



Automated Online Exam Proctoring Using AI

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Abstract: Over the past few years, online education has expanded quickly as more students enrol in MOOCs and other online courses. The COVID-19 pandemic has also sped up colleges' shift to online education. Another issue with online education is how to maintain academic integrity when taking tests. The research offers a multimedia analytics system for online exam proctoring (OEP) to overcome this issue. The system aims to offer real-time proctoring to identify test-taker cheating behaviour. The method employs audio-visual compliance to keep an eye on test-takers and spot any instances of cheating. In the world of education, AI-based proctoring systems (AIPS) are gaining popularity.

Artificial intelligence is used by these systems to keep an eye on students during exams and catch any cheating activity. Online tools are generally used by online proctoring systems (OPS) to guarantee exam integrity. These issues can be addressed and the validity and fairness of exams in online education can be ensured through the deployment of AI-based proctoring systems, such as the multimedia analytics system described in the study.

Keywords: COVID-19, MOOCS, OEP, AIPS, OPS.

I. INTRODUCTION

The COVID-19 pandemic has sped up the implementation of online learning and proctoring platforms, which use AI and machine learning to keep an eye on students while they take online tests. By identifying any questionable behaviour, such as cheating, and flagging it for further investigation, these systems seek to safeguard academic integrity.

The system ought to be able to keep track of numerous pupils at once and monitor any test-related misconduct. The system should make sure that the students' audio and video input is only utilised for monitoring reasons and that no other programmes can interfere with the exam because privacy considerations are also very important. Additionally, the system needs to contain fail-safe features so that students may pick up where they left off in the event of an interruption like a power outage. The overall objective is to establish a safe and impartial testing environment that gives students the confidence and assurance that they cannot cheat on any online tests.

Online human monitoring is one common approach for proctoring online exams. The main downside is that it is very costly in terms of requiring many employees to monitor the test takers. The need for an online exam proctoring system arises from the increasing trend towards online education and assessments. The shift towards online education has accelerated, and more students and educational institutions are adopting online exam proctoring systems to maintain academic integrity and prevent cheating during online exams. There are several reasons why an online exam proctoring system is necessary.

Firstly, online exams offer a lot of flexibility and convenience for students, allowing them to take exams at their own pace and from anywhere. However, this also opens the possibility of cheating, which can undermine the credibility of the exam and harm the learning outcomes of students. An online exam proctoring system can address this issue by detecting any suspicious behavior and ensuring that the exam is conducted fairly and securely.

Secondly, an online exam proctoring system can also help educational institutions to save time and resources, as it eliminates the need for physical invigilation and allows exams to be conducted remotely. This is especially important in the current climate where social distancing measures are in place.

Thirdly, an online exam proctoring system can provide valuable data and insights on student performance and behavior during exams. This data can be used to identify areas of weakness and improve teaching methods and learning outcomes.



II. COMPONENT DESCRIPTION

Landing Page:

This is basically the Home page of our Project. After opening the system this is the first page user will see. In this the user can create exam, share unique code with students and monitor cheating in real-time form the dashboard. In this we have opted for two options for registering, the user can register as an instructor and create exam and monitor students or the user can register as a student and appear for the exam generated by the instructor.

After registering the user can directly login to system and create exam or appear for exam. After completion of the exam the instructor can see the results and cheating behaviours detected during the exam.

Register:

This page provides the facility for the user to register and create a new account for only one time. This system provides two options to register as an instructor or as a student. For registering, any user requires to fill-up the following form box of Name, E-mail ID, Password and Confirm Password which must be same as the Password box.

There are multiple validations added for this form such as the e-mail must contain “@gmail.com” and the password must be at-least six characters long, with numbers, symbols and both uppercase and lowercase letters. There is also a toggle button asking “Are you an instructor?”. If yes, the user can enable it and get register as an instructor and if no, then there is no need to enable. And finally on clicking sign-up button the user can get registered.

Login:

This is the page where an existing user can login to the system. In this interface we have two input fields namely Email and password. The user should only use the registered email-id and password, if not the user will no get login to the system.

An unregistered user can register him/her-self by clicking on to the register button which will open the register page and create a new account by filling the required credentials.

Professor Page:

This page shows interface of the Professor page. After login to the system if the user is an instructor, then he/she can see their name on the top, also there is button of create exam through which the instructor can create a new exam by clicking on the button. After which a dialogue box will popup for creating new exam. This dialogue box contains multiple fields such as Exam Name, Exam Link, and Exam Duration, there is a button for generate exam code which will generate a unique code which the instructor can share with their student to appear for their exam.

There is also facility provided by the system to check logs of the students by providing the unique code and clicking on the check logs button. At last, there is a logout button through which the user can get logged out of the system by just clicking on the logout button.

Student Page:

This page shows the interface of the student's page which appears after login to the system as a student. In this page there are two buttons, one is for Start exam and second is a Logout button. When the student wants to appear for the exam, he/she can enter the exam code provided by the instructor and start the exam. After appearing the exam, the student can logout by just clicking the logout button.

Exam Page:

This page shows the After the login of the student, he/she will be directed to the exam page. The overall structure of the exam page will have The different sections such as right side will contain the google form showing the list of questions, whereas left side will have web-cam visuals occupying 25% of the screen and below the web cam visual the timer will be started. Exam will be terminated automatically when the timer reaches the zero.

The interface of this page is user-friendly and user is provided with the option of the exit exam in case he/she finishes the exam prior to the end-time of the exam.



III. RESEARCH METHODOLOGY

The preparation phase and the exam phase are the two steps in our suggested online exam approach. The test taker must authenticate himself throughout the preparation phase by using a password and facial authentication before starting the exam. To make sure that all the sensors are connected and operating correctly, this phase also includes calibration procedures.

Additionally, the test taker is taught and verbally agrees to the OEP system's rules, which include things like not letting anyone else use the room while the exam is still in progress. The test-taker completes the exam during the exam phase while being continuously "monitored" by our OEP system, which allows for the detection of cheating behaviour in real-time.

It is crucial to use a diverse and rich set of features to improve the overall detection performance of the OEP system, since the detection of some cheating behaviours relies on the ignition of multiple behavior cues.

User Verification:

One of the main issues with online exams is that a test-taker might ask someone else to help them with all or part of the exam. Throughout the entire exam session, an OEP system should be able to continuously confirm that the test taker is who he or she claims to be. The test-taker is also required to complete the exam without assistance from anyone else in the room. We choose face verification over other continuous user authentication methods like keystroke dynamics because of its dependability.

Text Detection:

Although text detection is a well-studied topic, it can be difficult to detect text in online exams because test-takers may try to cheat by placing the text far from the camera or using small font. Furthermore, since detecting the latter is not regarded as cheating, we must distinguish between text on printed papers and text on a computer screen or keyboard.

Tab Switch Detection:

The Internet and computers are an open gateway to valuable information for answering exam questions. cheating from the Internet is the most frequent among e-learners. Active window or tab-switch detection is a feature in Online Exam Proctoring (OEP) that enables the monitoring of the user's computer screen to determine which application window is currently active. The purpose of active window detection is to ensure that the user is not engaging in any unauthorized activity during the exam. There are different methods for active window detection in OEP, including: Screen capture, Window focus detection, Window title detection, Browser extension.

Multiple Face Detection:

Multiple face detection is a critical feature in Online Exam Proctoring (OEP) to ensure that the person taking the exam is the authorized user. Multiple face detection involves detecting and recognizing multiple faces within the webcam's view during the exam. This feature is particularly important to prevent impersonation or cheating, where the user may attempt to use another person to take the exam on their behalf. There are several methods for multiple face detection in OEP, including: Facial recognition, Background subtraction, Motion detection, Object detection.

Phone Detection:

Phone detection in OEP can be achieved through various methods, including the use of software and hardware. Software-based phone detection uses algorithms that monitor the student's device during the exam to detect any suspicious activity, such as opening a new application or browsing the web. Hardware-based phone detection involves using devices such as cameras or microphones to monitor the exam environment and detect any sounds or movements that indicate the use of a mobile phone.

Copy-Paste Commands:

The Online Exam Proctoring (OEP) system forbids copy-paste commands as a measure to guard against cheating and maintain the validity of the test. Students who copy and paste material from one source to another can do it swiftly and efficiently, giving them an unfair advantage during the exam. There are several ways to prohibit copy-paste commands during an OEP. One way is to disable the copy-paste feature entirely on the exam platform or software. This can be done by modifying the exam software settings or by using a separate software tool that restricts copy-pasting.

Another way to prohibit copy-pasting is to use browser extensions that block the copy-paste function during the exam. These extensions can prevent students from copying and pasting any content, including text, images, and code.



IV. FUTURE SCOPE

Improved facial recognition: One area that could be improved is facial recognition technology. This could involve developing algorithms that can better detect and recognize faces, especially in situations where there is poor lighting or the student's face is partially covered.

Enhance cheating detection: Online exam proctoring systems are often designed to detect cheating behavior, but they are not always foolproof. There may be ways for students to cheat that the system doesn't detect. Developing more sophisticated algorithms and machine learning models that can better identify potential cheating behaviors could be a valuable future direction for your project.

Accessibility for differently-abled students: It is important to ensure that the online exam proctoring system is accessible to all students, including those with disabilities. This could involve adding features like screen readers, keyboard navigation, or voice commands to the system to make it more accessible for differently-abled students.

V. CONCLUSION

Online testing is the next wave of adoption after online learning which has seen a significant rise in demand due to the problems posed by the ongoing COVID-19 Pandemic. OPS do not claim to be completely fool proof but are rapidly changing the adoption of online testing from home, a scenario that previously would have been thought to be preposterous amongst the masses. To sum up, it is difficult to know whether the benefits of these Online Proctoring technologies outweigh their risks. The most reasonable conclusion we can reach in the present is that the ethical justification of these technologies and their various capabilities requires us to rigorously ensure that a balance is struck between the concerns with the possible benefits to the best of our abilities.

REFERENCES

- [1]. Atoum, Y., Chen, L., Liu, A. X., Hsu, S. D. & Liu, X. (2017), 'Automated online exam proctoring', IEEE Transactions on Multimedia 19(7), 1609-1624
- [2]. Babitha, M. M., Sushama, C., Gudivada, V. K., Kazi, K. S. L. & Bandaru, S. R. (2022), 'Trends of artificial intelligence for online exams in education', International Journal of Early Childhood(01), 2457-2463.
- [3]. Karim, N. A. & Shukur, Z. (2016), 'Proposed features of an online examination interface design and its optimal values', Computers in Human Behaviour 64, 414-422.
- [4]. Labeyen, M., Vea, R., Florez, J., Aginako, N. & Sierra, B. (2021), 'Online student authentication and proctoring system based on multimodal biometrics technology', IEEE Access 9, 72398-72411.
- [5]. Muzaffar, A. W., Tahir, M., Anwar, M. W., Chaudry, Q., Mir, S. R. & Rasheed, Y. (2021), 'A systematic review of online exams solutions in e-learning: Techniques, tools, and global adoption', IEEE Access 9, 32689-32712.
- [6]. Nigam, A., Pasricha, R., Singh, T. & Churi, P. (2021), 'A systematic review on ai-based proctoring systems: Past, present and future', Education and Information Technologies 26(5), 6421-6445.