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# Review paper on Virtual Invigilator System using Computer Vision Techniques

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**Abstract:**

The rapid growth of online education has necessitated the need for effective proctoring systems to maintain academic integrity and ensure fair examinations. Traditional methods of proctoring, such as in-person invigilation, are not feasible for online exams. To address this challenge, a Virtual Invigilator System using Computer Vision Techniques is proposed. This system employs advanced computer vision algorithms to monitor and analyze the behavior of candidates during online examinations.

**Keywords**: Automated Proctoring, Computer Vision, Online Education, Academic Integrity, Behavior Analysis, Machine Learning, Exam Security.

**Introduction:**

With the advent of online education and the growing demand for remote learning, there is an urgent need for robust mechanisms to uphold academic integrity during online assessments. One of the significant challenges in online examination environments is ensuring that candidates adhere to the prescribed examination guidelines and maintain a fair testing environment. Traditional in-person proctoring methods are not viable in online scenarios due to logistical constraints and privacy concerns. Consequently, there has been a burgeoning interest in Automated Proctoring Systems that utilize Computer Vision Techniques to monitor and regulate online examinations. This study proposes an Automated Proctoring System employing state-of-the-art computer vision techniques to effectively monitor and analyze candidate behavior during online exams. Leveraging computer vision technologies, this system can detect and identify suspicious activities, irregular gaze patterns, and other behaviors that may indicate potential academic

dishonesty. The aim is to provide educational institutions and online learning platforms with a scalable, efficient, and non-intrusive solution to uphold academic integrity.

In this paper, we present an in-depth exploration of the Automated Proctoring System, detailing the underlying computer vision algorithms, the methodology employed for behavior analysis, and the machine learning models utilized for anomaly detection. We emphasize the system's capabilities in addressing academic integrity concerns and maintaining a level playing field for all candidates, ultimately contributing to the credibility of online education. The subsequent sections will delve into the technical aspects of the proposed Automated Proctoring System, presenting the design, implementation, and evaluation of the system to validate its effectiveness in monitoring and maintaining the integrity of online examinations. Additionally, ethical considerations regarding data privacy and the minimization of false positives will be discussed to ensure the system's compliance with privacy regulations and ethical standards.

**Literature Survey**

**Jay Mayekar et al:** In this paper, we propose and implement an automated proctoring system using computer vision techniques. The system helps in conducting examinations by fair means and hence, maintains its integrity. This study demonstrates how to avoid cheating in online examinations by employing semi-automated proctoring based on vision and audio capabilities, as well as monitoring several students.

**Simon Wenig et al.:** The paper presents a simulation framework for multi-terminal HVDC systems based on MMC. The selected modeling concept offers insight into global arm quantities, considered as essential parameters to investigate transient system controllability. Besides the feature to handle unbalanced voltage conditions in one of the interfaced ac networks, this control approach facilitates active regulation strategies of all converter arm energies to keep the system within a predefined operating area during and after dynamic events.

**Aiman A Turani et al:** In this work, In this paper, we have focused on the limitations and concerns regarding online proctoring. The two main concerns were test integrity and student performance. Avoiding fraud and cheating attempts within online proctoring sessions without affecting the test-taker's performance is considered to be very challenging. We suggested using the 360-degree security camera over the webcam to improve the proctoring process.

**AsepHadianSudrajatGanidisastra et al:** The evaluation results have shown us that incremental training has a better performance compared to batch training in speed and dataset size. The decrease in training speed and dataset size is not giving a negative influence on the accuracy rate, on the contrary, the proposed method will result in smaller storage space, smaller memory usage, and faster training speed. On the other hand, the face detection method can result in better face recognition accuracy.

**SarthakManiar et al:** In this paper, we propose and implement an automated proctoring system using computer vision. The system helps in conducting examinations by fair means and hence, maintains its integrity. This study demonstrates how to avoid cheating in online examinations by employing semi-automated proctoring based on vision and audio capabilities, as well as monitoring several students at once. However, if a person is sitting behind the laptop, the student can communicate with that person by reading the question. This can be catered by having a 360-degree camera monitoring the whole room of the student.

**Renuka Devi et al.:** This paper presents an approach for detecting abnormal behaviors in videos. The system first works by detecting all students present in the video. After detecting all the students, it tracks the detected students throughout the course of the video. The features of the tracked students are calculated using HoG feature descriptor and then sent to the K-Nearest Neighbor classifier. The classifier is pre-trained to detect normal or abnormal actions. System is made to be adaptable to lots of different conditions as in, a user can choose the behaviors that they want the system to detect and train the system specifically for that.

**Yousef Atoum et al.:**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 touse from the text taker's perspective, since it only requireshaving two inexpensive cameras and a 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.

**YusepRosmansyah et al.:** Online learning, also known as e-learning, has become increasingly prevalent in recent years and is the focus of this paper. Many academic institutions use the Learning Management System (LMS) as a medium for delivering e-learning. A vital feature in such a system is the electronic examination (e-exam), where verifying student's authentic competence is a challenge. This paper aims to present countermeasures for impersonation attacks. This research was a more focused effort and a continuation of previously owned one and many others found in works of literature.

The method of protection is presented in the form of an attack-defense tree model.

**Aditya Nigam et al.:** In this paper, 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.

**TejaswiPotluri et al.:** The primary aim of this paper is to create a comprehensive automation system that

can assist the proctor in overseeing students participating in an online examination. Our paper focuses on several features, including multiple-person detection, face spoofing, and head pose estimation.

**Conclusion:**

In this paper, we have suggested and put into practise a computer vision-based automated proctoring system. The system supports the fair administration of exams, upholding the integrity of the process. This study shows how semi-automated proctoring based on vision and audio capabilities and simultaneously monitoring many students may prevent cheating in online exams. However, if someone is seated behind the laptop, the student can speak with them by reading the question to them. A 360-degree camera that monitors the student's whole room can address this.

**References:**

1. Jay Mayekar1, Shubham Pal2, Aditya Pandey3, Bikra Pani4, Prof. Preeti Mishra5, "AUTOMATED PROCTORING SYSTEM",International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 10 Issue: 04 | Apr 2023.

2. Simon Wenig, Michael Suriyah, Freiber Rojas, Kevin Schönleber,ThomasLeibfried,"Simulation Framework for DC Grid Control and ACDC Interaction Studies Based on Modular Multilevel Converters", @ IEEE 2016.

3. Aiman A Turani,Jawad H Alkhateeb,AbdulRahman A. Alsewari,"Students Online Exam Proctoring: A Case Study
Using 360 Degree Security Cameras",2020 Emerging Technology in Computing, Communication and Electronics (ETCCE)

4. AsepHadianSudrajatGanidisastra, YoanesBandung,"An Incremental Training on Deep Learning Face
Recognition for M-Learning Online Exam Proctoring",The 2021 IEEE Asia Pacific Conference on Wireless and Mobile (APWiMob)

5."Automated Proctoring System using Computer Vision Techniques",Conference Paper · July 2021.DOI: 10.1109/ICSCAN53069.2021.9526411

6. RenukaDevi,GowriSrinivasa, "Detection of anomalous behavior in an examination hall towards automated proctoring",https://www.researchgate.net/publication/321260760,2017.

7.YousefAtoum, Liping Chen, Alex X. Liu, Stephen D. H. Hsu, and Xiaoming Liu, "Automated Online Exam Proctoring",ACCEPTED WITH MINOR

REVISION BY IEEE TRANSACTION ON MULTIMEDIA, DEC 30, 2015

8. YusepRosmansyah, "Impersonation Attack-Defense Tree", https://doi.org/10.3991/ijet.v15i19.12699

9. Aditya Nigam,RhitvikPasricha,Tarishi Singh, PrathameshChuri, "A Systematic Review on AI-based Proctoring Systems: Past, Present and Future",Education and Information Technologies (2021) 26:6421–6445,2021.

10. Tejaswi Potluri1 &Venkatramaphanikumar S1 &Venkata Krishna Kishore K1, "An automated online proctoring system using attentive-net to assess student mischievousbehavior",Multimedia Tools and Applications (2023) 82:30375–30404,2023.