IJIRCCE

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

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 7, July 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 7, July 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1107026 |

Real Time Student Monitoring System an Anti-cheat System using Machine Learning

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ABSTRACT: A combination of hardware and software technology called Virtual Examiner is designed to spot questionable exam-taking activity, such as plagiarism, cheating, and the use of unapproved resources. Using algorithms for identification of faces, facial recognition, and object detection, this study suggests a cheating identification system for online tests. The system use the examinee's camera to identify occurrences that would point to cheating, including the appearance of a third party, the use of a gadget, and the status of the candidate's absence. Identification of faces, recognition of faces and algorithms for object recognition make up the system pipeline. There is a considerable danger of academic dishonesty as a result of the COVID-19 epidemic forcing a number of educational institutions to migrate to remote instruction. In this research, a novel method for utilizing machine learning to identify examples of possible cheating is proposed. The program makes advantage of student continuous assessment scores to spot unusual.

KEYWORDS:- Cheating detection, Face detection, Object detection, person and phone detection, Mouth detection, Eye tracking.

I. INTRODUCTION

As additional learners taking use of Massive Open Online Courses (MOOCS) as well as virtual credential programs, online education has grown quickly in recent years. Colleges are shifting to online education to provide their students additional tools, and people are starting courses to better themselves. The epidemic has, however, compelled numerous educational organizations to switch to online education, which has an impact on admission tests and recruiting procedures. It is essential to uphold academic decorum and the sacredness of tests. Student at various levels, each with their individual capacities for learning, comprehension, and knowledge retention, are affected differently by this change. Cheating and other academic fraud, such as cheating, are on the rise. Implementing an anti-cheat system is crucial for preventing fraud and for continual tracking of digital transactions.

II. RELATED WORK

Here we have selected few key literatures after exhaustive literature survey and listed as below:

Hadian S. G et al [1], the author suggests using face checks as a continual verification of user approach. They increase resilience against posture and illumination fluctuations by using photos from e-learning online lecture sessions as training material. Every time a user completes their lesson, the algorithm receives new training.

Aiman A Turani et al [2], the authors provide a 360-degree security camera system for proctoring exams, increasing exam security and lowering stress. The system is improved using machine learning algorithms, and secure framework and biometric authentication provide efficient online exam operations. By simulating typical proctoring circumstances, this method ensures a more engaging and effective exam experience by letting proctors shift their eyes and move around students.

Asep Hadian Sudrajat Ganidisastra et al [3], Using photos from user-acquired lecture sessions, this study suggests progressive training for deep learning face recognition. The technique intends to preserve position and light fluctuations while minimizing training time and storage space, hence lowering server computing burden. Four face detectors—Haar-cascade, LBP, MTCNN, and Yolo-face—as well as a Facenet model were examined for high accuracy.

Mikel Labayen et al [4], The computer security approach presented here uses biometric technologies, automated signal

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analysis, and computer monitoring to continuously identify online users. It authenticates users using facial photos, voice snippets, and keystroke dynamics; it monitors users using cameras and microphones; and it shuts down machines.

Swathi Prathish et al [5], The authors suggest a multi-modal solution that uses webcams for audio and video capture as well as active window capture to do away with proctor presence during tests. An sophisticated rule-based inference system is developed using this data to identify malpractices.

Y. Atoum et al [6], The MACE filter was used to verify faces, and a webcam recorded test-takers' fields of vision to ensure text identification. Noise cancellation was used to reduce background noise in order to accomplish voice recognition.

III. PROBLEM STATEMENT

In instructional and testing situations, conventional virtual examination techniques are ineffective, intrusive, and produce false positives or negatives. As a result, innocent students may get severe penalties or incidents of academic dishonesty may go unnoticed. To guarantee academic integrity and safeguard student privacy, a trustworthy solution is required. Due to their ease and scalability, online tests are well-liked, although cheating is still a serious concern. Human proctors and timed examinations, two common anti-cheating measures, have limits in terms of accuracy, scalability, and cost-effectiveness. So, to identify and stop cheating in online tests, efficient and automatic procedures are required.

IV. DESIGN AND IMPLEMENTATION

For the purpose of to stop cheating in online tests, examinations, and interviews, this project uses cam integration, streaming video, frame extraction, recognition of faces, mouth monitoring, recognizing objects, tracking of eyes, face detection, and mobile phone detection. The DNN of OpenCV and yolo algorithm is used to achieve better outcomes. For whispering instances, mouth tracking and object detection are also used.

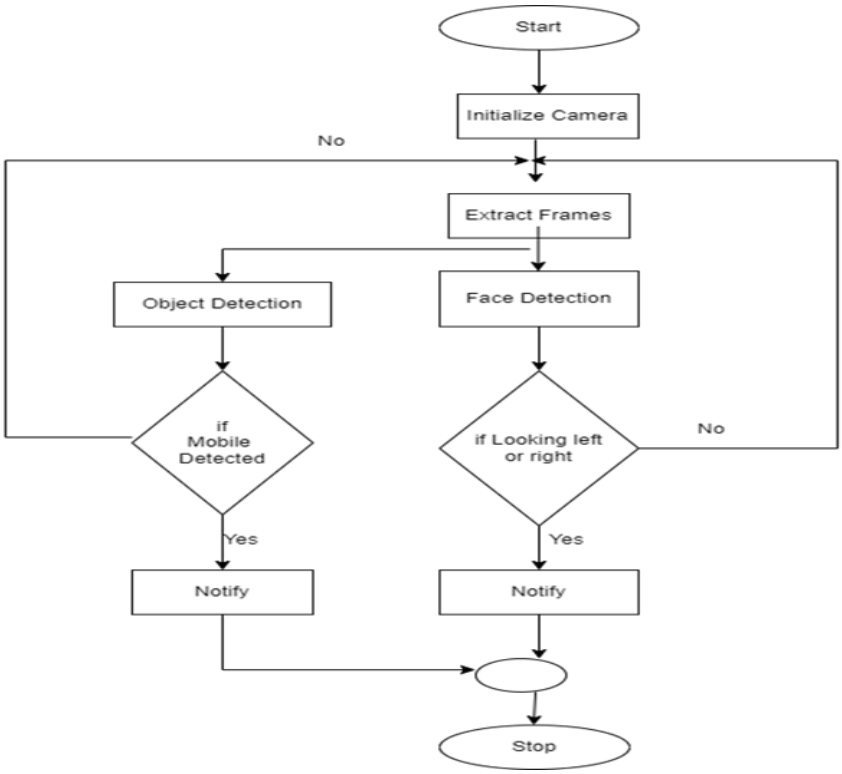

Figure 1: Flow chart of the system design

- **Camera Integration:** Integrate webcams or cameras into the examination environment to capture video

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footage of the students during the exam.

- **Video Streaming:** Set up a video streaming infrastructure to transmit the live video feed from the cameras to the monitoring system in real-time.
- **Frame Extraction:** Extract frames from the incoming video stream at a regular interval (e.g., every second) to process them individually.
- **Mouth Tracking:** Apply computer vision techniques, such as facial landmark detection or shape analysis, to track the movement of the mouth region in the extracted frames. This can help detect unusual behavior like whispering or talking during the exam.
- **Object Detection:** Utilize object detection algorithms, such as YOLO, to identify objects in the frames that may indicate cheating, such as unauthorized materials or devices.
- **Eye Tracking:** Use eye tracking algorithms to monitor students' eye movements and gaze patterns. This can help detect if students are looking away from their screens or engaging in suspicious activities.
- **Face Detection:** Apply face detection algorithms, like openCV or deep learning-based models, to identify faces in the frames. This can help verify the presence of registered students and detect any attempts to use impersonation.
- **Cell Phone Detection:** Employ machine learning models, such as image classification or deep learning-based object detection, to identify cell phones or electronic devices in the frames. This can help detect students attempting to access unauthorized information.

V. RESULT ANALYSIS

Person and Phone Detection

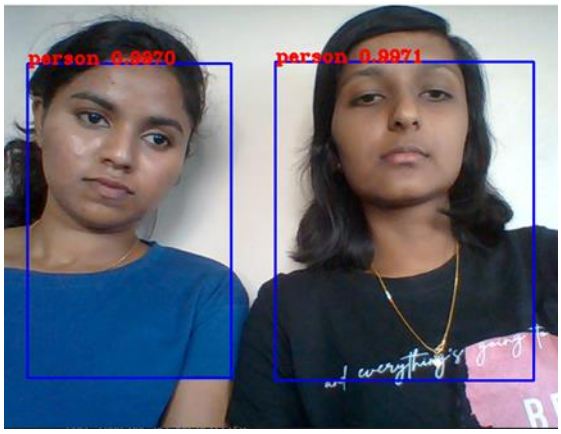

Figure 2: More than one person detection

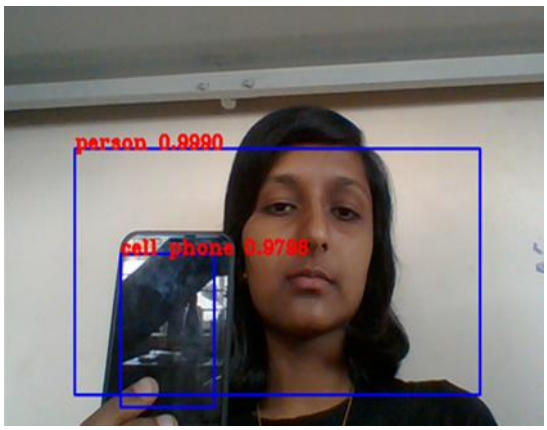

Figure 3: Phone detection

The above figure 2 and 3 represents the Modify recognition of objects algorithms to distinguish multiple people in the same frame by changing the parameters or using methods for handling crowded or overlapping situations. Train a model to find phones in exam rooms, either the same model or a new one, and interpret the information to show the bounding boxes around the phones.

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Eye Tracking

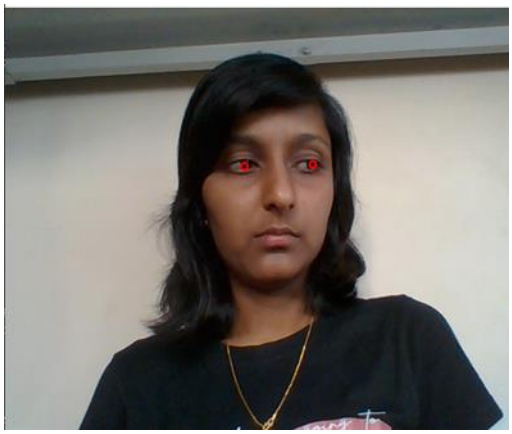

Figure 4: Looking left

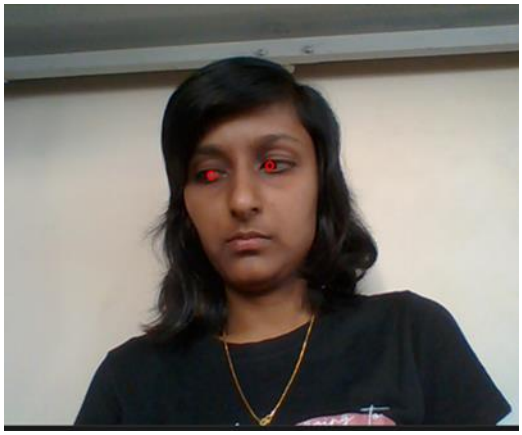

Figure 5: Looking right

The above figure 4 and 5 represents as candidates attempt to glance to the right or left, eye movement tracking notifies the candidate.

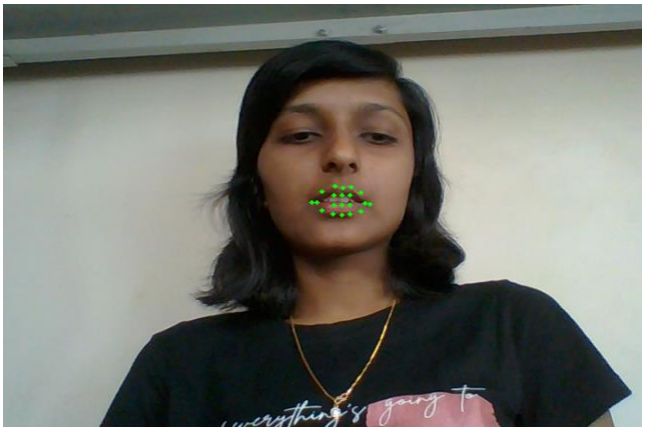

Figure 6: **Mouth Detection**

VI. CONCLUSION AND FUTURE ENHANCEMENT

The paper examines online exam cheat and presents strategies for preventing it. It proposes a method of cheating detection and avoidance utilizing online proctors and ongoing verification. Python was used to create the machine learning models, while PHP and MySQL were used to create the web server. It used two factors—total time spent in front of the screen and the number of times they left it—to determine whether an examinee was cheating or not. Tests conducted in the laboratory revealed an accuracy of over 95%.

By preserving the active browser tab or window of the examinee to track changes to the exam window, this research seeks to advance previous work. Priority Scheduling enables the system to iterate over concerning examinees more frequently and monitor them more effectively. With such high accuracy, our AI proctoring technology proves that online proctoring is the way of the future and substantially lowers exam fraud.

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Impact Factor: 8.379

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

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