

AI Present: Face Recognition Attendance Tracker For Virtual Learning

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Abstract- *The COVID-19 pandemic outbreak has resulted in an unprecedented crisis across the globe. The pandemic created an enormous demand for innovative technologies to solve crisis-specific problems in different sectors of society. Several countries have closed educational institutions temporarily to alleviate the COVID-19 spread. The closure of educational institutions compelled the teachers across the globe to use online meeting platforms extensively. The virtual classrooms created by online meeting platforms are adopted as the only alternative for face – to-face interaction in physical classrooms. In this regard, students' attendance management in virtual classes is a major challenge encountered by the teachers. Calling students' names in virtual classrooms to take attendance is both trivial and time-consuming. Immediate necessity to develop a proper tracking system to monitor students' attendance and engagement during virtual learning. In order to realize a highly efficient and robust attendance management system for virtual learning, we introduce the AI based Random Interval Query and Face Recognition Attendance Management System (hereafter, Virtual Meet) using RNN and DCNN. To the best of our knowledge no such automated system has been proposed so far for tracking students' attendance and ensuring their engagement during virtual learning.*

Keywords- Machine Learning, Convolutional neural network, Virtual Learning, Face recognition

I. INTRODUCTION

During online lectures, it's hard to keep students engaged without a teacher's physical presence and face-to-face contact, manual attendance calling, and also it is difficult to find out whether the student is really attending the class or not. In order to realize a highly efficient and robust attendance management system for virtual learning, we introduce the AI based Random Interval Query and Face Recognition Attendance Management System. It is an innovation based on Artificial Intelligence – Deep Learning, specially designed to help the teachers/instructors across the globe for effective management of attendance and engagement during virtual learning.

Existing system

Zoom, Google Meet, Microsoft Teams, and Cisco Web-ex Meetings are used to create virtual classrooms. Manual attendance calling, self-reporting attendance systems (using tools like Google forms), video calling students, short quizzes or polls, questions and discussions by selecting random students, and timed assignments. In the case of physical classrooms, biometric-based attendance monitoring systems are essentially based on face, fingerprint, and iris recognition technologies.

II. LITERATURE SURVEY

Zhigang Gao et al (2021) proposed Student Attendance Management Method Based on Crowd sensing in Classroom Environment where the author proposes an intelligent attendance management method. The verification process is classified into a series of crowd sensing tasks, which has the advantages of high real-time performance and low disturbance. Difficult in planning to shift the attendance checking scene into the virtual one. Shubham Mishra et al (2021) proposed Online Attendance Monitoring System Using QR Code (OAMS) which is QR Code Based Attendance Management System, a mix of two web applications created for taking and registering attendance of the students on the regular routine. We have proposed an approach to computerize this cycle utilizing the students' gadgets instead of the teacher's gadget. If someone's mobile or pc is not responding then teacher can give him attendance manually. Hao Yang et al (2020) proposed Face Recognition Attendance System Based on Real-Time Video Processing, in order to overcome the challenges of video-based face recognition (VFR), Ding C has proposed a comprehensive framework based on convolutional neural network (CNN). a face recognition attendance system based on real-time video processing is designed, and two colleges in a province are selected for real-time check-in and inspection of student attendance. The system fails to correctly judge that the two identifiers are very similar. Muhammad Zeeshan Khan et al (2019) Deep Unified Model for Face Recognition Based on Convolution Neural Network and Edge Computing: The proposed methodology is

able to recognize the people even when frame has multiple faces. Automatic attendance system has been anticipated for the purpose of minimizing the human errors which take place in the conventional attendance taking system to validate the efficiency of the proposed algorithm. Furthermore, we are planning to work on observing introvert and extrovert behavior based on our proposed face recognition algorithm. Huimin Zhang, et al (2019) Cloud-Based Class Attendance Record System: 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 DNN (Deep Neural Networks). 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 we will optimize the UI based on users’ feedbacks to make it more user-friendly.

III. PROPOSED SYSTEM

The proposed face recognition attendance tracker system architecture is shown in figure 1.

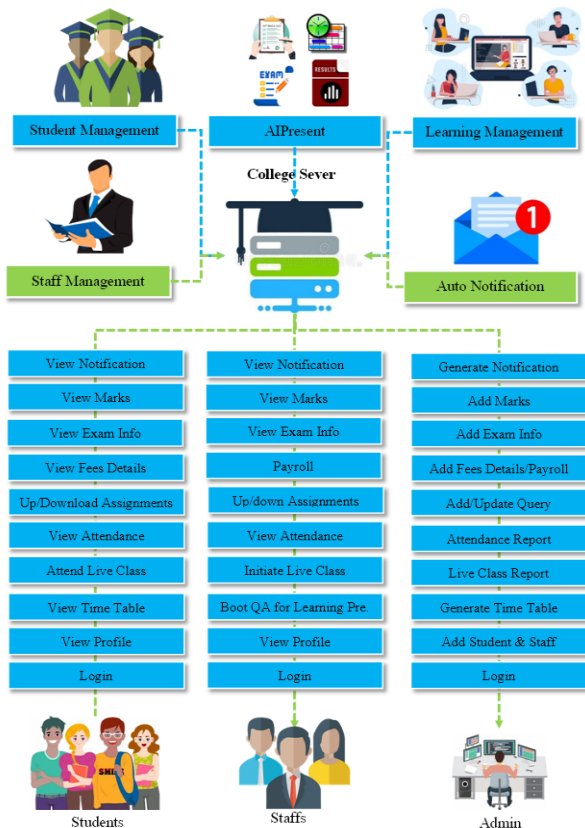


Figure 1: System Architecture for Face Recognition Attendance Tracker

AI Present is an innovation based on Artificial Intelligence – Deep Learning, specially designed to help the

teachers/instructors across the globe for effective management of attendance during virtual learning. It encompasses a novel design using the AI Deep CNN (Convolution Neural Network) model to capture face biometric randomly from students' video stream and record their attendance automatically. Proposed two ancillary modalities - verifying students' responses to Subjects and UIN (Unique Identification) queries at random intervals of time, speaker identification. The system design for AI based Virtual Attendance Tracker is shown in Figure 2.

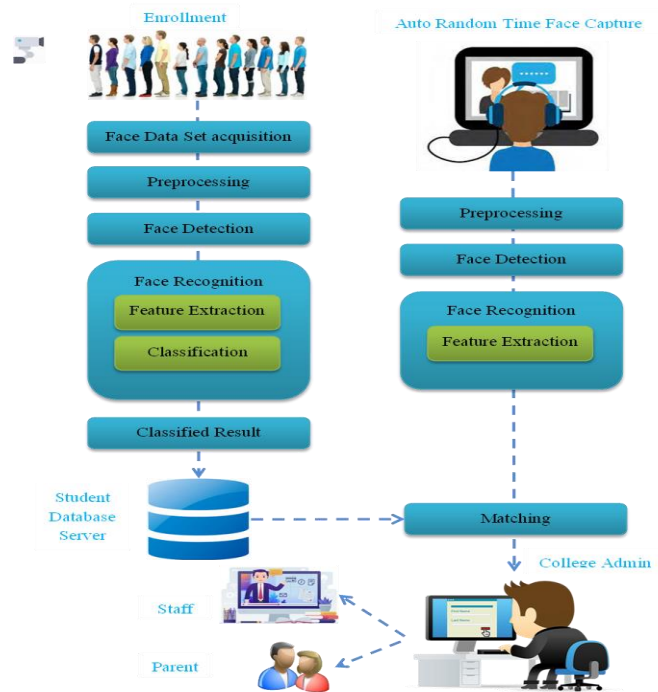


Figure 2: The system design for AI based Virtual Attendance Tracker

Modules

1. Virtual Meet:

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

- 1) 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.
- 2) It performs the extraction of face images from the web screen.

2. AI Present Module:

2.1 Enrollment Phase

Student Databases Server maintained in this system are student information database, face database and attendance database.

2.1.1 Face Image Acquisition-This module is initial part of the system. Logitech C270 (3MP) is used for image acquisition.

2.1.2 Preprocessing The acquired images are converted to grayscale image and then resize.

2.1.3 Face Detection the image is given to face detection.

2.1.4 Feature Extraction face image is given as input to the feature extraction module to find the key features that will be used for classification.

2.1.5 Feature Classification Here, it is done with DCNN method. Then these results are stored into the database.

3. Student Management: The institute can enrol students to the college after counselling, manage personal details, assign class, roll number and generate ID cards to the students. Student profile with photo and documents, Parents & Guardian details, Id card and certificates, Detailed profile & progress tracking, Progress report.

4. HR & Staff Management: Manage HRM activities of the college including registering technical / non-technical staff, manage staff designations, personal details and professional details, generate ID cards, staff performance analysis and appraisals. Staff records, Staff attendance, Leave Management, Payroll and salary Reimbursement, Promotion/Transfer.

5. End User:

Admin module is handled by top management. Here Admin can add/update/delete student/employee/courses, view course list/student list or many different modules, send SMS, emails, reminders time to time. **Student** can view profile, task, class schedules, exam report card, attend Live Class Session.

Teaching faculty / AP / HOD can access the information of Students Profile, his detailed Fees account, his Term wise and Daily attendance and his appraisal report.

Implementation

It encompasses AI Deep CNN (Convolution Neural Network) model to capture face biometric randomly. It has Proposed two ancillary modalities - verifying students' responses to Subjects and UIN (Unique Identification) queries at random intervals of time, Speaker Identification. The data flow diagram for attendance tracking using AI is shown in Figure 3.

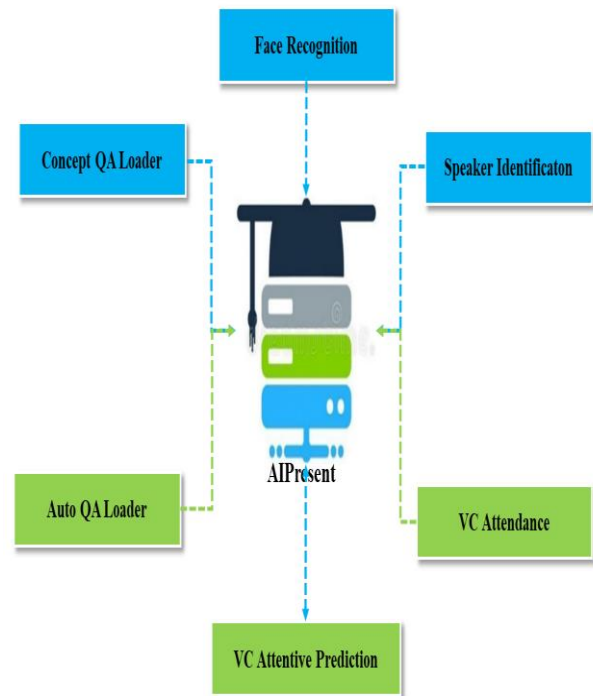


Figure 3: Data flow diagram for attendance tracking

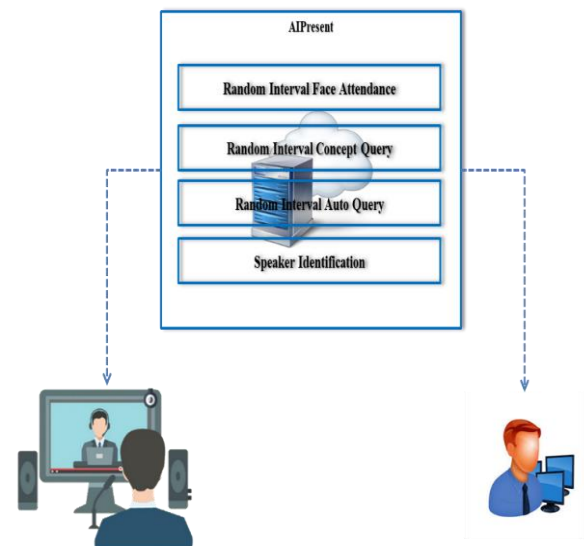


Figure 4: AI Present Architecture for Face recognition attendance tracking

It is highly efficient and robust attendance management system for virtual learning, Monitors students' attendance and engagement during virtual learning without affecting their focus on learning. students' engagement and attention in virtual learning are enhanced. Introduces the novel feature of randomness face-embedding learning approach that yielded a recognition accuracy of 98.95%.The AI present architecture for face recognition attendance tracking is shown in figure 4.

IV. CONCLUSION

The pandemic COVID-19 has forced millions of students and staffs to move their communication online. During online lectures, it's very hard to keep students engaged without a teacher's physical presence and face-to-face conversation. Further, its also not easy to find out whether the student is really attending the class or just being online throughout the class. Random Interval Query and Face Recognition Attendance Management System (RIQFRAMS) is an innovation based on Artificial Intelligence – Deep Learning, specially designed to help the teachers/instructors across the globe for effective management of attendance and engagement during virtual learning.

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