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Remote Proctoring System

Avish Jain
Department of Information Technology
Dwarkadas J. Sanghvi College of Engineering
Mumbai, India

Priyanca Gonsalves
Department of Information Technology
Dwarkadas J. Sanghvi College of Engineering Mumbai, India

Prem Doshi
Department of Information Technology
Dwarkadas J. Sanghvi College of Engineering Mumbai, India

Nilesh Navalkar
Department of Information Technology
Dwarkadas J. Sanghvi College of Engineering Mumbai, India

Abstract : **Remote proctoring software is a technological solution that facilitates the surveillance and oversight of online examinations and evaluations. The significance of safe and dependable online examinations has grown considerably in light of the rising prominence of online studying and distant job. The issue at hand is effectively addressed by remote proctoring software, which use sophisticated algorithms and artificial intelligence to identify and mitigate instances of academic dishonesty in the context of online examinations. The objective of the remote proctoring software project is to create a dependable and effective system that can be employed by educational institutions and organizations for the purpose of administering safe online examinations and evaluations. The project will encompass the conceptualization, creation, and evaluation of the software, alongside the incorporation of security protocols to safeguard the authenticity of the examinations. The remote proctoring software will employ a comprehensive approach to identify any potentially fraudulent activities throughout the examination, utilizing a combination of video and audio surveillance, screen sharing, and keystroke analysis. In addition, the program will employ face recognition technology to authenticate the test taker's identity and ascertain their compliance with the designated individual assigned to undertake the examination. In order to safeguard the examinations and maintain their integrity, the remote proctoring software will be developed with a robust framework comprising many levels of security measures. The software employed in this context will utilize encryption algorithms to safeguard the integrity and confidentiality of the data exchanged during the examination process. Furthermore, the program will be hosted on highly secure servers, thereby mitigating the risk of unauthorized individuals gaining access to the system. The project on remote proctoring software possesses the capacity to significantly transform the manner in which examinations and assessments are administered, hence enhancing accessibility, convenience, and security for both students and educators. The escalating demand for online learning and remote work has led to a corresponding increase in the necessity for secure and dependable online examinations. Consequently, the development of remote proctoring software emerges as a significant and beneficial addition to the domains of education and assessment.**

IndexTerms :Artifcial Intelligence · Exams · Online proctoring · Online learning · Proctoring system

I. INTRODUCTION

II. The proliferation of technological advancements has brought about a significant transformation in the delivery of education, wherein online learning has emerged as an indispensable component within the contemporary educational milieu. The increasing prevalence of e-learning platforms and virtual classrooms has led to a significant demand for dependable and safe assessment techniques. The need for maintaining the integrity of online exams, tests, and

III. certifications has led to the emergence of Remote Proctoring Systems (RPS) as a significant solution.

IV. The utilization of traditional in-person proctoring methods is not viable inside the virtual learning setting, hence necessitating the implementation of remote proctoring as an essential solution for academic institutions, certifying bodies, and companies who administer online examinations. Remote proctoring systems employ a blend of advanced technology and clever algorithms to oversee examinees during the examination procedure, identifying any possible occurrences of academic misconduct or violation of examination regulations.

V. With the ongoing growth and integration of online education into the global learning landscape, it is crucial to embrace innovative measures such as Remote Proctoring Systems in order to uphold academic integrity and provide equitable assessments.

VI. This article offers a comprehensive examination of a sophisticated Remote Proctoring System that has been developed to address the difficulties associated with invigilating online exams and to guarantee the integrity of academic assessments in the era of digitalization. The suggested Remote Proctoring System (RPS) aims to offer a robust and reliable solution for remote proctoring by utilizing artificial intelligence, machine learning, and biometric identification techniques..

VII. In the following sections, it will delve into the key features and functionalities of the Remote Proctoring System, elucidating how each component contributes to a seamless, secure, and user-friendly exam monitoring experience. Furthermore, it will address the crucial aspects of data privacy and security, which are paramount when dealing with sensitive exam-related information.

II. LITERATURE SURVEY

Many research papers have been published and after referring to these papers, these are few points described in these papers.

The author highlights a few factors that have an impact on online exams, such as a poor internet connection, power outages, and the challenge of proctoring students' live video performances when there may be technical difficulties on both ends. It focuses mostly on strengthening the network connection. The user's head gaze would be monitored using the gaze tracking technique outlined, and if it exceeded a predetermined threshold, it might be assumed that the user was engaging in malpractice. Additionally, it discusses the Learning Management System (LMS) platform and the Advanced Integrated Propulsion System (AIPS)[1].

Addresses common proctoring issues like preventing cheating on online tests by using several browser windows or asking for assistance from peers. The created system will employ a webcam attached to the device to detect the user's face and measure their head's yaw angle in order to evaluate whether they are taking the exam honestly and without using any form of exam cheating. Additionally, it contains datasets for audio analysis that are useful for calculating and comparing mean ambience and peaks. Face disappear duration is quite useful to get the exact time frames for which the user was not present in front of the webcam [2].

Primary focus is on identifying the left from the right eye and assists in locating the pupil's centre. The main task is the eye detector, which must first calculate the local extreme points and gradient values in the entire facial picture before evaluating the eye regions using the very first set of CNN to determine if it is a left or right eye. Following this, the second CNN was used to identify the eye's centre. Convolutional neural networks (CNN) and support vector machines (SVM) are the technologies in use here. The paper mentioned above is helpful for exams with multiple choice questions that are taken online [3].

Makes sure that managers are informed as soon as the algorithm identifies a cheater. CNN/RNN algorithms are employed in this. For the purpose of detecting lip and eye movement, other AI algorithms are employed. For the purpose of maintaining the student graph, a threshold value is retained. If it exceeds the specified limit, a notification with the names of the pupils and their roll numbers will be sent to the responsible supervisor [4].

Speaks explicitly about mouth detection and estimate, which will enable the system to determine if a user is speaking or remaining silent. The SDM Method for oral landmark detection and subsequent patch cropping are the methodologies employed in this paper. They were able to process the mouth movement using CNN with a 90% overall performance/accuracy. CNN (Convolutional Neural Network) technology is used [5].

III. PROPOSED APPROACH

A. Cheating Detection

The system architecture involves a user logging into the system at the time of the exam and being seated in front of a camera. The continuous frames captured by the camera are then used as the means of supervision for the exam.

B. User Verification

The user will log in with his id. Then after the user starts a test, the system will check if the user attempting to take the exam is the same user who logged in to prevent masquerading.

C. Person Counting

While the user is attempting the test, the system will count the number of people/objects in the frame, by continuously taking in frames from the user’s webcam and make sure that the user is the only one present.

D. Eye Gaze and Headpose Estimation

The system will catch abnormal focus of the user's gaze will be detected through eye gaze and head pose estimation, which will be used to identify any attempt at cheating. If any abnormality is matched by the webcam, it is taken note of.

E. Audio Detection

The system will continuously detect audio through the user's microphone and that will be used to eliminate any attempt to cheat through whispering or other means.

F. Notification and Counter

The system will keep a record of every attempt at cheating detected for a particular user. The user will be warned via a notification for any attempted cheating detected, and a counter will be increased. If the value of the counter exceeds a threshold at any given point, the exam will end for that user.

IV. IMPLEMENTATION

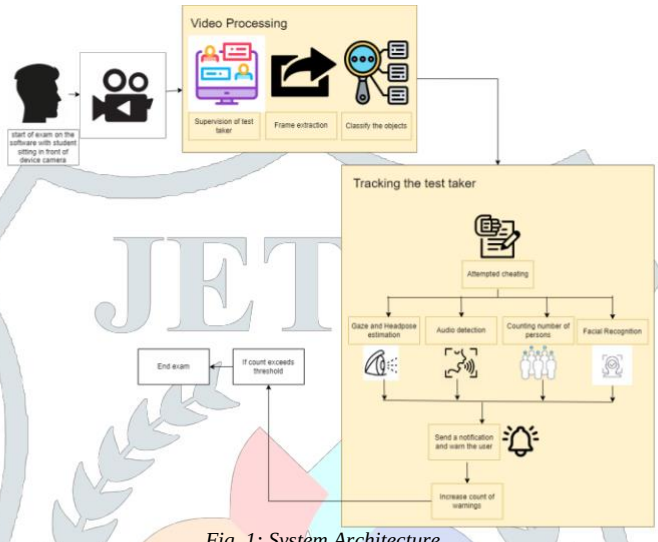


Fig. 1: System Architecture

The user first registers on the website, providing necessary details such as name, email, and a unique identifier (like student ID). The information is safely stored by the system. The user subsequently accesses the system by utilizing their login credentials. The credentials are verified by the system prior to granting access.

Upon successful login, the individual is able to access and review their examination schedule. The system employs email or the website dashboard to disseminate notifications to the user regarding forthcoming examinations.

Upon the commencement of the examination, the user proceeds to authenticate their identity by logging into the designated system. The user is prompted by the system to configure their camera and microphone in preparation for the proctoring procedure. The system performs an assessment of the video and audio components in order to ascertain their compliance with the requisite standards.

Subsequently, the system proceeds to conduct user verification. The system acquires a live image of the user and employs face recognition algorithms to compare it with the reference image provided during the registration process.

Upon successful matching, the user is granted permission to proceed.

The system does an analysis of the user's surroundings by utilizing the camera stream. The system employs object detection algorithms to verify the absence of any individuals other than the user and to ascertain that no unlawful objects or materials are present in the surrounding area

Upon the successful completion of the environmental assessment, the user is granted permission to commence the examination. The monitoring of the user's video and audio feed remains ongoing during the examination.

The system employs eye-tracking and head position estimating techniques to observe and analyze the user's visual focus and head orientation. In addition, the system employs audio detection algorithms to actively monitor and identify any potentially suspicious sounds. In the event that the system detects any deviant behavior, it will provide a warning to the user and subsequently increase a counter.

In the event that the counter above a predetermined threshold, the system will initiate an automatic termination of the examination. The user is duly informed of the termination and the rationale for it is duly documented.

Following the examination, the user has the opportunity to peruse their proctoring report, encompassing any cautionary notices or instances of termination. The technology additionally offers the user the opportunity to contest any instances of false positives.

This user flow is designed to optimize the user experience by ensuring a smooth and uninterrupted process, while simultaneously upholding the integrity of the examination procedure. It is noteworthy to acknowledge that the system has been developed with a user-centric perspective, so assuring that the interface is designed to be straightforward and the instructions are formulated to be lucid. This measure will aid in the reduction of user errors and the mitigation of confusion throughout the examination procedure.

V.System Requirements

The system requirements for the user operating the software are enumerated:

1. A computer with a modern processor and sufficient RAM is necessary to run the AI-based proctoring software.
2. A high-quality webcam is necessary to capture video of the test-taker during the exam.
3. A microphone is necessary to capture audio of the test-taker during the exam.
4. A stable and fast internet connection is necessary to transmit video and audio data in real-time.
5. Headphones may be necessary to prevent audio feedback during the exam.
6. Adequate lighting is necessary to ensure that the video captured by the webcam is clear and of high quality.
7. A keyboard and mouse are necessary for the test- taker to interact with the exam software.

8.The authors have used windows as operating system.

9.Web browser which was used was Google Chrome

10.In order to ensure test integrity, the AI-based proctoring software will be responsible for monitoring the behavior of test-takers and identifying any irregularities. The utilization of AI- based proctoring software necessitates the monitoring of test-takers' behavior and the identification of any potentially suspicious action.The subject of discussion is the concept of activity.

VI.Testing And Results

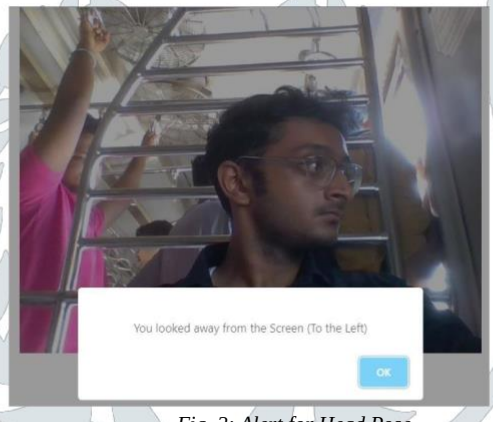
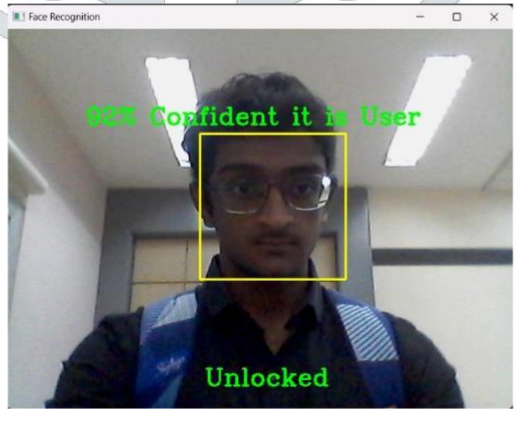
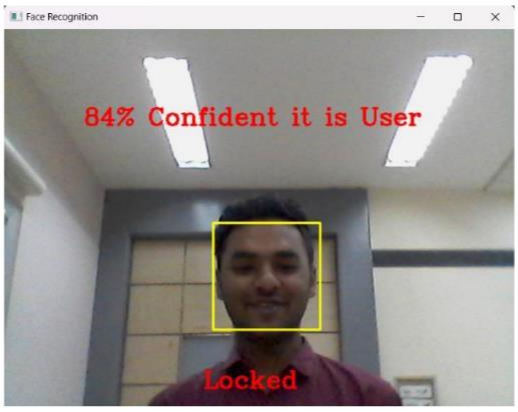
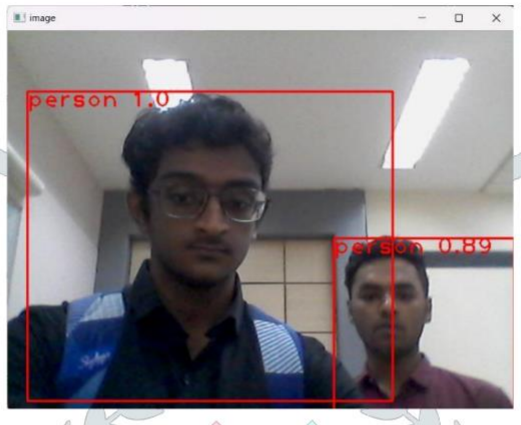
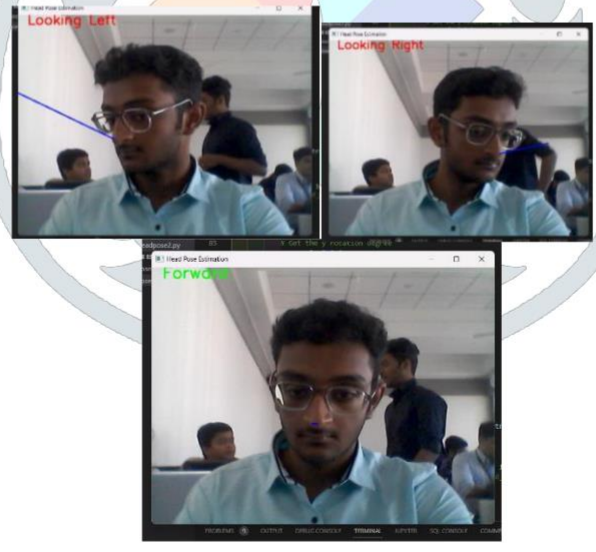


Fig. 2: Alert for Head Pose









VII. CONCLUSION

The implementation of a remote proctoring system that incorporates face recognition, head pose estimation, gaze detection, and voice detection provides a robust mechanism for upholding the integrity of online examinations. The utilization of

sophisticated algorithms and instantaneous notifications within the system aids in the prevention of academic dishonesty, thereby ensuring that students are assessed only on their individual aptitude and skills.Nevertheless, it is crucial to acknowledge that remote proctoring systems possess imperfections and may exhibit some restrictions. An instance where the system's ability to identify cheating may be compromised is when a student employs a secondary device to gain access to external resources. Moreover, certain students may experience unease with the extent of surveillance facilitated by these tools. Hence, achieving a delicate equilibrium between the imperative of maintaining exam security and the imperative of safeguarding student privacy and well-being is of utmost significance.Additionally, it is crucial to acknowledge that the effectiveness of a remote proctoring system is contingent upon its proper implementation and the proficiency of the proctors involved. It is imperative for proctors to undergo comprehensive training in order to effectively interpret the alerts provided by the system and subsequently execute suitable actions when deemed required. Furthermore, it is imperative that the system is built in a manner that prioritizes user-friendliness and accessibility for all students.In general, the utilization of a remote proctoring system incorporating face recognition, head pose estimation, gaze detection, and audio detection constitutes a significant asset in safeguarding the authenticity and credibility of online examinations. Nevertheless, it is crucial to employ this approach in a manner that effectively manages the requirement for maintaining exam integrity while also considering the necessity for safeguarding student privacy and ensuring their comfort. Through effective implementation and comprehensive training, this method has the potential to promote equitable and ethical conduct during online examinations, benefiting all students involved.

VIII.FUTURE SCOPE

In order to enhance our comprehension of the various facets pertaining to proctoring procedures utilized in remote assessment, it is imperative to juxtapose the outcomes of this investigation with the conclusions derived from analogous surveys conducted subsequent to conventional on-campus tests. This will aid in the identification of characteristics that are distinct to this particular form of evaluation.It is imperative to undertake an additional research investigation on the topic of integrity, specifically by comparing the data obtained from remote and on-campus proctoring techniques. This study aims to ascertain the comparative effectiveness of different proctoring mechanisms in deterring cheating and upholding the integrity of academic assessments.Furthermore, it is imperative to conduct an investigation into the various aspects that contribute to the level of satisfaction experienced by students in relation to remote proctoring. This would contribute to enhancing the design and implementation of remote proctoring systems, hence increasing their user-friendliness and efficacy.

Ultimately, it is imperative to investigate the effects of remote proctoring on students' examination outcomes. This study aims to ascertain the potential effects of remote proctoring on student learning, specifically investigating whether it yields positive or negative outcomes.

The aforementioned examples provide a limited selection of potential future employment prospects that warrant further investigation within the realm of remote proctoring. The increasing prevalence of online exams necessitates a deeper comprehension of remote proctoring and its implications for students' views, satisfaction, and academic success.

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