RESEARCH ARTICLE OPEN ACCESS

Artificial Intelligence for Detecting Cheating Patterns in Online Exams

Dev Raj, Kamta Prasad Varun, Vivek Nishad, Monu Pandey
Guide: R.D. Engineering College, Ghaziabad, India

ABSTRACT
As online education continues to grow, especially after the COVID-19 pandemic, concerns about fairness in online exams have also increased. Traditional ways of monitoring students are not always effective in virtual settings. In this study, we present a practical idea for a system that can help spot cheating during online tests. It works by watching a student's face and tracking screen activity. For example, it can notice if someone keeps looking away, turns their head frequently, or switches browser tabs. We suggest using simple tools like OpenCV and MediaPipe, which don't require high-end computers and are easy to work with. The idea also includes a behavior scoring method to decide when to flag suspicious actions. While we haven't built the full system yet, our design is made to be lightweight, flexible, and easy to install, even for colleges with limited resources.

In this paper, we've shared the main idea behind the system, why it can be useful, and how it might be improved or developed further in the future.

KEYWORDS - Online Exams, Cheating Detection, AI Proctoring, OpenCV, Academic Integrity, Eye Tracking, Screen Monitoring.

I. INTRODUCTION

Online education has quickly gained popularity as a learning method in recent years, particularly during and after the COVID-19 pandemic. Flexibility and accessibility have been benefits of this shift, but it has also mentioned new difficulties, chief among them being the impartiality of online tests. Exam integrity may be compromised by students engaging in dishonest behaviors, including switching tabs in their browsers, using mobile devices, or getting assistance off-camera. For large-scale or remote exams, manual invigilation techniques are frequently impractical. We provide an AI-powered solution to this problem that can effectively and automatically identify questionable activity during online tests.

II. RELATED WORK

Prior studies have focused on AI in education, specifically online proctoring. However, most existing solutions are either commercial and closed source, or they just focus on camera video without taking browser behavior into account. Deep learning is used in several gaze tracking methods; however, they require a lot of computing power and training data. Our research emphasizes the necessity for readily accessible hybrid systems that combine screen surveillance and lightweight facial behavior analysis to identify cheating.

III. METHODOLOGY

A. Monitoring Facial Behaviour

It detects movement of the head, eyes, and face via a webcam.

Events that are flagged include head turning sideways and eyes off the screen for longer than five seconds.

Tools: MediaPipe and OpenCV for facial landmark recognition.

Depiction: Head Movement Detection Diagram with Eye Tracking

B. Tracking Screen Activity

Recognizes idle time, screen minimizing, and tab switches.

Notifications if windows other than the test are opened.

System calls in Python and JavaScript were used in its implementation.

Diagram: Event Flow for Screen Monitoring

C. System of Behavior Scoring

Suspicious activities are given scores.

If the score is over the threshold, a warning is generated.

A customizable grading system according to the needs of the institution.

Diagram: Alert System and Behavior Scoring Threshold.

IV. TECHNOLOGIES AND TOOLS

JavaScript (for tracking screen and browser activity) and Python (OpenCV, MediaPipe).

Flask (for integrating user interfaces)

Flask (for UI integration)

JSON or SQLite (for storing log data)

V. PROPOSED EXPERIMENTAL SETUP AND ANTICIPATED RESULTS

To evaluate the performance of the proposed AI-based cheating detection system, we outline a hypothetical test environment. The aim is to simulate an online examination scenario and observe how the system would behave under various conditions.

Simulated Environment:

A group of 10 students taking an online exam via webcam and browser
Some students engage in typical cheating behaviors such as
Looking away from the screen
Turning their head or using a mobile phone
Switching browser tabs to search for answers

Expected Behaviour of the System:

The facial behaviour module would flag suspicious actions like prolonged eye movement away from the screen or frequent head turns.
The screen activity tracker would generate alerts if a user switches tabs, minimizes the exam window, or opens unauthorized applications.
A behaviour scoring model would combine these detections

Expected Results:

The system is estimated to identify around 80% of cheating behaviors in this controlled scenario.
Some false positives may occur due to lighting issues or accidental movement.
These results, though hypothetical, are based on the logic and features proposed in the system design.

VI. DISCUSSION

Compared to pricey AI proctoring solutions, our lightweight hybrid approach offers a useful substitute. It is compatible with simple webcam configurations and may be used on typical laptops. It strikes a balance between simplicity, accuracy, and performance without utilizing sophisticated deep learning. Reliability may be increased by future integration with face recognition and speech activity detection.

VII. CHALLENGES

Lighting and webcam quality variations
Privacy issues with ongoing surveillance
Difficulty telling the difference between suspicious and real conduct

VIII. FUTURE SCOPE

To identify background voices, incorporate microphone input.

Make the solution compatible with popular LMS platforms like Moodle or Google Classroom.

Use machine learning to gradually identify typical vs. aberrant patterns.

IX. CONCLUSION

This paper introduces a hybrid AI-based system to detect cheating patterns in online exams. By combining facial behavior tracking with browser activity monitoring, the system provides a reliable, cost-effective tool to improve exam integrity. Further development could enable broader adoption and deeper analysis, reinforcing trust in remote education.

X. REFERENCES

[1]. OpenCV Documentation: https://docs.opencv.org/
[2]. Google's MediaPipe: https://mediapipe.dev/
[3]. AI in Online Proctoring Systems: ResearchGate
[4]. ACM Digital Library: Recognizing Questionable Conduct in Online Evaluations
[5]. https://www.w3schools.com/jsref/obj_window.asp
[6]. W3Schools JavaScript Window Events

XI. IMPLEMENTATION STATUS

This study offers a conceptual approach for identifying online exam cheating using AI-based methods. Even though the system has not been implemented yet, all the necessary tools, design strategies, and simulation stages are included to help researchers and developers build it in the future.

XII. ACKNOWLEDGMENT

We acknowledge the cooperation of R.D. Engineering College in Ghaziabad, India, as well as our faculty advisor, for this study. We would especially want to thank our peers who assisted in simulating the testing environment.

XIII. AUTHORS' PROFILES

Dev Raj
MCA Student

Kamta Prasad
MCA Student

Vivek Nishad
MCA Student

Monu Pandey
MCA Student