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e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 4, April 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.165



9940 572 462



6381 907 438



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Online Proctoring using AI

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ABSTRACT: This paper will provide you with insight about the successful companies in the field of proctoring, what are new technologies getting into the picture currently in 2022 to improve the recent proctoring method? Related study about their pros and cons. Also helps you in understanding how Live Proctoring using AI maintain the decorum of the exam and keep their value. This paper also include basis of monitoring, face detection and flow chart and how to resolve monitoring issues as it plays a critical role in online proctoring system (OPS).

KEYWORDS: AI Artificial Intelligence, OPS Online Proctoring system, Online exam, face detection, Live Proctoring using AI (LPAI)

I. INTRODUCTION

Remote education that include electronic learning (i.e. when mobile, desktop, laptop are accessing learning materials via connected to internet from a one's comfort area) are fast gaining popularity due to their capacity to supply unlimited academic resources and their accessibility which removes limited availability for students with access to campus or other constraints. A student can participate in learning activities and access the lecturer's different academic information using their own computer or mobile device with an internet connection [2]. Exams are one of the most crucial aspects of any learning programme, and online learning programmes are no exception. Cheating is always a possibility while taking an online exam. Henceforth, the prevention and detection of its incidence are critical. When we talk about proctoring in terms of testing, we're talking about when a test is monitored by an unbiased, approved proctor who verifies the test taker's identity and the test taking environment's integrity. Invigilators for online exams can beat cheaters at their own game with automated and live proctoring using an AI solution like Proctortrack [3]. It eliminates human error and ensures that the entire process of creating an online exam is faultless.

The following are four monitoring methods which come with Proctortrack service by Verificient Tech. among which last 3 are well known by other proctoring companies as well:

i) Live Proctoring with AI: It's a real-time hybrid solution that combines live remote human proctoring with AI-assisted auto proctoring intervention capabilities in cases of cheating, suspicious behaviour, or imposter. AI is used to further analyse the outcomes of the testing integrity. For high-stakes tests, this strategy is ideal [3]. Example is- Proctortrack | XL.

ii) QA (Quality Assured): recorded sessions are further evaluated utilizing a manual QA review procedure in this more robust version of Proctortrack | AI. It generates the most accurate reports. Turnaround is 12-24 hours. This is an excellent study guide for midterms and finals. This is a great one for midterms and finals. We can also refer it as Recorded proctoring ([1], [3]). Its example is - Proctortrack | QA (Quality Assured).

iii) Automated proctoring: it helps in automated data analysis, automated identity verification and delivering data recording as described earlier. This procedure assures quick turnaround and high accuracy. It can deliver data within 6 hours. Its example is- Proctortrack | AI (Artificial Intelligence) [5].

iv) Proctor lite (Browser Lockdown): does automated verification process as well as data collection. Video, audio, and screenshots from the desktop are among the captured proctoring data. If client wants to do self-evaluation, all session data collected by the proctoring software would be made available on the integrity review website. Within 2-3 hours, real-time video data is available.

When we say Live Proctoring using AI (LPAI) it is an advanced proctoring system which combines the functionality of two different proctoring that is human-based and AI-based systems.

II. LITERATURE REVIEW

The most common method of user verification is knowledge-based user verification, which includes using challenge question, password, or an ID. Token-based verification is another method for user verification; however, due to security and privacy issues third option is becoming more popular. Identity-based biometric features allow more accurate and

effective identification procedures ([9], [14]). The examinee and the unauthorised person form a contract that allows the examinee to be replaced for part or all of the exam duration. Exam proctoring systems should ensure that examinees are capable of taking the exam on a regular basis.

ProctorU is a webcam and microphone-equipped online proctoring system (OPS). It's live proctoring systems that enable a proctor to monitor students via camera while walking them through the whole online exam process. Before the exam begins, proctors must check that no unlawful items are present ([1], [9]). Xproctor, for example, uses facial recognition, behaviour video streaming, speech, and photo-graphic technology to verify pupils and continuously track and monitor them. It also supports a number of LMS, which allow for unlimited photo, screenshot, and video captures when installed on a user's PC ([1], [5]). In an online exam, continuous verification is critical since users must be confirmed at all times during the exam. Existing biometrics include a lot of properties that can be exploited for variety of reasons. Information related to biometric holds both pros and cons, and the biometrics used will be chosen by the application being developed [4].

There are a number of AI-based software programmes to help them bridge the gap between online lectures and online assessments. Examus is an example of such software that allows you to collect student behaviour characteristics during online lectures and then submit them to proctoring services for improved online exam supervision ([9], [14]).

The table I shows the list of online proctoring vendors. Every provider approaches online proctoring differently and uniquely (OLP). The proctor can observe and communicate via messaging with the student in live OLP, on the other hand fully automated OLP, the webcam and microphone keeps recording from the start without the need for live proctor intervention [15].

TABLE I
VARIOUS AI-PROCTORING SYSTEM (BASED ON TWO OLP METHOD)

Company's Proctoring services	Fully Automated	Live
Mettl		✓
Kryterion		✓
Proctorfree	✓	
PearsonVUE	✓	✓
Proctorio	✓	
Examity	✓	✓
Proctortrack	✓	
BVirtual	✓	✓
Respondus		✓
ProctorU		✓
SoftwareSecure		✓
Loyalist		✓
Global Campus Proctoring		✓
Tegrity	✓	

III. FLOW DIAGRAM

The users are outlined in a general design of the OPS and an exam room which include; test-taker, proctor, and unauthorized collaborator, computing devices, wireless communication, data storage, and unauthorized information resources (refer Figure 1) [9].

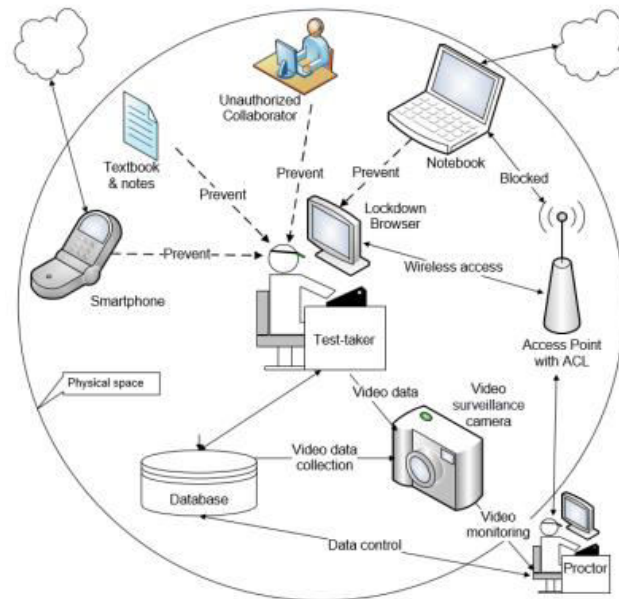


Fig. 1 Online Proctoring System- OPS

A. Components of OPS

Below mention some of the components of OPS for better clearance and understanding:

- i) **Camera:** The webcam an input device which is use to provide the proctoring authority to view the test-taker in real-time. This scenario will help to prevent any attempts of cheating. The system can ensure that just the authorized user is appearing in the exam using face recognition technology, preventing impersonation ([7], [10], [16]).
- ii) **Mic:** A microphone is an audio recording and analysis device. It can be used to sum-up if the test-taker is getting help from an outsider who isn't within the camera's field of view or via a call on a different device [7]? Because noises in the background can be misinterpreted as getting help or unacceptable behaviour, the software must be educated to avoid false positives ([10], [11]).
- iii) **Screen Share / Recording:** This allows the PO to see the user's screen. The proctor can then check the student's open tabs to make sure they aren't browsing for answers on other websites or in their notes [6]. This can also be saved by the AIPS for future reference in the event of a disagreement over a suspicious conduct flag produced by the system. This works in conjunction with the Application Lock setting, as it keeps track of other programmes that have been used to cheat [7].
- iv) **Browser & Application Lock:** It helps to ensure that users are not accessing other programs while exam is in progress. The AI Proctoring System ensures that no other programmes are communicating or documents are available especially when exam is in progress. This can be accomplished via the "secure browser" option, which prevents tab switching as well as searching for answers online ([5], [7]). If an attempt is made it will be flagged by the system as a copy case.
- v) **Gaze Tracking:** test-taker behaviour is observed for copying unacceptable resources such as notes or scientific calculator or textbooks by using gaze tracking. Additional hardware such as a gaze tracker itself [4] is used to monitor the student. AIPS can be train to recognise suspicious activity from user's end, such as making peculiar hand gesture or looking away from the screen ([11], [12]). The system must allow for minor user movements, as it is unrealistic to expect them to sit stationary for the entirety of the exam.

B. Examiner process diagram

Figure 2 depicts the system's flow from the examinee's perspective.

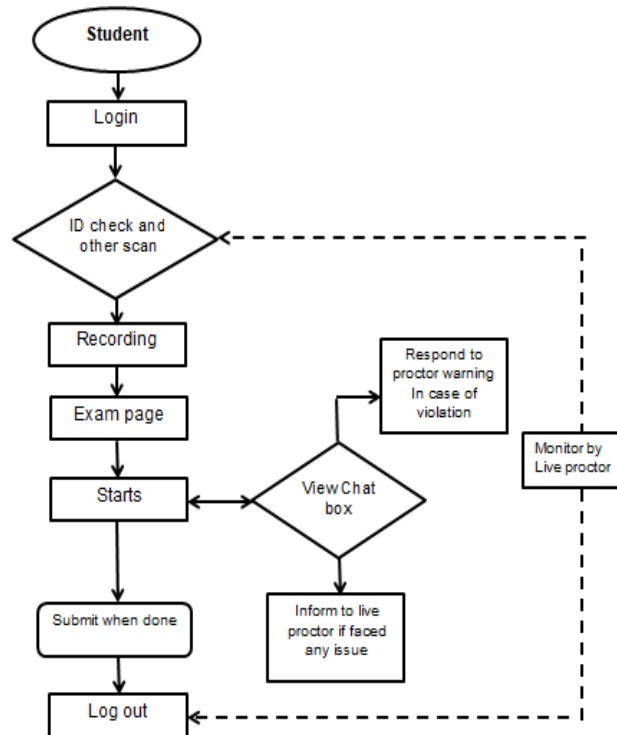


Fig. 2 Student Process flow

The only requirement for a user is to use their system which fulfils the basic requirement to run the proctoring software for signing in their account and an exam key issued by the proctor. If there are any problems in the exam, the examiner can email comments to the proctor. Following submission, an assessment is generated automatically.

The designed method also enables the proctor to manually track the exam for all examiners for the entire exam duration. The examinee's terminal is immediately blocked whenever they open a new tab or minimise the screen while proctoring software is running, and the proctor's terminal shows that the examiner has forfeited the exam owing to an attempted exam violation ([4], [6]). If the examinee is allowed, he or she might submit a query to the proctor requesting manual access.

C. Issues

User privacy is a significant security factor that can be readily abused [9]. It is must for every student to authenticate their identity before starting the exam; so they must confirm their personal information with the proctor. Scanning their User ID cards, such as their college ID, federal or government ID, and so on, accomplishes this ([1], [5], [16]). These documents are frequently related to sensitive user data and are easily exploitable. Phishing calls, as well as other major crimes such as catfishing, harassment, and so on, can be made using the associated contact details. Stating facts providing user's all personal information with proctors every vendor needs to avoid, as a proctor might end up engaging in wicked behaviour [9]. As a result, extra caution must be used to verify that any Proctoring Software is safe, dependable, and protects the privacy of all users.

In order to prevent misconduct there are several software programmes which has access to the user's devices IP addresses (those are desktops/laptops and mobile phones). They can, however, be easily regulated nowadays by employing untraceable VPNs. Candidates may take use of this to commit fraud, diluting the application's effectiveness [16].

Candidates' computers must meet specified minimal requirements, including a working webcam and microphone, as well as sufficient RAM. They must also grant proctors access to control and ensure enough internet bandwidth [9]. All

of this must function properly throughout the examination. If any of these components fails, the examination is momentarily halted until they are repaired and functional again [17]. Any applicant dealing with these challenges must move his or her focus away from the exam and toward resolving the issue, which is not ideal in such a stressful situation.

Several online assessment system providers (for example, ProctorExam, Proctorio) offered accommodating techniques for simplifying the transition to online assessments in institutions and organisations during the period of the crisis due to current circumstances imposed by COVID-19 ([1], [9]). The cyber security risks of online educational technology grew more visible and prompted more concerns, including privacy and integrity issues, as the move to online education accelerated ([9], [12]).

IV. CONCLUSIONS

Many companies are looking for the solution how proctoring can evolve to serve multiple types of subject exams not only objective based, essays but also for mathematics, listening based, theory based, subjective and many more. Today businesses are finding their way towards incorporating technology into it as it's the way to get promising customers. So to fulfil their needs many start-up companies or even the MNCs are fastening their seatbelts to cope up with the growing competition.

Another point of view on broad AI-based systems is their pervasiveness and level of trust. Human values underpin the AIPS system (such as sanctity of exams, cheating prediction, etc.). The essential question is how trust enabled AIPS could be design. Researches are yet to be made that comprises the actual classroom based proctoring systems to human trust value of AIPS henceforth in this sort of scenarios LPAI works well. Artificial Intelligence that is trustworthy in near future is still question mark [8]. Many colleges and businesses, particularly those in developing and developing countries, cannot purchase AIPS software because of its high cost ([3], [5]).

ACKNOWLEDGMENT

As an author we express our gratitude to the anonymous editors and reviewers who took their time to read this paper. We heartily thanks to Mrs. Padmaja Deo, Team Leader, and Mr. Akshay Peddi, Trainer (Verificent Technologies Company), for their excellent contributions and criticism on the paper.

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