

A Multifaceted Approach to Real Time Online Proctoring with Gaze Tracking, Facial Aspect Ratio Analysis and Object Detection

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Abstract: *The proliferation of online education and examinations has necessitated the development of secure and reliable online proctoring systems to maintain academic integrity. In this research, we propose a comprehensive real-time online proctoring system that leverages gaze movement analysis, facial aspect ratio assessment, and mouth opening status detection to identify potential cheating behaviors during remote exams. Additionally, the system incorporates object detection using the You Only Look Once (YOLO) algorithm to identify prohibited items like phones and books within the examination environment. The gaze movement analysis module employs computer vision techniques, including eye tracking algorithms, implemented using Scipy, to monitor students' eye movements during the examination. By analyzing gaze patterns, the system can detect instances of prolonged off-screen viewing, flagging potential attempts to access unauthorized materials. The facial aspect ratio analysis component utilizes facial landmarks to calculate the aspect ratio of key facial features. This approach aids in detecting abnormal head movements or deviations from typical facial expressions, which may indicate dishonest behavior. Furthermore, the proctoring system incorporates mouth opening status detection, using a deep learning algorithms, to identify instances of verbal communication or whispering during the exam. In addition to gaze and facial analysis, our system integrates the YOLO object detection algorithm to identify phones and books in the examination environment. By employing a pre-trained YOLO model, the system can efficiently detect and flag any unauthorized items within the students' vicinity. This multi-faceted system contributes to enhancing the integrity and security of remote examinations in the digital education era.*

Keywords: Deep Learning, detection, online proctoring, alert, algorithm, YOLO, Python, Pycharm, Scipy, movement, eye, mouth, head

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