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Development of Random Authentication System on E-Learning Platform

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Abstract: Due to easiness and expansion in property of smart mobile devices, it is becoming inevitable for mobile applications to have an important role in higher education systems. Currently educational institutions are choosing online platform to conduct classes and exams. The existing system doesn't monitor the attentiveness of the student throughout the session, whether the student is present virtually. Since conducting the exams, scanning and uploading the documents are done through different applications, it is a long process which is time consuming. In this paper, we will be developing "The LEARN" application which allows the faculties to check the attentiveness of the student and generate automatic attendance using facial recognition, where the camera will get turned on at random instance of time. Online streaming is done using WebRTC.Notification service is provided to faculties, if a foreground or background application comes into picture on the student's application and classes and examination schedule will be notified to students. The Online examination service allows the students to attend exam online and upload the answer scripts using FPDF after completing the exam through same application in the specified time. Online meeting services enhance faculties and students to interact virtually.

Keywords: Online Exam, Attentiveness, WebRTC, FPDF, Facial recognition.

I. INTRODUCTION

Now we are living in digital era. Every aspect of life is becoming digital. Technology can make learning systems easier and more flexible to access. An online learning platform is one example of technological impact in learning system that facilitates the implementation of learning evaluations. Students think that it is easier to cheat on online E-learning platform than conventional classes.

The LEARN APP is a Server-Client based application which provides unique e-learning platform for Faculties and Students. Faculties will be provided with web application and Students are provided with mobile application to communicate and access course and exam schedules. This also provides an online examination facility where invigilator can monitor students during exam and students can write, scan and upload the answer scripts for evaluation.

As the teacher cannot monitor the attentiveness of the student throughout the session like conventional classes, we are introducing a facial recognition system through which the teacher can monitor the attentiveness of the student as the camera will be turned on at random instance of time and also automatic attendance will be taken at the end of the session based on the attentiveness of the student. Also the attentiveness of the student is monitored by introducing a notification alert feature in which the notification will be sent to the host, if a foreground or background apps comes into a picture.The system architecture of the proposed system is shown in figure 1. The main objectives of the proposed system are as follows: (i)To develop an application

which monitors the attentiveness of the student and automatic attendance system using facial recognition, (ii)To integrate a scanning and uploading of the answer sheets feature in the same

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application and notification service for notifying the students about exams and classes and also notifying the faculties if a foreground or background apps runs on the students application during the session.

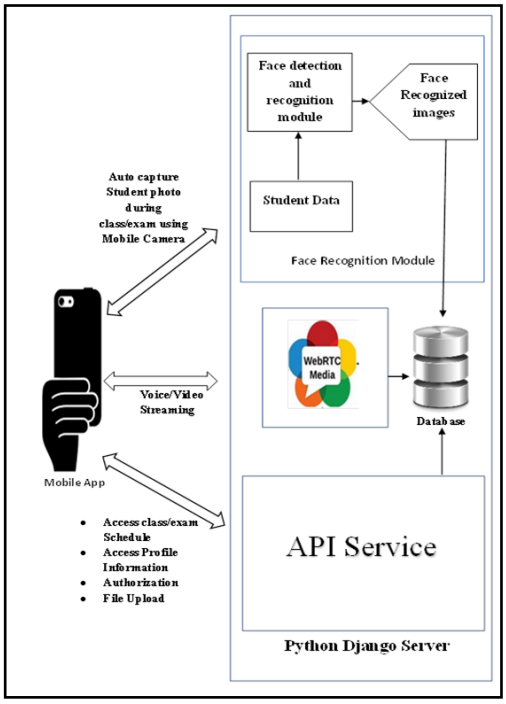

Fig 1: Architecture of proposed system

II. REGISTRATION MODULE

This module is used for registering teachers and students to the application. Teacher and students register themselves by providing username, email ID, password. The images of the student are captured for facial recognition purpose, and are stored in the database for further comparisons.

III. TEAMS AND THE VIRTUAL CLASS ROOM MANAGEMENT MODULE

WebRTC (Web Real-Time Communication) is a technology which enables Web applications and sites to capture and optionally stream audio and/or video media[3][12], as well as to exchange arbitrary data between browsers without requiring

an intermediary as shown in figure 2. The WebRTC standard covers, on a high level, two different technologies: media capture devices and peer-to-peer connectivity [10]. Media capturing devices includes video cameras and microphones in android, but also screens capturing "devices". For android devices, this is the central point for establishing and controlling the connection between two the peers in WebRTC media. A function MediaStreamTrack [12] has a kind property that is either audio or video, indicating the kind of media it represents. Each track can be muted by toggling its enabled property. Weare using avigator.mediaDevices.getUserMedia() to capture the usersMediaStream.

A track has a boolean property remote that indicates if it is sourced by the method RTCPeerConnection [10] and coming from a remote peer as shown in figure 2. This provides the server-less benefits of mesh conferencing without the excessive bandwidth usage and stream management challenges.

It fetches the Upcoming Exams from Server using API and displays it to user using ListView. Android ListView is a view which groups several items and display them in vertical scrollable list [10][11]. The list items are automatically inserted to the list using an Adapter that pulls content from a source such as an array or database. SessionsArrayAdapter creates a view for each array item by calling the custom view function. Gson is a Java library that can be used to convert Java Objects into their JSON representation. It can also be used to convert a JSON string to an equivalent Java object.

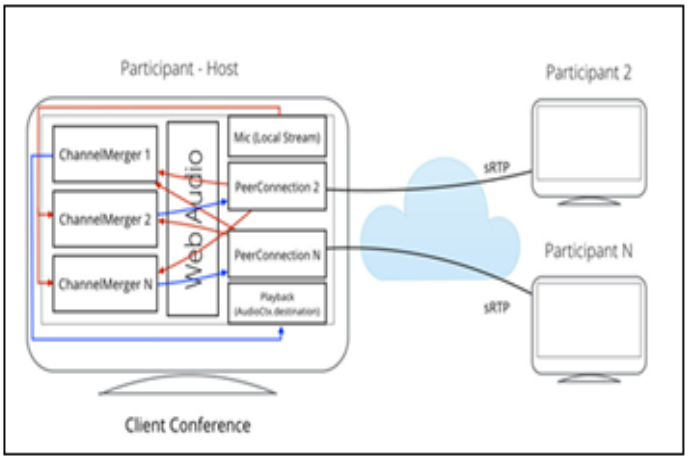

Fig 2:WebRTC conferencing

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IV. ATTENDANCE MANAGEMENT MODULE

Mobile Camera is used to capture the face of the student during the session for attendance purpose. The camera has to be faced such that it captures the faces of all the students effectively. Using facial recognition the attendance of the student is marked [5]. In order to recognize the face of the student, initially we will be training the classifier and detect student face. Student has to attend 80 percentage of the session and only if the respective student's face is recognized successfully then the attendance will be marked as present otherwise will be marked absent [6]. The whole process represented in figure 3 requires the following steps:

4.1 Train Database:

Training is to find all the faces in the dataset directory and encode them into 128-d vectors. The face encodings are stored in "encodings.pkl" pickle file along with the student's ID. Initially the facial images of the enrolled students are captured. In this system a set of images of particular student will be captured. This data is later given as an input for detection purpose using facial recognition algorithm [19].

4.2 Face Detection and cropping:

To detect the user with new Image uploaded during the class. It first detects the face using the OpenCVHaar Cascade detector. As next step the attempt is made to match with the encoded faces from "encoding.pkl" file. To detect and localize faces in frames this system rely on OpenCV's pre-trained Haar cascade file [20]. The image of the student is captured is initially and is scanned to detect faces. The encoded data is collected and the haar cascade is loaded into the cascade classifier [18]. The detectMultiScale function is a general function that detects the face from gray scale of different sizes in the input image. The detected objects are returned as a list of co-ordinates.

4.3 Attendance Update:

In order to update the status of attendance for the student, the system will check for few criteria like the student has to stay active in the session for 80% of the session duration. Once this criteria is satisfied and his face recognition is detected, then the attendance status of the student will be updated to present (P) else it is updated as absent (A) [6][7]. This updating is done using the student ID. Once the attendances of all the students are updated, lecturer can download a document containing the attendance status of the students.

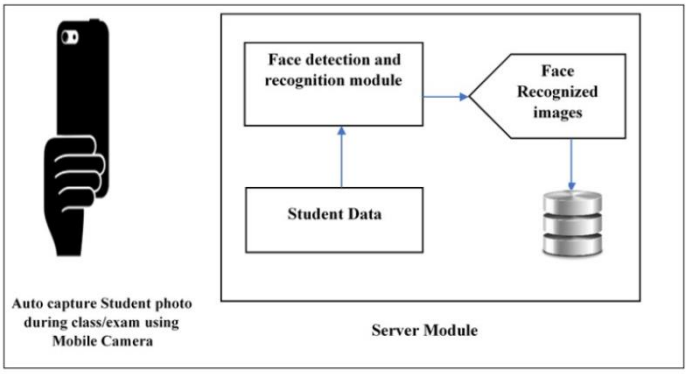

Fig 3:Face recognition and attendance system

The original database containing the images of the students is created by taking a live real time video of the students, and splitting the video into thirty frames, converting them to grey scale and storing only the faces of the students as images, then we will be training the respective images by using a deep neural network to compute a 128-d vector.

V. SCANNING AND UPLOADING MODULE

In this module, the answer scripts written by students during the exam, are scanned using android camera, and is converted into digital form [1] as shown in figure 4, these digital images are merged using python FPDF library to obtain the PDF.

5.1 Capturing camera:

Mobile Camera is used to capture the images and the images are uploaded to the server for merging it as PDF and stored in Server file Storage. Database will be updated with the file link for further reference.

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5.2 Python PDF library:

Python FPDF library is used for merging all the images uploaded by each student into single pdf and stored in server file storage. It will convert pixel into mm, set the document size to A4 layout and checks for orientation.

Therefore this module allows students to capture and upload the written documents at the end of the exam to the server and convert them to the PDF and save on server side for further evaluation. For converting the pdf we are using the FPDF library for python which creates new PDF file by adding all the images uploaded by the student and saves it to the database for further evaluation. Lecturer can view and download the PDF files saved on server.

PyFPDF is a library for PDF document generation under Python, ported from PHP (FPDF "Free"-PDF, a well-known PDFlib-extension replacement with many examples, scripts and derivatives). Compared with other PDF libraries, PyFPDF is simple, small and versatile, with advanced capabilities and easy to learn, extend and maintain.

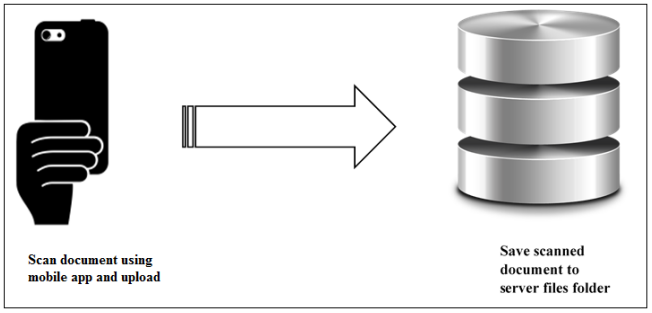

Fig 4: Scanning and uploading the exam papers.

VI. NOTIFICATION SERVICE

App Service will be constantly checking for the screen minimization. If screen is minimized the notification will be sent to host. For sending notifications [15] Google Firebase cloud messaging is used as shown in the figure 5. Firebase Cloud Messaging (FCM) is a cross-platform messaging solution that reliably sends messages. On disconnect from the network, the notification is sent to host.

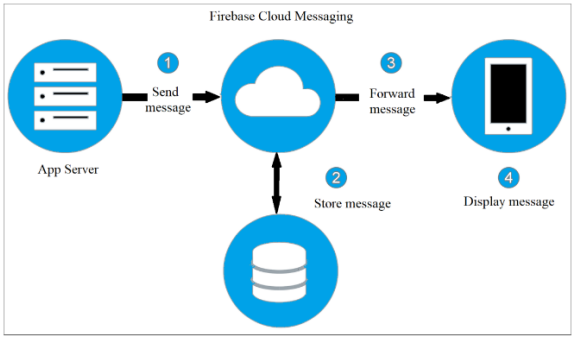

Fig 5: Firebase cloud messaging

This module will detect the user inactivity by overriding the activity onUserInteraction function and checking the user inactivity based on the intervals which are set inside the handler whenever a key, touch, or trackball event is dispatched to the activity. A document containing all the user inactivity notifications [15] is sent to Lecturer using the notifications API; later the lecturer can download the documents to view the details.All calls to user activity'sonUserLeaveHint() callback will be accompanied by calls to onUserInteraction(). This ensures that your activity will be told of relevant user activity such as pulling down the notification pane and touching an item there.

VII. RESULTS

Login Page

Class Schedule

Online Streaming

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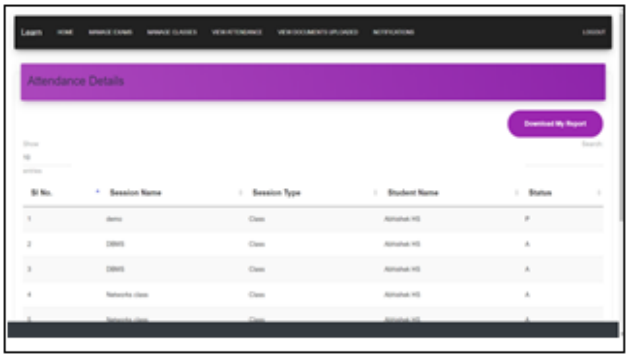

Status of Attendance

Fig 6: Screen shots of the proposed system

VIII. CONCLUSION

Inthiswork,wehaveassessedtheperformanceofthepr oposed system with existing system. The result is analyzed statistically by taking different data records. The error percentage for the proposed system when compared to the existing system is low and same for few data records. So the proposed system is more efficient compared to the existing system.

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