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RANDOM INTERNAL QUERY AND RECOGNITION ATTENDANCE SYSTEM FOR VIRTUAL CLASSROOM USING MACHINE LEARNING

Mr.T.Manivel[1], Dr.D.Anitha[2], M.Boopalan[3], K.Dinakar[4], N.Harish[5], R.JayaPradhap[6]

[1,2] Supervisor ,3,4,5,6 Student(B.TECH)

Department of Information Technology, Muthayammal Engineering College, Rasipuram,Tamil Nadu, India.

dinakar221200@gmail.com, jayapradhap81110@gmail.com, harishharish63195@gmail.com, manivel.t.it@mec.edu.in, boopalan1552000@gmail.com

ABSTRACT

The COVID-19 pandemic outbreak has resulted in an unprecedented crisis across theglobe. The pandemic created an enormous demand for innovative technologies to solve crisis-specific problems in different sectors of society. In the case of the education sector and allied learning technologies, significant issues have emerged while substituting face-to- face learning with online virtual learning. 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. Student attendance is a measure of their engagement in a course, which has a direct relationship with their active learning. However, during virtual learning, it is exceptionallychallenging to keep track of the attendance of students. Calling students' names in virtual classrooms to take attendance is both trivial and time-consuming. Thus, in the backdrop of the COVID-19 pandemic and the extensive usage of virtual meeting platforms, there is a crisis-specific immediate necessity to develop a proper tracking system to monitor students'attendance and engagement during virtual learning. In this project, we are addressing the pandemic-induced crucial necessity by introducing a novel approach. In order to realize a highly efficient and robust attendance management system for virtual learning, we introduce the Random Interval Query and Face Recognition Attendance Management System (hereafter, AI Present). 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: *Artificial Intelligence, Virtual classroom, Optimization Algorithm*

1. 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 key distinction of a virtual classroom is that it takes place in a live, synchronous setting. Online coursework can involve the viewing of pre-recorded, asynchronous material, but virtual classroom settings involve live interactionbetween instructors and participants.

Virtual classrooms and distance learning, as alternate technology-driven learning methods, have been growing at a reasonable pace. Virtual classrooms have been specificallyin use by all sectors, including primary and higher education as well as corporate learning. The increasing popularity of social and microlearning strategies, fostered by general socialmedia platforms like YouTube and Twitter, and major educational technology disruptions like edX, have added to the increasing acceptance of virtual modes of learning. It is expectedthat the predominant use of virtual classrooms would increase by a whopping 16.2% compounded annual growth rate by 2023. Nevertheless, virtual classrooms have not yet been considered as a serious alternative or substitute for the contemporary face-to-face (F2F) learning.

The current pandemic situation has paved the way for a ground test of virtual classrooms as a prominent tool of learning in the current times. Schools, colleges, universities, corporates, and even world bodies and multilateral organizations like the UNO,WHO, and G20 have had to switch to the lesser-used virtual mode of learning and communications. These emergent circumstances stand as a conducive test for companies offering virtual classroom platforms and services like Blackboard, Desire2Learn, Cisco, Microsoft, etc. The test parameters are varied, some predominant ones being bandwidth management, network traffic, server response time, and a number of concurrent users.

2. LITERATURE REVIEW

The author proposes an intelligent attendance management method named AMMOC. AMMOC need neither deploy additional hardware devices in the classroom, nor collect the biological characteristics of students. AMMOC only needs to install two Android applications on mobile devices of

teachers and students respectively, and uses mutual verification between students to complete attendance checking. AMMOC divides theclassroom into several subregions, and assigns students to verify the student number of sub regions. After AMMOC obtains the location information of students, it uses an algorithm based on intelligent search, selects several students to complete the crowdsensing tasks which require to submit the number of students of a specific subregion, etc.

3. 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. Enhances the efficacy of the attendance management in virtual classrooms by integrating two ancillary modalities students' real-time response to CAPTCHAs, Concept QA and UIN (Unique Identification Number) queries. Monitors students' attendance and engagement during virtual learning without affecting their focus on learning.

Proposed two ancillary modalities - verifying students' responses to Subjects and UIN (Unique Identification) queries at random intervals of time.

Develops a user-friendly attendance recording system for teachers that can automatically record students' attendance and generate attendance reports for virtual classrooms.

Deep learning in the form of Convolutional Neural Networks (CNNs) to perform the face recognition.

A. **Convolutional Layer:** Convolutional layer performs the core building block of a Convolutional Network that does most of the computational heavy lifting. The primary purpose of Convolution layer is to extract features from the input data which is an image. Convolution preserves the spatial relationship between pixels by learning image features using small squares of input image. The input image is convoluted by employing a set of learnable neurons. This produces a feature map or activation map in the output image and after that the feature maps are fed as input data to the next convolutional layer.

B. **Pooling Layer:** Pooling layer reduces the dimensionality of each activation map but continues to have the most important information. The input images are divided into a set of non-overlapping rectangles. Each region is down-sampled by a non-linear operation suchas average or maximum. This layer achieves better generalization, faster convergence, robust to translation and distortion and is usually placed between convolutional layers.

C. **ReLU Layer:** ReLU is a non-linear operation and includes units employing the rectifier.It is an element wise operation that means it is applied per pixel reconstitutes all negative values in the feature map by zero. In order to understand how the ReLU operates, we assumethat there is a neuron input given as x and from that the rectifier is defined as f(x)= max (0,x) in the literature for neural networks.

D. **Fully Connected Layer:** Fully Connected Layer (FCL) term refers to that every filter inthe previous layer is connected to every filter in the next layer. The output from the convolutional, pooling, and ReLU layers are embodiments of high-level features of the inputimage. The goal of employing the FCL is to employ these features for classifying the input image into various classes based on the training dataset. FCL is regarded as final pooling layer feeding the features to a classifier that uses SoftMax activation function. The sum of output probabilities from the Fully Connected Layer is 1. This is ensured by using the SoftMax as the activation function. The SoftMax function takes a vector of arbitrary real- valued scores and squashes it to a vector of values between zero and one that sum to one.

4. SYSTEM SPECIFICATIONS

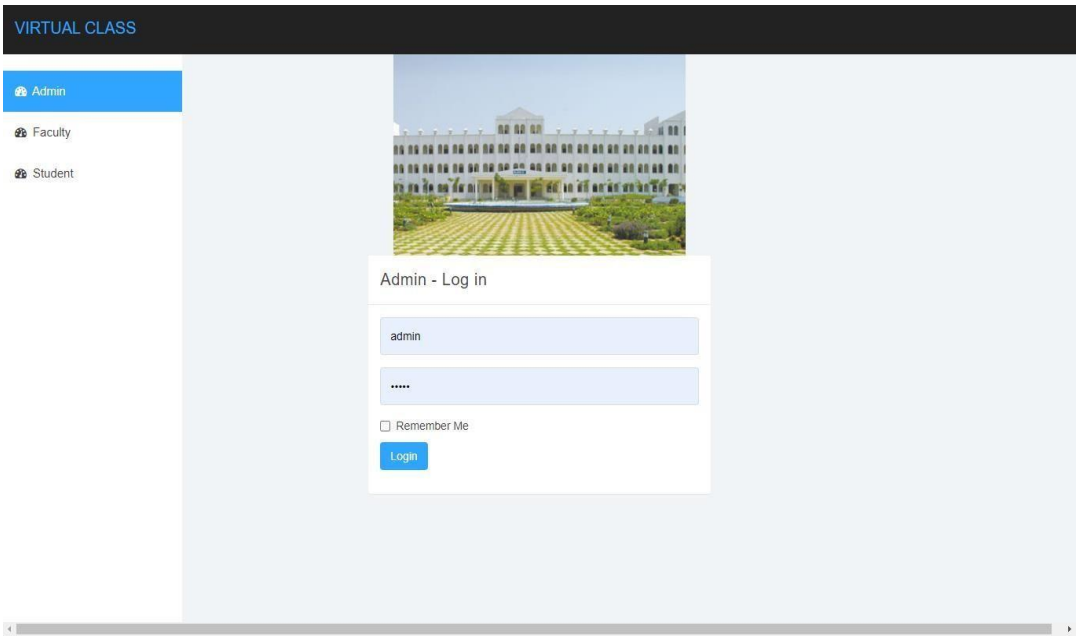
Hardware specification

- Processors: Intel® Core™ i5 processor 4300M at 2.60 GHz or 2.59 GHz (1socket, 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 Learn

5. RESULT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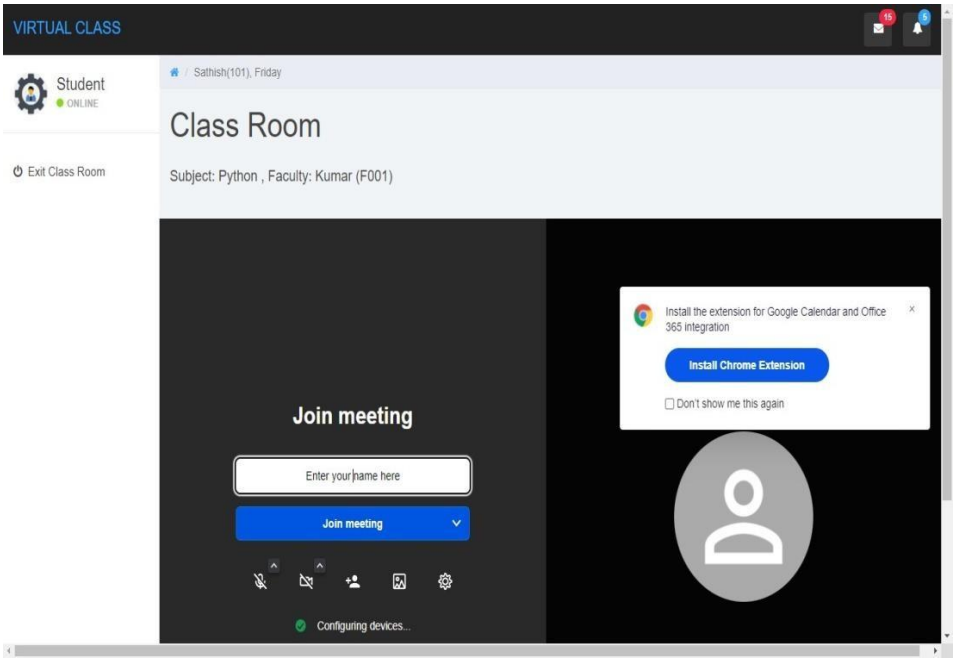
Faculty
Student
Admin - Log in
admin
Remember Me
Login


VIRTUAL CLASS
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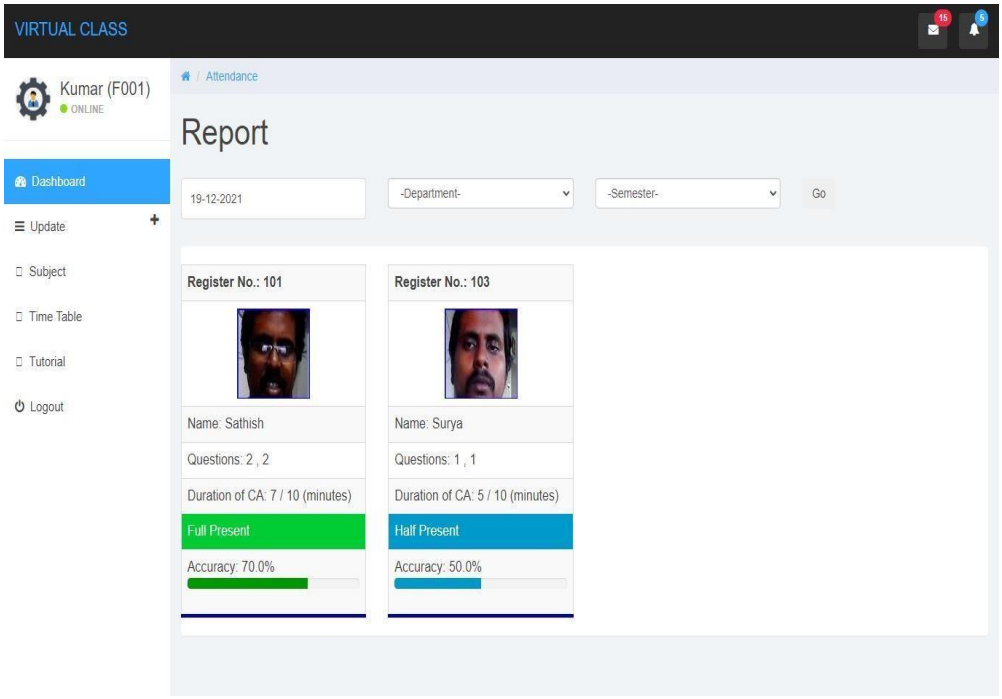
ONLINE
Exit Class Room
Sathish(101), Friday
Class Room
Subject: Python , Faculty: Kumar (F001)
Join meeting
Enter your name here
Join meeting
Configuring devices...
Install the extension for Google Calendar and Office 365 integration
Install Chrome Extension
Don't show me this again



6. CONCLUSION

Random Interval Attendance Management System (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 virtuallearning. AI Present facilitates precise and automatic tracking of students attendance in virtual classrooms. It incorporates a customized face recognition module along with specially designed ancillary submodules. Both the face recognition and the sub modalities are for students' attendance monitoring in virtual classrooms. The submodules check students' responses to CAPTCHAs, Concept QA and UIN queries. The system captures face biometric from the video stream of participants and gathers the timely responses of studentsto Concept QA and UIN queries, at random intervals of time. An intelligible and adaptive weighting strategy is employed for finalizing the decisions from the three modalities. AI Present could be integrated with any existing virtual meeting platform through an application interface like a web page or a specific App.

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