Online Exam System with Secured Approach

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Abstract: **Online examination system is a web-based examination system where examinations are given online. Research and comparison for different web examination system in the current individual field, proposed a set of design mode about general examination platform which apply in colleges and universities, research and analysis the key technology, and proposed improved scheme, made system being perfect. The major problems in online examination system is authentication of candidate and stop malpractices during examinations. For proper authentication, authorization process to ensure that the right candidate is appearing for the exam we will work on pixel enhancement for clear visibility. We will also work on making a system in which it not just detects and captures front camera picture but also the rear facing camera. We will work on audio enhancement to reduce the background noise of wind and any distortion in the audio making it clearer to analyse. Data encryption plays an important role in preventing unauthorized access to question banks. It also helps to avoid result manipulation and blocks access without valid credentials. It is a vital feature to ensure the security of the examination. The entire communication between server and examination client is also encrypted with a secure mode of communication. We will make sure that only the one who is conducting the exam has full access and will be alerted if someone try to do malpractice during the exam.**

Keywords: **Online examination, Authentication, Data encryption, Malpractice.**

1. Introduction

Remote examination and proctoring are significantly gaining importance in the wake of accommodation of comfort, security and accessibility. This could not just increase importance for course or stream-based examinations but also help in MOOC and other credit-based certifications for the concern of establishing credibility. Instead of taking examinations in a traditional classroom architecture, now we could lay emphasis on comfort-based learning and verification by means of digital proctoring on a remote basis.

According to the UNESCO Educational Disruption and Response to COVID-19 pandemic, most of the governments across the globe are closing down educational institutions and are significantly moving their activity to online and remote modality impacting over 89% of the world's student population.

The traditional method of e-exam needs dedicated examination centres along with computers for conducting the exams. Moreover, to provide security measures during the exam, security policies need to be framed for conducting the exam.

Here, the students use the configured system setup for writing their exam, which uses the security policy that never changes throughout the exam. Rather dynamic security policy must be enforced for conducting the e-exams if the student writes the exam through the device such as a desktop/laptop. Essential emphasis still remains on accuracy of the models used for proctoring and the depth of analysis that takes place to avoid malpractices in case of remote environment which includes high level analogy of suspicious movement detection and flagging and elimination or hardening false positives until significant accuracy is achieved. While this sort of system invites, multiple detection mechanisms, which could be on fronts of Face detection, Noise detection, Eyeball movement detection, change of tabs detection, Device detection and more, often one or more together could facilitate the fairness of examination and add credibility and integrity to it, apart from identity verification to avoid non-repudiation.

A fully automated online and continuous proctoring was proposed to detect some cheating behaviour of online exam participants. The system made to monitor some hint in the exam room by using camera and a microphone which is expected to have the ability to detect any cheating behaviours such as: ask directly to other people in the room, where the valid participant is being replaced by others to complete the exam. A visual verification for the whole exam session is needed in an online exam, therefore a continuous user verification with face verification is needed. The system captures the images of the student at regular intervals for monitoring and stores it as proof of cheating. This system thus prevents malpractice during the examination without the help of a proctor. This system eliminates the need for a proctor to monitor the examination and hence, prevents the students from attempting to exchange information. Monitoring of images of every student by the proctor is not feasible.

The proposed work consists of three phases, namely Registration phase, Authentication phase, and Online examination phase. The registration phase is used for allowing each student to complete the registration process for getting a user name, password for each student. In the authentication phase, the students are allowed to complete the mutual authentication process in order to participate in the online examination system. During the online examination phase, students are getting a set of questions from the server, and each student answers for the questions and submits it back to the server.

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2. Problem Definition

With the advent of COVID-19, remote learning has blossomed. Schools and universities may have been shut down but they switched to applications like Microsoft Teams to finish their academic years. However, there has been no solution to examinations. Some have changed it to an assignment form where students can just copy and paste from the internet, while some have just cancelled them outright. If the way, we are living is to be the new norm there needs to be some solution. ETS conducts TOEFL and GRE among others is allowing students to give exams from home where they will be monitored by a proctor for the whole duration of the exam. Implementing this scheme at a large scale will not be plausible due to the workforce required. So, let's create an AI in python which can monitor the students using the webcam and laptop microphone itself and would enable the teachers to monitor multiple students at once.

3. Proposed Method

A. Authentication with Image Verification

1. Basic Login, Register, Forgot Password, Change Password, etc.
2. System allows only one login per user, so that user can't do any unfair means.
3. System will verify image of user at every time of login and also in exam using face recognition technology.

B. Professor

1. Using AI, professor can generate questions & answers, the 2 types of questions & answer can be generated: objective & subjective.
2. Professor can create exam, view exam history, share details of exam with students, view questions, update, delete questions, but update & delete questions will not work at the time of exam & after the exam.
3. Professor can insert marks of subjective & practical exam & also publish the results, view results.
4. Professor can view Live Monitoring of Exam & also can view proctoring logs of the students.
5. Professor can report problems, recharge exam wallet, view FAQ, contact us.

C. Students

1. Give/Take Exam
2. Check Exam History
3. Check Results
4. Report Problems

D. Exam

1. Types of exams Supported:
   - Objective
   - Subjective
   - Practical
2. If webpage is refresh, then the timer will not be refreshed
3. Support for Negative Marking.
4. Support for randomize questions.
5. Support for Calculator for Mathematical type of Exam
6. Support for 20 types of Compilers/Interpreters for programming practical type of Exam.
7. For Objective type of Exam:
   - Single page per question
   - Bookmark question
   - Question Grid with previous & next button
   - At the time of exam submission all questions statistics will be showed to user for confirmation.

E. Proctoring

1. Making logs of window events whenever user changes tab or opens a new tab.
2. Making logs of audio frequency at every 5 seconds of the students.
3. Detection of Mobile phone.
4. Detection of More than 1 person in the exam.
5. Gaze Estimation: Estimating the position of student body & eyes movements.
6. Taking Students images logs at every 5 seconds.
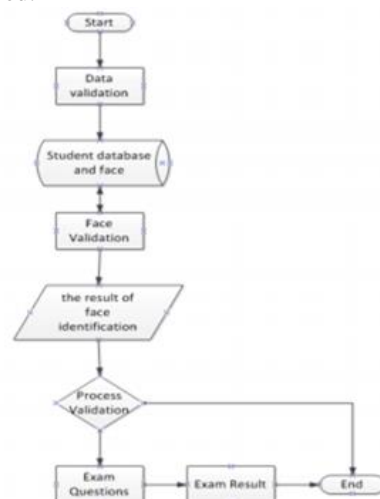7. CUT, COPY, PASTE, Taking Screenshots Function is disabled.
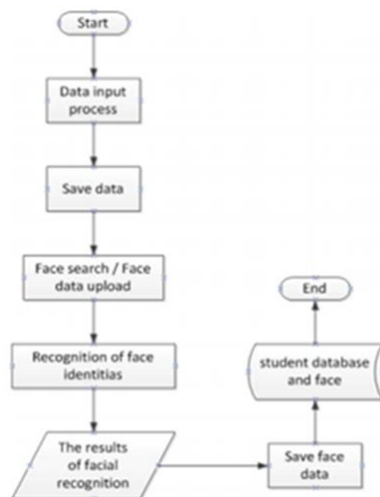

Fig 1. Frontend process

Fig. 2. Backend process

4. Discussions

A. Advantages

- Environment friendly
- Ease to use
- Highly secure

B. Disadvantages

- Challenges in Technology Adoption.
- stable internet connection.
- Susceptible to Cheating

C. Limitation

- Online
- Mobile or mobile web portal

D. Future Scope

- Sound masking
- UI enhancement
- Different methods to improve training

5. Conclusion

This paper presents a multimedia analytics system for online exam proctoring, which aims to maintain academic integrity in e-learning. The system is affordable and convenient to use from the text taker's perspective, since it only requires having a computer with working camera and microphone. With the captured videos and audio, we extract low-level features from six basic components: user verification, text detection, speech detection, active window detection, gaze estimation, and phone detection. These features are then processed in a temporal window to acquire high-level features, and then are used for cheat detection. These promising results warrant further research on this important behaviour recognition problem and its educational application.

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