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# AI-Integrated Proctoring System for Online Exams

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## Abstract

Lately, remote education has been more popular. However, there hasn't been a legitimate outcome for academic exams. Several institutions have mandated remote proctoring, where an invigilator proctor continuously monitors student performance, while others have collected assignments that students can copy and paste from the internet, where an invigilator proctor keeps watching pupil conditioning. There must be a solution if the way we live is to become the new norm. We have proposed a methodology in this research to formulate a comprehensive system that is AI-based and can help avoid exam cheating. The system monitors for fraudulent activity and records the proof. This technology will be both affordable and secure.

**Keywords:** Online examinations, distance learning, and proctoring

## 1. Introduction

Universities now conduct their research and writing online. This presents a significant challenge from both an educational and, consequently, an examination point of view. Conducting exams in an ethical manner is a significant issue that needs to be figured out. In the last six generations, the number of internet users in India has almost doubled. This benefited universities because many students were able to continue their studies remotely. Furthermore, this made it easier to take exams online, which advanced the concept of online proctoring in the academic setting. Digitally administration refers to a computerized type of surveillance that makes use of cutting-edge monitoring software. Invigilators can invigilate remotely during a proctored exam. To maintain the exam's credibility, they use video, audio, and various anti-cheating features. Conventional online proctoring in remote examinations is


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a difficult task because many participants cannot be proctored simultaneously. A teaching assistant can physically monitor students using all of their senses during manually proctored examinations at the centers. They can detect student sounds and movement patterns and easily ensure that perhaps the event runs efficiently. Because the teacher is not physically available on site, online exams limit supervision. A good remote online proctoring system should make it easier to detect movement and background noise. The invigilators may always invigilate during a proctored exam. They use audio, video, and eye-catching anti-cheating measures to keep the test's integrity.

### 1.1 Problem Statement

Students, the workforce, and academic foundations are benefitted by the increasing use of online test while also being challenged by it. International locations and time zone differences do not affect students; today there are various barriers that prevent students from taking assessments because evaluations can be communicated practically anywhere on the globe with a secure software association and the web. The objective was to develop an AI system that can monitor pupils via web camera and mic so that teachers can constantly check on multiple students at once. The system must also maintain a record of possible wrong doings. You can use the misconduct logs and should manually check the pupil if there are any concerns. The device should also monitor testing to ensure that any power failure cannot stop the test.

### 1.2 Literature Review

Scholarly dishonesty in the climate of online fraud has been emphasized by the authors of the paper [2]. Over the past few years, online education has grown in popularity. Understudies can access the system with a few simple keystrokes and search through a large selection of internet services to hire someone to finish their homework and write research papers for the benefit of the understudy on record, and enlist in assignments or complete the entire online course. Despite the foundations, Online learning is seen as a viable option for advanced education, a means of increasing understudy enlistments, increasing their advantage of the registered student to take the entire online course, write research papers, or complete other schooling assignments.

Whereas the universities and colleges have viewed the internet as a means to increase student enrolments, which has added to their main concern, the number of Internet scamming groups that support academic dishonesty has also grown rapidly. The region have become

more prevalent, leaving staff and how to avoid disputes amongst school administrators. Well, how or what to prevent such behaviour in both traditional and virtual classes, how to avert similar conduct in both conventional and online classes.

The goal of this study, according to paper [1], was to provide a fair comparison of the key features of the internet delegation frameworks that are currently in use. Furthermore, a curriculum should expend significant effort in developing guidelines and regulations for test security and ensuring that examinees and others are aware of them. It should make it clear and accessible to everyone how and where violations and attempts to tamper with the validity of a test can be reported, preferably anonymously. The acquired data must be safeguarded against theft and hacking.

In the paper [4], The purpose of this study was to compare online test results from administered versus non-delegated online tests. The test execution of 147 understudies who attempted various segments of an online course was contrasted utilising direct blended impacts models, with nearly all of the understudies having no delegating and the rest leveraging internet administration programming. Understudies scored 17 points lower on average and spent significantly less time in online tests that used administration programming versus non-delegated tests. Huge evaluation disparities and disparities in time use occurred on various tests, both across and within segments of the same course where some evaluation delegating standardized test proctoring software was used by some university students and not by others.

## 2. Methodology Used

### 2.1 Procedure

1. Student registration on the platform utilizing contact information and a face image.
2. Submitting the most recent facial image for each exam registration which a data base stored image will use to verify.
3. When a student begins the test, the proctoring system begins exam.
4. Tab changes will be recorded.
5. Every 10 seconds, an image of the student will be taken and compared to an image taken before the exam; if the images do not match, they will be logged as well.

6. The recognition of multiple faces and the absence of any faces on the screen will also be documented.
7. It will also be logged if more than one voice is heard.
8. Certain exams will employ head position tracking. They don't require writing instruments, like verbal skills.
9. A student will be disqualified if they are discovered engaging in fraudulent activity in their logs.
10. Students will be given the opportunity to request conventional verification, in which logs will be manually checked to determine the claim.

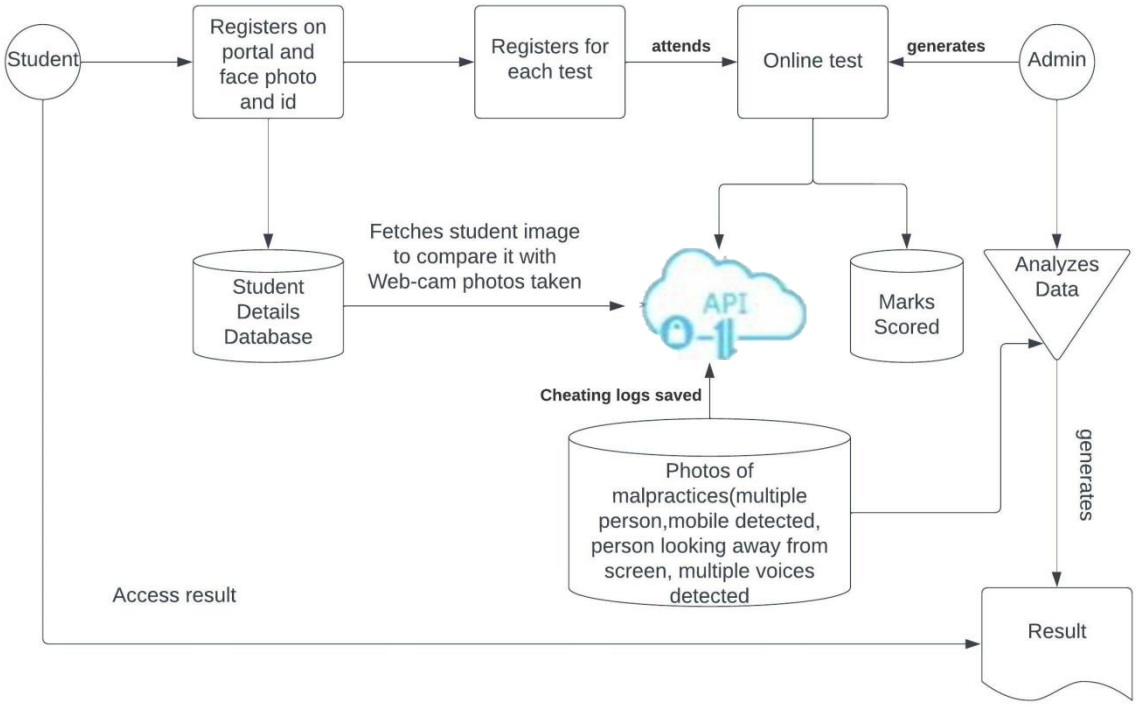


**Figure 1.** System Methodology

## 3. Algorithms

### 3.1 Haar-Cascade Algorithm

It is mainly used for recognitions of face, nose, eyebrows and mouth. It will select in 3 forms such as edge feature, line feature and four-rectangle feature. The figure 2 shows the Haar Feature Selection, it is divided into 2 parts, right part and left part. Right part is the

brighter part of human face and left part is the darker part of human face. The pixel would be taken and some of the pixel will be identified.

It is a strategy that is a straightforward approach to the issue of face recognition that can distinguish between the front and side of the face. A simple yet effective surface administrator called Haar-Cascade pattern thresholds the area around each pixel to name the pixels in a picture and interprets the result as a binary number as shown in figure 3.

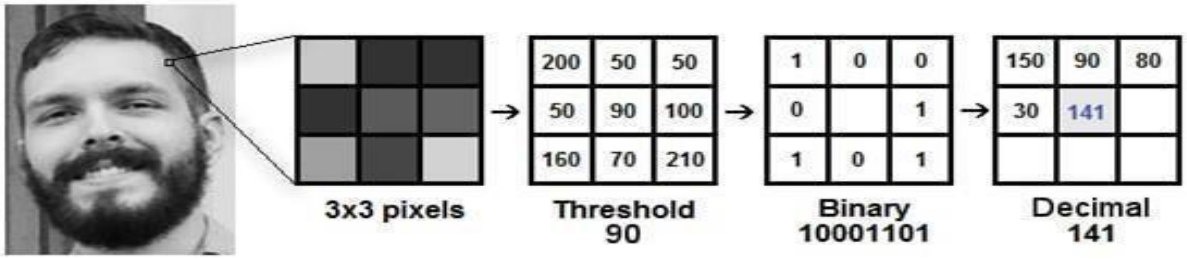


**Figure 2.** Haar-Cascade Classifier

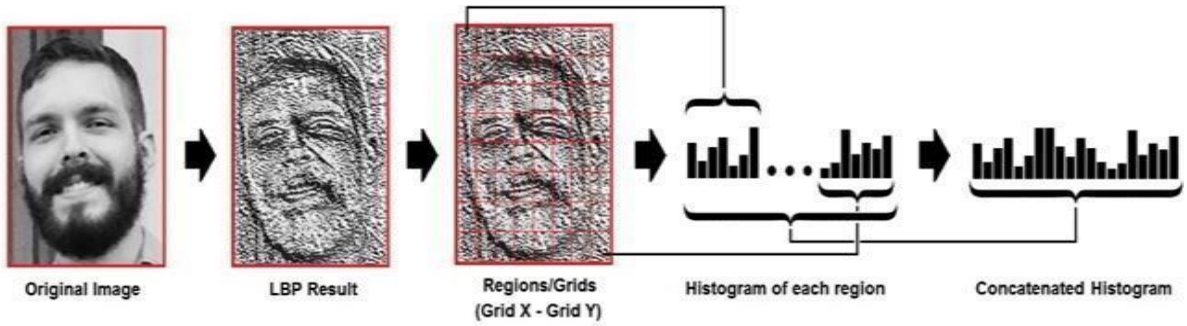


**Figure 3.** RGB to Grayscale Conversion

### 3.2 Multi-Person, No person and Phone Detection

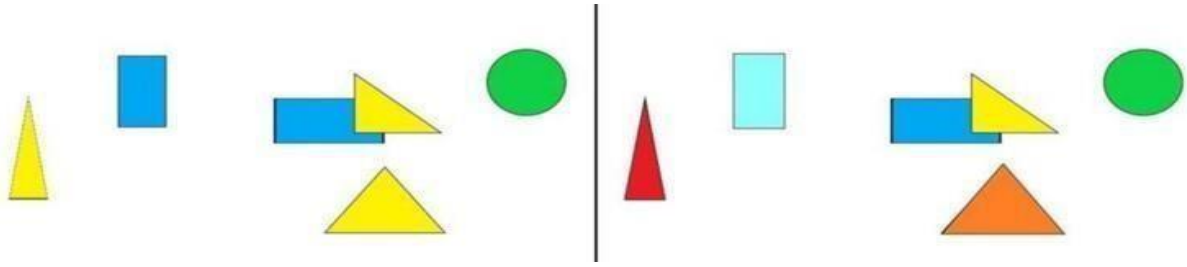

**Figure 4.** Multi-Person, No person and Phone

We'll be using a model architecture called YOLOv3, which stands for You Only Look Once. The above model figure 4 is a one-shot learner, which means that each image only

goes through the network once to make a prediction, allowing the architecture to be very performant, predicting against video feeds at up to 60 frames per second.

## 4. Proposed System

With the help of artificial intelligence and voice recognition, we have presented a web-based system in this research that will track down and assess student cheating during online exams.

**Registration:** When students register for the first time on a portal, they provide personal information, an ID card, and a photo that is recorded in the database and used to verify them before the exam.

**Multi image acquisition:** If more than one person can be seen in the frame, the

database will additionally flag the incident as malpractice.

**Face Recognition:** Face Recognition is used to identify the student, and if the face matches the stored face image, they are confirmed and given the go-ahead to administer the test. On the student's PC or, if the test is being taken on a smartphone, the front camera, there is a webcam installed. A log is preserved in the database if the student's face does not match the one that has been saved, which happens frequently throughout the test.

**Head position recognition:** Students' head postures will be scrutinised in MCQ-based exams where utilising a pen and paper is not necessary, and if it seems that a student is looking away from the screen, its record will also be stored.

**Device detection:** Using a mobile device while in class will be flagged as cheating and entered into the database.

**Browser tab switch detection:** If a student switches the active tab while taking an exam, it will be regarded as malpractice and reported.

**Voice detection:** We use a microphone to capture audio samples from the student's environment in order to stop them from abusing voice assistants during tests. If the frequency of the sound exceeds a threshold, it is also recorded.

**User-friendly interface:** Students can easily utilize the interface, while administrators can easily add new tests and provide results.

The administrator can go into misconduct records for human verification of logs if a student seeks a re-evaluation via the internet.

## 5. Results and Discussion

Using a user-friendly mobile and web-compatible exam portal, a reliable system that monitors cheating behaviours employed during online tests, such as sitting with a buddy, using a mobile device, switching tabs to look up answers online, and getting up from the seat while the test is still taking place. Candidate verification and attendance management.

When taking an exam online, the system will provide a single portal for logging in, accessing the question paper, a chat window to engage with the examiner, and an embedded scanner for uploading answer sheets.

Preventing the candidate from accessing or opening any other application while taking the online test on a desktop or mobile device.

Employ voice recognition to listen for irregularities during the online or offline exam. Figure 5 depicts the laptop application version. Figure 6 shows a warning when the user switches the tab and logs the activity


**Figure 5.** Laptop Application

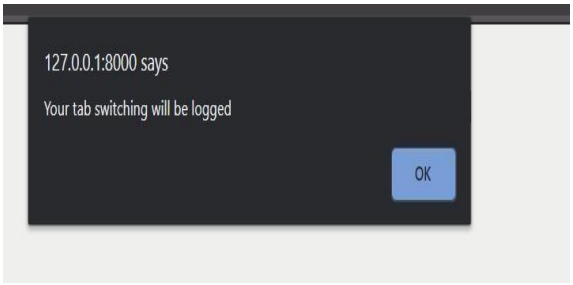


**Figure 6.** Tab switch pop up

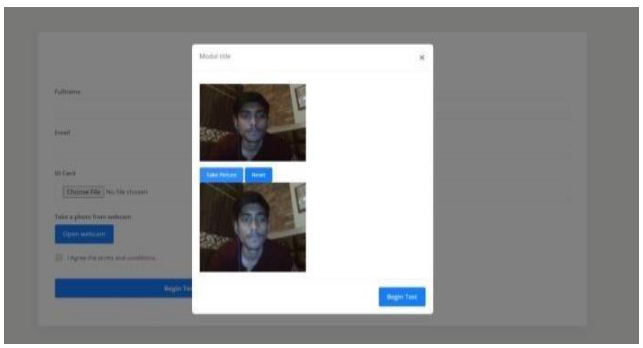

**Figure 7.** Register for test

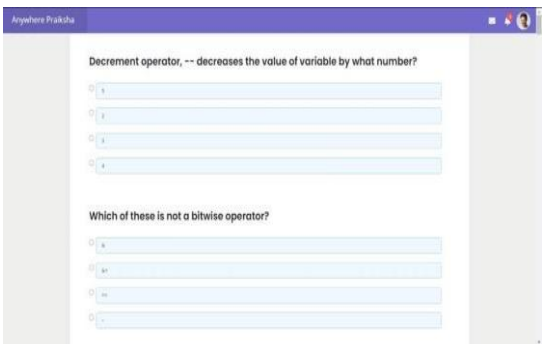


**Figure 8.** Test screen


**Figure 9.** Multiple faces detected


**Figure 10.** Mobile phone detected

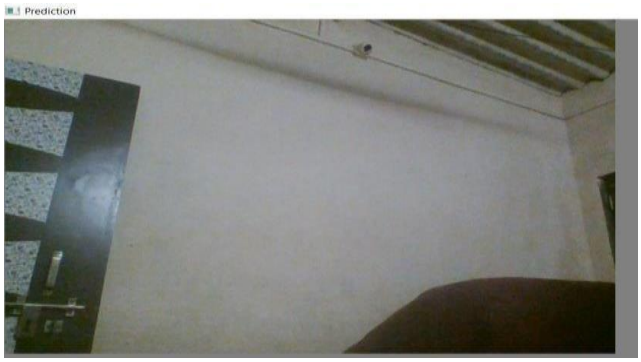


**Figure 11.** No person detected


**Figure 12.** Head pose detection

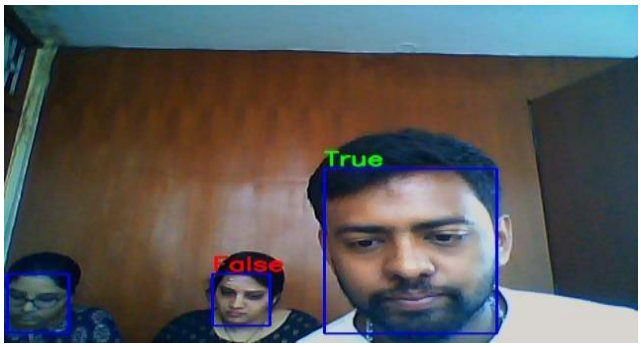


**Figure 13.** Face Spoofing

**Figure 14.** Mouth detection


**Figure 15.** Head pose detection

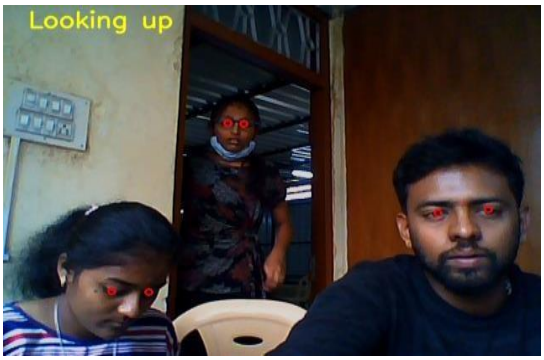


**Figure 16.** Eye Tracking

Figure 7 displays the registration form for each test, together with the photo obtained at registration and other personal information like the email address and identification card. Figure 8 shows the test screen with photos of the student taken in the background. Figure 9 demonstrates that more than one individual is administering the test and records it as exam fraud. In figure 10 a student is seen accessing a mobile phone while taking the test in , and the behaviour is recorded as academic dishonesty. Figure 11 demonstrates that there is no one in the picture and records it as misconduct. Figure 12 depicts a student glancing away from the computer screen and logging it as malpractice. Figure 13 shows that there is another person present and unregistered and logs it as malpractice. Figure 14 shows that the mouth is detected open and logs it as malpractice. Figure 15 demonstrates that certain candidates are looking away from the computer screen, which is recorded as malpractice. Figure 16 depicts a student gazing up over the computer screen, which is recorded as academic misconduct.

## 6. Conclusion

Given the recent growth of online proctoring, there is a huge need for AI proctored solutions. It is feasible to develop an accurate AI proctoring system. To handle conflicts, it's crucial to record fraud. The majority of students don't have access to computers, so developing a proctoring solution that is mobile-compatible is urgently needed. Our goal in conducting this study is to show that online proctoring is the future and that it can drastically lower exam fraud. The impact of video proctoring is sufficiently significant to demonstrate that it affects test results given the possibility that unproctored students may turn to academic dishonesty by using resources that were explicitly forbidden throughout the test. In comparison to unproctored examinations, when students took substantially longer to complete the test, the effect of proctoring via video suggests a potential impact on the percentage of test time used to take the test.

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