computer vision experts in crafting effective features, and each individual component is optimized separately, making the whole detection pipeline often sub-optimal. There are many existing FR methods that achieve a good performance.

IV. RESEARCH IDEA

The process flow is first, the link is sent to both the teachers or lecturers and students on the corrected time. Teachers or lecturers and students must log into the virtual classroom by using their smart devices. We simply assumed 'N' as the total number of students enrolled for the course. In each session, students must turn ON the camera for the mandatory time period. In the virtual class, all students' faces are retrieved from the video frames at random intervals and stored on the host server



V. STRUCTURE



VI. MODULES

1) Virtual Meet

A virtual meet API is a video conferencing tool where instructors and participants engage with each other and with the learning material. The interface between AI Present and virtual meeting platforms are facilitated through a web interface that runs on the teachers and students' smart devices in master and slave modes, respectively. The faculty, as well as students, should log in to the online learning platform with their smart devices. The web interface page should remain active during the entire course of the class.

Here, the web interface at the teachers' smart device facilitates two things.

- It provides the teacher with a timely reminder to click the web-screen for capturing all students' faces of the virtual class for initiating the attendance entry.
- It performs the extraction of face images from the web screen.

2) Attendance system

After the verification of faces and successful recognition is done, the attendance of the student is marked in front of his/her roll number. If the face is not recognized, an error page is displayed. It involves the attendance report generation. The module takes student information and daily attendance status from student database. The attendance is calculated as per requirement. There are options for calculating day-wise, student wise and class-wise attendance. The attendance reports are generated and saved in a file.

Enrollment Phase

Student Databases Server maintained in this system are student information database, face database and attendance database. Student information database consists of roll number, name and class of student. Attendance database includes attendance status of student for every day.

3) Face Image Acquisition

This module is initial part of the system. Logitech C270 (3MP) is used for image acquisition.

4) Preprocessing

The acquired images are converted to grayscale image and then re size. After the removal of noise using mean and Gaussian filters all further operations are performed on this image.

5) Face Detection

After capturing the image, the image is given to face detection module. This module detects the image regions which are likely to be human. Face detection purpose, Region Proposal Network (RPN) draws anchors and outputs the one which most likely contains the objects. The detected face regions are cropped and scaled to 200x200 resolutions and then used for further recognition task.

6) Feature Extraction

After the face detection, face image is given as input to the feature extraction module to find the key features that will be used for classification.

7) Feature Classification

The module composes a very short feature vector that is well enough to represent the face image. Here, it is done with DCNN method. Then the classified result is stored into the database.

8) Verification Module

After capturing the image, the image is given to face detection module. This module detects the image regions which are likely to be human. After the face detection using RPN, face image is given as input to the feature extraction module to find the key features that will be used for classification. The module composes a very short feature vector that is well enough to represent the face image. Here, it is done with DCNN with the help of a pattern classifier; the extracted features of face image are compared with the ones stored in the face database. The face image is then classified as either known or unknown. If the image face is known, corresponding student is identified. Face recognition is the next step after face detection. The faces cropped from the image are compared with the stored images in the face database. Here, Eigen face method is used for face recognition.

9) Student Management

In this module, institute can enrol students to the college after counselling and manage personal details, assign class, roll number and generate ID cards to the students.

10) Staff Management

Manage HRM activities of the college including registering technical / non-technical staff; manage staff designations, personal details and professional details, ID cards, staff performance analysis and appraisals.

11) Academic Management

It helps the college to maintain the information about students, staffs, fees details, IA marks and Department details in a systematic order and also to access details very quickly.

12) Attendance Management

Student attendance management enables easy tracking attendance information of students. Generate quick attendance reports with class wise analysis, monthly analysis and yearly analysis. There is also provision for Faculty/AP/HODs to take attendance with an Android based phone or tablet. Staff attendance module maintain quick and accurate recording of staff attendance and automatically calculate the total leaves, pending leaves, working days. Various types of leaves/absences/late comings can be marked for employees. By using this module, school management can easily record the regularity and punctuality of each employee

including late coming, early going and can determine salary payable efficiently.

13) Reports & Analysis

This module maintains quick and accurate recording of staff attendance and automatically calculate the total leaves, pending leaves, working days. Various types of leaves/absences/late comings can be marked for employees. By using this module, school management can easily record the regularity and punctuality of each employee including late coming, early going and can determine salary payable efficiently.

14) SMS/Email Facility

The facility to send SMS/Email like Class Schedule, Fees Payment/Attendance/Exam, Meetings, Seminars etc. to Students, Parents/Guardians, Employees, management etc. are included.

VII. ADVANTAGES

- Randomness ensures that students cannot predict at which instant of time the attendance is registered.
- Highly efficient and robust attendance management system for virtual learning.
- Monitors student's attendance and engagement during virtual learning without affecting their focus on learning.
- Student's attention and engagement in virtual learning are enhanced.
- Introduces the novel feature of randomness.
- Face-embedding learning approach that yielded a recognition accuracy of 98.95%.
- Provide authorized access.
- Ease of use.

VIII. FUTURE SCOPE

By integrating voice recognition and adding adaptive weights for each modality, the efficiency of the System can be further improved. Facility for online examination can be added in future. The Student can apply for special courses and online payment facility is also available for them.

IX. CONCLUSION

This system incorporates a customized facial recognition module along with specially designed ancillary

sub modules. Both the face recognition and the sub modalities are applicable to monitoring student attendance in virtual classrooms. The system captures face biometrics from the video stream of participants and collects the timely responses of students to UIN queries, at random intervals of time.

X. ACKNOWLEDGEMENT

We would like to express a deep sense of gratitude towards our guide Mrs.V.Hemalatha, Head of the department, Computer Science and Engineering Department for her constant encouragement and valuable suggestions. The work that we can present is possible because of her timely guidance.

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