International Journal of
Electrical and Computer System Design
ISSN: 2582-8134 www.ijecsd.com

Random Interval Query And Face Recognition Attendance System For Virtual Classroom Using Deep Learning

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Abstract: Our project is a web application for virtual classes, that includes features which checks student attendance and attentiveness. The exceptional circumstance caused by the COVID-19 pandemic demands substantial modifications within the teaching-learning processes across the world. Teachers and students are making use of online learning in virtual classrooms as an alternate for face-to-face learning in physical classrooms. So, we are proposing an innovative project Random Interval Query and Face Recognition Attendance Management System using Deep learning.

Keywords: Virtual Classroom; Synchronous; Activity Theory; Learner Engagement; Attendance Management; Covid-19; RIAMS; Digital Studying

1. INTRODUCTION

Deep learning, is a machine learning technique used to build artificial intelligence (AI) systems. It is based on the idea of an artificial neural network(ANN), which is designed to perform complex analysis of large amounts of data by passing it through many layers of neurons.

Virtual classrooms and also distance learning, as alternative technology-based learning methods, have grown at a reasonable pace.As a good test for virtual classroom platform and service provider companies like Blackboard, Desire2Learn, Cisco, Microsoft, etc. Test parameters are varied, with some of the main parameters being bandwidth management, network traffic, server response time, and number of concurrent users. However,during virtual learning, it is difficult to keep track of student participation. Calling students by name in a virtual classroom for attendance is both trivial and time-consuming.

In order to realize a highly efficient and robust attendance management system for virtual learning, we introduce the Random Interval Attendance Management System (RIAMS), is a Web Application developed using Deep Learning. It is implemented using Deep Convolutional Neural Networks(DCNN) Algorithm The significance of the RIAMS model is that it precisely monitor attendance in virtual classrooms without hindering the learning process. Further, it can generate dedicated attendance reports, pinpointing students' attention during virtual learning at random time intervals. Randomness ensures that students cannot predict at which instant of time the attendance is registered. Another added advantage of the RIAMS approach is that it requires only nominal internet bandwidth in comparison with the existingface recognition based attendance tracking systems.

Existingface recognition systems require student's video cameras to be kept 'ON' throughout the virtual classroom session. The proposed model can be easily scaled and integratedinto a wide variety of virtual meetings, including business meetings.

Educational institutes applying the RIAMS system can effectively monitor the attendance without affecting the learning objectives ofthe class.

Similar to other Virtual classroom it contains existing features.

RIAMS virtual classroom includes the following additional features:

- **End-to-end encryption:** to ensure virtual classroom access is restricted to authorizedlearners.
- **Quiz:** At the end of session , based on lecture thought , a quiz will be conducted to know the student participation.

2. LITERATURE SURVEY

2.1. A Student Attendance Management Method Based on Crowd sensing in Classroom Environment

This paper presents a student attendance management method that mixes the active reporting and sampling check of students' location information, which has the benefits of high real-time performance and low disturbance.

2.2. Cloud-Based Class Attendance Record System

The paper presents an automatic class attendance registering system CBCA System based on face detection and recognition on cloud computing, students just need to stand in front of the camera for a few seconds, and sign-in is completed, and sign-in data can be stored in a local or central database.

3.PROBLEM IDENTIFICATION

Online classrooms have become a new necessity in recent times due to the COVID crisis. Many solutions pop-up with better systems every time. But in order for an effective class, a well organised attendance system and a better query clearance is important. Find an effective way or a solution to overcome all these problems.

4. PROPOSED METHOD

4.1 Scope of the project

The proposed method is that the simplest and therefore the best approach to automatically capture the attendance during virtual learning. the importance of the RIAMS model is that it precisely monitors attendance in virtual classrooms without hindering the training process. Further, it can generate dedicated attendance reports, pinpointing students' attention during virtual learning willy-nilly time intervals. Randomness ensures that students cannot predict at which instant of your time the attendance is registered. Another added advantage of the RIAMS approach is that it requires only nominal internet bandwidth as compared with the present face recognition based attendance tracking systems

Our design of the RIAMS is in such the simplest way that it doesn't affect the training process in any way. Neither the scholars nor the teachers will should face any difficulties in virtual classrooms with the RIAMS design. Similarly, the CAPTCHA and UIN queries also are fast processes which take but 30 seconds, on each turn. Thus, the teaching-learning process will remain focused on obtaining the training outcomes, as the attendance is automatically monitored within the background.

4.2 System Specification

Hardware Specification

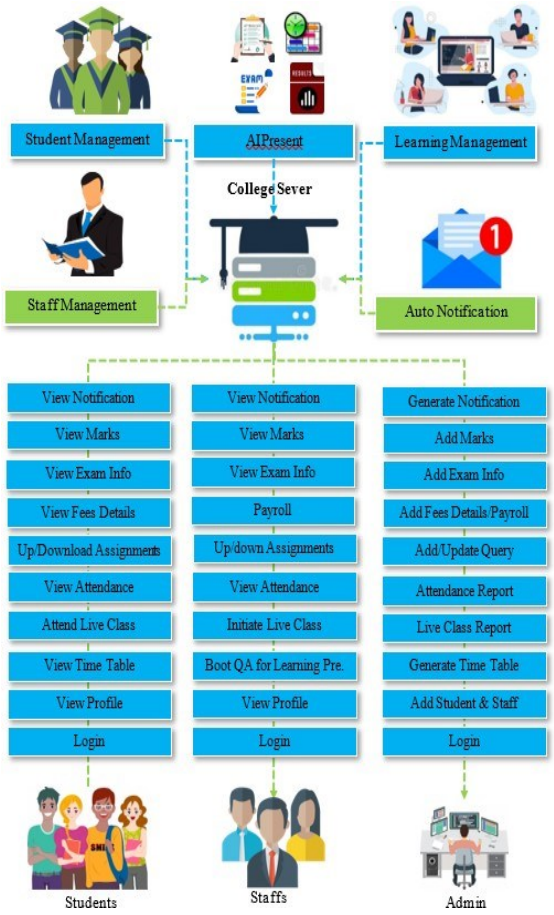
- **Processors:** Intel® Core™ i5 processor 4300Mat 2.60 GHz or 2.59 GHz (1 socket, 2 cores, 2 threads per core), 8 GB of DRAM
- **Disk space:** 320 GB
- **Operating systems:** Windows® 10, macOS*, and Linux*

Software specification

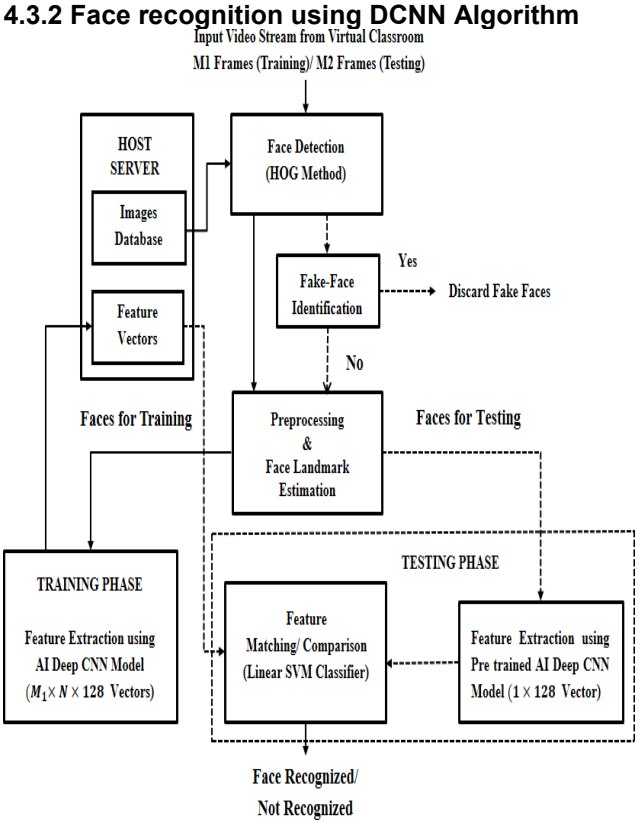
- **Server Side** : Python 3.7.4(64-bit) or (32-bit)
- **Client Side** : HTML, CSS, Bootstrap
- **IDE** : Flask 1.1.1
- **Back end** : MySQL 5.
- **Server** : WampServer 2i
- **DL DLL**: TensorFlow, Pandas, SiKit

4.3.Design Architecture

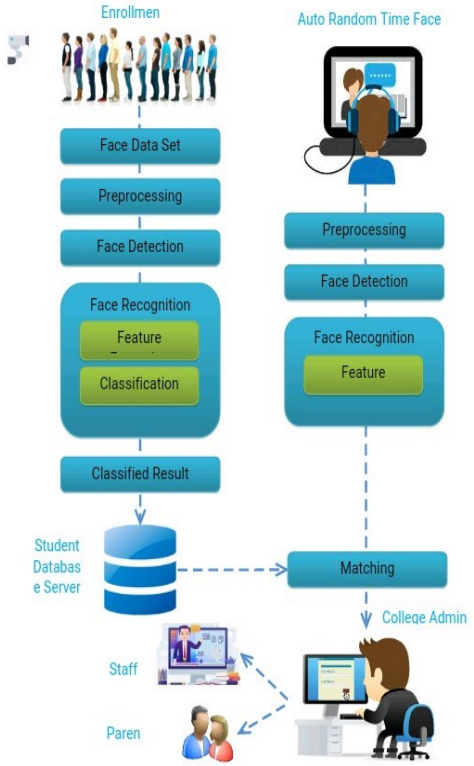
4.3.1 Overall System Architecture



4.3.2 Face recognition using DCNN Algorithm



4.3.3 Architecture For Automatic Random Interval Face Recognition Attendance

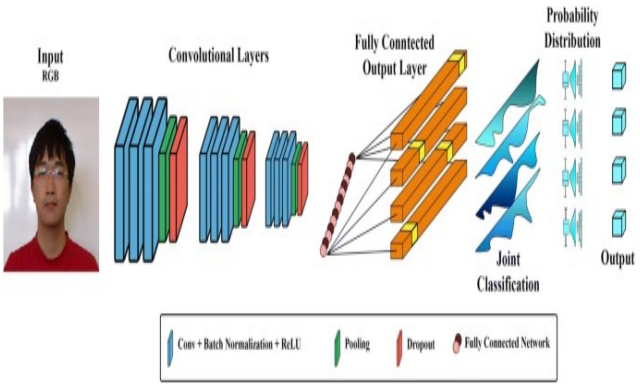


4.4 Proposed System

Proposed System of the project introduces the novel feature of randomness in an AI-based face recognition system to effectively track and manage students' attendance and engagement in virtual classrooms. Because the random intervals required for executing RIAMS attendance tracking modalities are too short (30 seconds, or less), the teaching-learning process isn't affected. as an example, the scholars have to turn on their cameras for fewer than a second only (assuming the attendance is taken twice supported face recognition).

It incorporates ancillary submodules for assessing students' responses to CAPTCHAs and UIN queries, to make sure active engagement in virtual classrooms. Monitors students' attendance and engagement during virtual learning without affecting their specialize in learning. Develops a user-friendly attendance audio system for teachers that may automatically record students' attendance and generate attendance reports for virtual classrooms.

Deep learning within the kind of Convolutional Neural Networks (CNNs) to perform the face recognition.



4.4.1 Advantages

- The proposed design has a robust and efficient AI-DL based face recognition module, customized for virtual learning application.
- Students' attention and engagement invirtual learning are enhanced.
- Introduces the novel feature of randomness
- Provide authorized access.
- Multiple face detection.
- Provide methods to maximize the numberof extracted faces from an image.
- Ease of use.
- Multipurpose software.
- Can be used in different places university college, school and even business too.

4.5 Result

The results from the face recognition module are discussed in accordance with its training and testing phases. Face recognition can be regarded as successful if at least one of the five training samples matches with the test sample. Thus, if the test images extracted from the video frames of the virtual class are matching with the training samples, attendance from the face recognition module is recorded. A comparative evaluation based on the accuracy of the proposed face recognition Deep Convolutional Neural Network (DCNN) system, compared to other algorithms. The results show that the proposed DCNN achieves higher accuracy compared to other approaches.

The efficiency of the proposed system is improved by introducing students' responses to CAPTCHA (P2) and ConceptQA that pop-up in the students' device at random intervals. Also, the students have to enter their UIN ,when they are directed to do it randomly. The random intervals of time are designed in such a way that it follows the attention span distribution of the students. Most psychologists claim the typical student's attention span is about 10 to 15 minutes long. The timely response of students to the random queries like CAPTCHAs and UINs, set by the teacher can be considered for attendance along with the decision of the face

recognition system. The details of these two processes will be stored in the server for later retrieval. The faculty could automatically receive the report regarding the response of the students to the random CAPTCHAs, Concept QA and the entry of their UIN, from the server through his/her application/web interface.

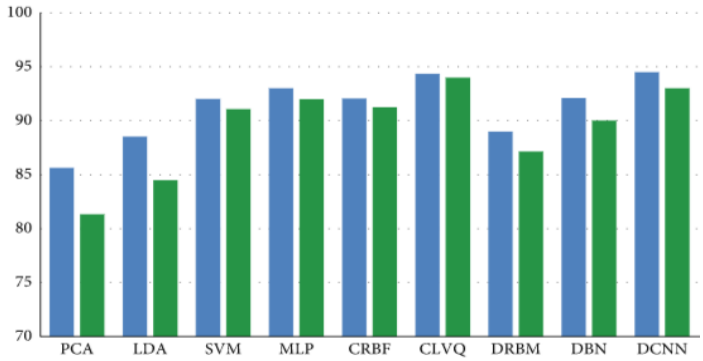


Fig: Face Recognition Accuracy

5. CONCLUSION

Our proposed system is mainly designed to help teachers to track effective attendance with face recognition system by capturing photo from the video stream of participants during online sessions and comparing them with database. Theexperimental results show that the RIAMS device model is highly efficient and scalable. Its modest design allows teachers to precisely monitor and manage students' attendance and generate reports as per the administrative requirements. It also insist participant attention by gathers the timely responses of students to Concept QA and UIN queries, at random intervals oftime. RIAMS is very user-friendly and robust and can be easily integrated with any existing virtual meeting platform.

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