Facial Recognition based Attendance using AWS Rekognition

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Abstract—The portal provides an easy interface for registering and managing attendance status for all students registered on different courses under one platform. The attendance registration is done using image recognition technology. We provide student registration (for new course registrations) and a website for the students and teachers to get updates on all the overall attendance status. Apart from attendance system, the portal also provides other features such as sending remote such to bridge the communication gap between teachers and students. The website is developed for students as well as the teachers where they can login using their unique USN/Lecturer ID and password to view the relevant information.

Keywords—AWS Rekognition, Facial Recognition, Automated Attendance

I. INTRODUCTION

With the popularization of digitization, we have come a long way when it comes to advancement of technology. Tasks which may be as trivial as getting a taxi or ordering food have been implemented digitally. One such task which has not been addressed yet is the way attendance is taken and maintained in majority of the educational institutions. The system is still completely pen and paper based and thus, tedious for the both the teachers and students when it comes to taking, managing or viewing attendance. The teachers have to manually call out names one by one and maintain the records in registers. Firstly, the process of calling out names individually and then keeping records manually is tiresome in itself and to add to that, tons of paperwork, which indeed are easily destructible, have to be maintained through the academic period.

When it comes to the students, they need to reach out to the respective teacher every time they want to keep a track of their attendance or test marks in the corresponding course. Apart from the attendance aspect, there are few other problems that need to be addressed when it comes to educational institutions. When a teacher wants to make an important announcement to a class that is not currently being engaged, he/she looks out for the Class Representative (CR) to relay their message. Now, if the information is to be delivered urgently and the CR isn't available or reachable at that moment of time, it might lead to problematic consequences for both the teacher and their students.

This proposed system is a student-teacher portal which is aimed at solving the problems that have been mentioned above. Firstly, the facial recognition system as explained in [1] eradicates the need of individually calling out names. Given a picture of the class, the system can automatically recognize the faces mark out the students that are present in the class. Secondly, all the data is stored and maintained safely in our cloud databases which can be retrieved as and when required. All the required information can be accessed by the teachers and students remotely using the portal after authentication of identity. Apart from the facial recognition, fingerprint authentication-based attendance has been provided as an alternative. The system also provides a feature for the teachers wherein they can publish an important announcement remotely by using the portal. The announcement is automatically sent to each and every student that it is intended for. Thus, in this way, an effective implementation of the system proposed here will eradicate some of the most trivial but genuine problems that exist in majority of our institutions.

II. OBJECTIVES

The primary objective is to build 2 different android apps, one each for the students and the teachers using insights in [2]. The teachers' app will be capable of starting the automated attendance procedure, send notifications remotely and view and manage different information. The students' app allows registration of attendance via fingerprints as an alternate method. It also allows students to keep a track of their own statistics such as attendance status, exam performance etc. The prime objective of the entire system is to automate one of the most important everyday tasks in every educational institution – The attendance registration and management system using android apps and facial recognition as descried in [3] and [4.

The current process requires a lot of time and valuable resources including substantial amount of man power. The portal aims at speeding up the process by automatically registering attendance in a classroom using facial recognition technology. The use of this system will save a lot of time and also save valuable resources like paper because all the data is updated and stored on our cloud system.

The website is designed to provide fast and remote access to all the relevant data for the students as well as the lecturers. Apart from this, the system is aimed at creating a complete portal that will facilitate easy communication between the users

via the mobile app such as sending notifications remotely and sharing important information and announcements among each other.

III. EXISTING SYSTEM

The existing system requires the lecturer to call out names or USN individually for each student and then register the attendance manually. Also, a lot of paperwork has to be handled by the lecturer for every course that they handle. The entire process is lengthy and eats into the valuable lecture time. Maintaining paperwork is also tedious. Whenever a student wants to know about his/her attendance status, he/she has to reach out to the lecturer to know the same, which again, is not a very efficient way. If the paper records get destroyed by natural causes or human errors, the consequences can be devastating. Also, students sometimes indulge in unethical activities like putting proxies for their friends. To avoid this, the only option the lecturer has, is to lookout for the student every time he/she calls out a name making the process even lengthier. When the teacher has to make an important announcement, either they have to make it themselves when the class is engaged or approach the class representative at other times which may or may not work depending upon the availability of the representative.

A. Drawbacks

- Requires too much human effort.

- Wastage of valuable time.

- No proper security structure leading to unethical practices.

- Tiresome process of maintaining tons of paperwork.

- Difficult for teachers and students to access the data as and when   required.

- Unable to bridge the communication gap between teachers and students.

IV. PROPOSED SYSTEM

The proposed system is a portal for teachers and students. The system just requires the teacher to take a picture of the class and it will automatically register the attendance of every student present in the class. Also, it enables the teachers to reach out to each student remotely as and when required. The teachers and students can check all the required information using their mobile applications whenever they want as the system stores all the data on our cloud databases. The main objectives of system are to digitize the entire process of attendance along with solving a few other trivial problems. It aims at adding proper security aspects to the process. The system contains a different mobile application for the teachers and students.

A. Advantages

- Saves precious time during lecture hours.

- All the data is stored safely in cloud databases.

- Everything is digitally managed, hence, saving paper and efforts to maintain the paperwork.

- Eradicates unnecessary human efforts where not required.

- Adds proper security to the process using facial recognition primarily and fingerprint authentication as an alternate.

- Teachers and students can use their respective mobile apps to access all the important information such as attendance status, marks in different course etc.

- Makes it easier for the teachers and students to communicate.

V. SYSTEM DESIGN

Fig. 1 shows the three system components that are: mobile apps – one each for the students and teachers that runs on their smartphones connected to the Internet. The AWS instance is responsible for handling all the requests the end user sends and send suitable response by performing the required computations available in the stored database.
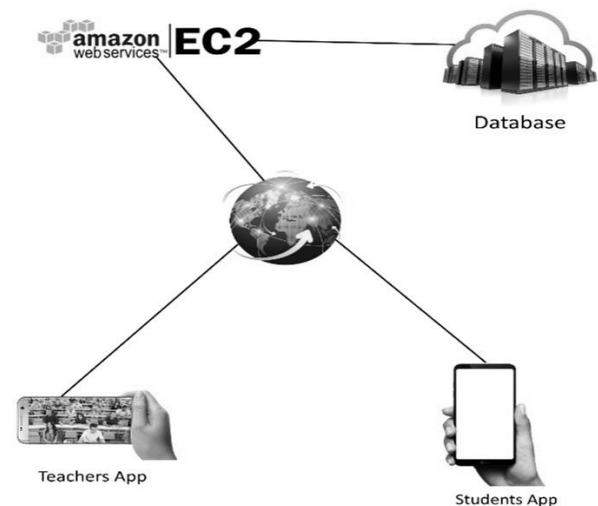

Fig. 1

Fig. 2 gives a basic idea of the system architecture. It describes how requests are handled by AWS Rekognition when the user sends an image for analysis. The image is uploaded to an Amazon S3 bucket, the facial recognition triggers and returns the appropriate image ID if the image is successfully matched with an image already present in our database.
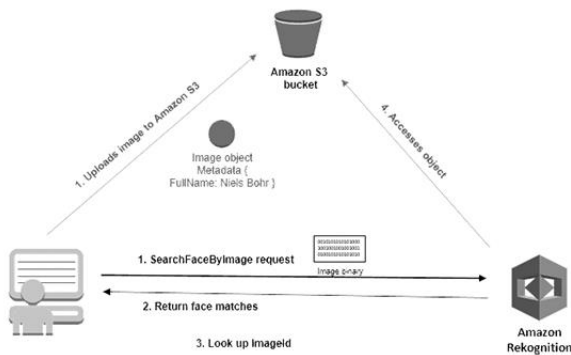
Fig. 2

The system is constructed as shown in the 2 diagrams above. The system is majorly implemented using Amazon Web Services. The website is hosted using an AWS EC2 instance. The facial recognition service itself uses Amazon Rekognition service. We first create a collection of our images from the S3 bucket that contains images of individuals and generate face IDs to later identify the faces when a picture of the entire class is uploaded. The teachers' app is responsible to start the entire process. As soon as the app captures an image of the classroom, the system uploads the image to a separate S3 bucket. From there, it is added to the same collection and then the image recognition results are returned after the system has tried to recognize each one of the faces already available in the collection. The attendance is then updated accordingly. The task can be accomplished using video surveillance cameras as explained in [5]. The end user mobile apps require the user (student or teacher) to login to the portal using proper login credentials. Once logged in, they can make use of the services provided by the system. The app requires a verified login upon which the user is given a list of services they can use. The app then sends requests to the server which performs the required operations with or without using data from the database and sends back the response to the user app.

VI. CONCLUSION

An automated system like this that makes use of cloud services and advanced technologies like Amazon Rekognition will significantly reduce un-necessary human efforts and help complete the task in much more efficient and cheaper fashion. Not only does the system makes data access and communication easier, but also contributes towards a major environmental issue – saving papers.

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