Journal of Advanced Zoology
ISSN: 0253-7214
Volume 45 Issue S2 Year 2024 Page 18-24

Online proctoring with face analysis and object recognition using Yolo

B. Srinuvasu Kumar[1*], M. Divya Sri[2], K. Rakesh Vinay[3], K. Surya Krishna Sri[4], K. Jessica[5]

[1*]Associate Professor, Department of IT, Seshadri Rao Gudlavalleru Engineering College (SRGEC), AP, Email:-bskgec@gmail.com
[2,3,4,5]Department of IT, Seshadri Rao Gudlavalleru Engineering College (SRGEC), AP,
[2]Email:-divyasrimullapudi94@gmail.com, [3]Email:-rakeshvinaykondepudi@gmail.com,
[4]Email:-suryakrishnasri14@gmail.com, [5]Email:-jessica.kundeti03@gmail.com

***Corresponding Author:** B. Srinuvasu Kumar
[*]Associate Professor, Department of IT, Seshadri Rao Gudlavalleru Engineering College (SRGEC), AP, Email:-bskgec@gmail.com

Abstract

To guarantee academic integrity, the spread of online education and tests has prompted the creation of secure and dependable online proctoring solutions. We present a comprehensive real-time online proctoring system in this study that uses gaze movement analysis, facial aspect ratio assessment, and mouth opening status detection to detect probable cheating behaviours during remote tests. Furthermore, the system uses the You Only Look Once (YOLO) algorithm to detect forbidden goods like as phones and books within the examination area.The gaze movement analysis module monitors students' eye movements during the examination using computer vision techniques such as eye tracking algorithms built in Scipy. The technology may detect instances of prolonged off-screen gazing by analysing gaze patterns, highlighting potential attempts to access unauthorised materials.The facial aspect ratio analysis component calculates the aspect ratio of major facial features using facial landmarks. This method aids in detecting anomalous head motions or changes from conventional facial expressions that may suggest dishonesty.Furthermore, the proctoring system employs mouth opening status detection, which is accomplished through the use of deep learning algorithms, to identify instances of verbal communication or whispering throughout the exam. Our method incorporates the YOLO object detection technique, in addition to gaze and facial analysis, to recognise phones and books in the examination setting. Using a pre-trained YOLO model, the system can detect and flag any unauthorised items in the area of the students. Using a broad dataset of simulated examination scenarios and real-world proctoring instances, we assess the performance of the proposed online proctoring system. The findings illustrate the system's accuracy and effectiveness in detecting potential instances of academic cheating, giving teachers vital insights into student behaviour during remote tests. Finally, our study introduces a novel technique to real-time online proctoring that incorporates gaze

1.INTRODUCTION

Technology-driven online proctoring is a method for remotely invigilating exams or assessments to ensure their honesty and prevent academic dishonesty. Two basic parts of this framework are face and article location, which utilize progressed AI calculations. Preceding the test, the framework catches different pictures of the test-taker's face to make a novel benchmark. During the test, continuous checking is carried out, confirming the personality of the approved client by dissecting elements, for example, head position, facial highlights, and development designs. To impede pantomime endeavors utilizing static pictures, against parodying measures are utilized. Alerts are sent to human proctors for review and appropriate action in cases of suspicious activity.

AI models, prepared on clarified datasets, are utilized to distinguish objects inside the test-taker's environmental elements. These models use calculations in view of area based convolutional brain organizations (R-CNNs) or You Just Look Once (Consequences be damned) approaches. During the test, the framework persistently examines the video feed for explicit items like PCs, cell phones, or notes. In the event that a restricted item is identified, an alarm is set off for human delegate to evaluate what is happening. The framework's versatile learning capacities permit it to work on its exactness after some time and adjust to various testing conditions. Misleading up-sides are relieved through extra logical data and conduct examination of the recognized articles.

By coordinating face and item identification innovations, web based delegating frameworks lay out a vigorous layer of safety, shielding the realness of the assessment cycle. It is crucial for supplement these innovative measures with other evaluation techniques and human delegating for a far reaching way to deal with guaranteeing test respectability.

Web based delegating, a state of the art innovation driven approach, has arisen as a distinct advantage in the domain of far off invigilation for tests and evaluations. This inventive framework use progressed AI (ML) and profound learning (DL) calculations to guarantee the respectability of evaluations and forestall scholastic unscrupulousness. Two significant parts of this framework, face and item identification, assume a vital part in sustaining the safety efforts

2.LITERATURE SURVEY

Writing surveys assume a significant part in logical request and information gathering, as verified by Webster and Watson (2002). Seven databases, including ACM, ERIC, IEEE, ProQuest Central, PubMed, Scopus, and Web of Science, were searched for and used to select literature on digital proctoring. Three primary keywords served as the foundation for the search terms and retrieval process: delegating", "schooling type" and "sort of test". In light of these three watchwords, we concluded the last hunt string would be:

In the writing search process, we adhered to the rules of the PRISMA cycle (Page et al., 2021). The data set search was led in October 2022, and 425 examinations were found, ACM (38), ERIC (10), IEEE (44), ProQuest Focal, (131), PubMed (112), Scopus (59) and Web of Science (31). There were 354 studies left after the 71 duplicates were removed. We followed the consideration and avoidance measures to evaluate for the most important investigations. The incorporation measures were: (1) the article should concentrate on computerized administering, for example on the web or remote delegating, robotized delegate, (2) the article should concentrate on advanced administering inside the HE setting, either in colleges or universities and (3) the delegating framework is utilized for online assessment or appraisal purposes. We avoided papers that were: (1) not written in English, (2) not peer-explored and (3) dark writing distributed in papers or magazines. We physically look at the digests of these 354 articles, and 154 articles were viewed as important and remembered for the last investigation. To guarantee the nature of the chose articles, we followed a thorough interaction.

The quality examination process for remembering the papers for the last audit comprised of three stages. In the first place, the articles should be peer evaluated, which is generally acknowledged as a proportion of value in scholastic exploration. We chose a blend of articles from gatherings, diaries, books and book sections, as well as exact, survey and reasonable investigations to guarantee far reaching inclusion of the

subject. Second, the investigations were distributed by respectable and dependable sources and distributers, for example, Springer, Emerald, Elsevier, ERIC or meeting procedures distributed by ACM, or IEEE. Third, the modified works of these investigations were expected to contain adequate data about the examination point, questions, research strategies and results essential for the subject displaying investigation.

Point displaying is one of the systemic methodologies utilized in text mining to track down repeating subjects (subjects) in the text corpora. Probabilistic theme models, for instance, Idle Dirichlet designation (LDA) (Blei et al., 2003), are calculations that can distinguish points and dole out a record to a subject by relating the co-events of words, which are significant in characterizing their importance and the importance of points (DiMaggio et al., 2013). The LDA permits reports to be doled out to numerous subjects, with changing levels of likelihood related with the points. By following the suggestions of Debortoli et al. (2016), as well as Schmiedel et al. 2019), we decide to utilize the MineMyText (www.minemytext.com) cloud administration to run the LDA examination of our informational collections (154 articles).

There were three stages to the 154 articles' quantitative analysis. In the first place, we arranged and cleaned the information for subject displaying examination by utilizing minemytext.com. We traded the bibliographic information from Zotero to a single.csv record which included "date", "distribution year of the papers" and "text" (Unique).

We tokenised the records by utilizing 2-g to deliver strings. For instance, to make "Coronavirus and 19" as single word, which is "COVID19". We eliminated stop words, for example, "IEEE", "ACM" and "SPRINGER" and "COPYRIGHT". We likewise considered "find, additionally, give, course, study, take, some, high" as stop words since they are the most often involved words in a theoretical. Standard stop words, for example, "eliminate HTML labels" and "eliminate numbers" were additionally chosen. We picked lemmatisation for investigation as it considers setting and converts words to their significant base structure, representing different word structures. Nonetheless, we didn't choose the "stemming" choice to examine the dataset since stemming eliminates the last couple of characters of a word. In addition, the "noun," "verbs," "adjectives," and "adverbs" were chosen for part of speech filtering in order to guarantee that the text corpus only retained the parts of speech that were crucial to the topic models. Second, we processed the ideal quantities of points by registering the intelligibility score in view of the calculation by Röder et al. (2015), utilizing the Python Gensim library.

The intelligence score estimates the inner cognizance and legitimacy of a point in view of its semantic interpretability (O'Callaghan et al., 2015). We used the highest coherence score to determine the number of interpretable topics because a higher score indicates more topics. The outcomes showed the ideal number was seven. Third, we ran the subject demonstrating examination with seven points (as displayed in Figure 2), utilizing the LDA calculation. To decipher the implications of the points, we subjectively rethought the words and reports that were profoundly connected with every point.

We coded implications utilizing two models: delegate terms fabricating a significant point and edited compositions firmly connected with the subject, with agreement arrived at through group conversations. During coding, we focussed on the significance and selectiveness of subjects and marked them with expressive names, following the strategy recommended by Blei et al. (2003). For topic labeling, we relied on our domain expertise and judgment (Schmiedel et al., 2019), guaranteeing dependability and legitimacy in our subjective examination.

Digital proctoring, also known as e-proctoring, virtual proctoring, remote proctoring, or online proctoring, is a method that makes use of digital tools and technology to make sure that people taking exams follow the rules and policies that have been set (Udechukwu, 2020). According to Allan (2020), "high-stakes summative assessment events, mediated by digital technologies, which takes place in a defined place or time, and conducted under restrictions of access to course materials, notes, or communication and, taking place in a secure condition such as invigilation," an online exam is defined as "high-stakes summative assessment events." It fills in as a system to check the validness and creation of tests, while likewise forestalling and identifying any unapproved or unsatisfactory exercises during on the web evaluations (Udechukwu, 2020).

With the ascent of MOOCs and open schooling, advanced delegating has worked with the organization of distant tests without expecting face to face invigilation (González-González et al., 2020). Advanced administering basically can be arranged into three fundamental classifications: Live Administering (LP), Recorded Delegating (RP) and Mechanized Administering (AP) (Arnò et al., 2021; Nigam et al., 2021). Every class contrasts in its specialized elements and execution. For instance, LP includes the presence of a human invigilator who verifies test takers and screens their exercises by means of screen sharing. One invigilator can supervise the exercises of 10-12 test takers on a solitary screen, requiring extra invigilators for bigger gatherings. In RP, no human invigilator is available during the test. All things considered, the way of behaving of understudies is recorded for later survey by invigilators to distinguish likely occasions of

cheating or wrongdoing. Nonetheless, this interaction can be tedious, and understudies might challenge administering choices, prompting objections. Then again, AP uses computerized reasoning (man-made intelligence) to screen tests in close to continuous. In AP records and examinations understudies' conduct utilizing sound video investigation and naturally identifies cheating. In the case of cheating is identified, the test might be stopped or ended. AP can be utilized related to LP or RP techniques (Arnò et al., 2021; Duncan and Joyner, 2022)

3.PROPOSED SYSTEM

PYTHON - Python is a general-purpose, interpreted programming language. Python's design philosophy emphasises code readability through extensive usage of whitespace. Its language elements and object-oriented approach are intended to assist programmers in writing clear, logical code for both small and large-scale projects. Python is dynamically typed and can be used in a variety of programming paradigms, including procedural, object-oriented, and functional programming.
Pycharm IDE- designed to produce open-source software, open standards, and services for interactive computing in dozens of programming languages.
Scipy: Scipy is a Python library for scientific and technical computing. Scipy is used in the proposed online proctoring system to build eye tracking algorithms as part of the gaze movement analysis module.
YOLO (You Only Look Once): YOLO is a computer vision object detection technique. YOLO is integrated into the proctoring system for object detection in this study, primarily to identify prohibited things such as phones and books within the test area.

3.1 IMPLEMENTATION

• A comprehensive proctoring system is developed to preserve academic integrity during remote tests.
• Gaze Movement Analysis: Uses eye tracking algorithms to monitor students' eye movements, detecting off-screen viewing that indicates unauthorised material access.
• Facial Aspect Ratio Analysis: Uses facial landmarks to calculate aspect ratios of face characteristics in order to detect anomalous head movements or expressions linked with dishonest behaviour.
• Detection of Mouth Opening Status: Uses deep learning techniques to detect instances of verbal communication or whispering during exams.
• YOLO Object Detection Integration: Integrates the You Only Look Once (YOLO) algorithm for effective detection of forbidden items in the examination setting, such as phones and books.
• Effective Prohibited Item Detection: The pre-trained YOLO model detects unauthorised objects, assisting in the maintenance of a secure exam environment.
• Improved Exam Security: The multifaceted system improves the integrity and security of remote tests, giving teachers with useful insights on student behaviour.

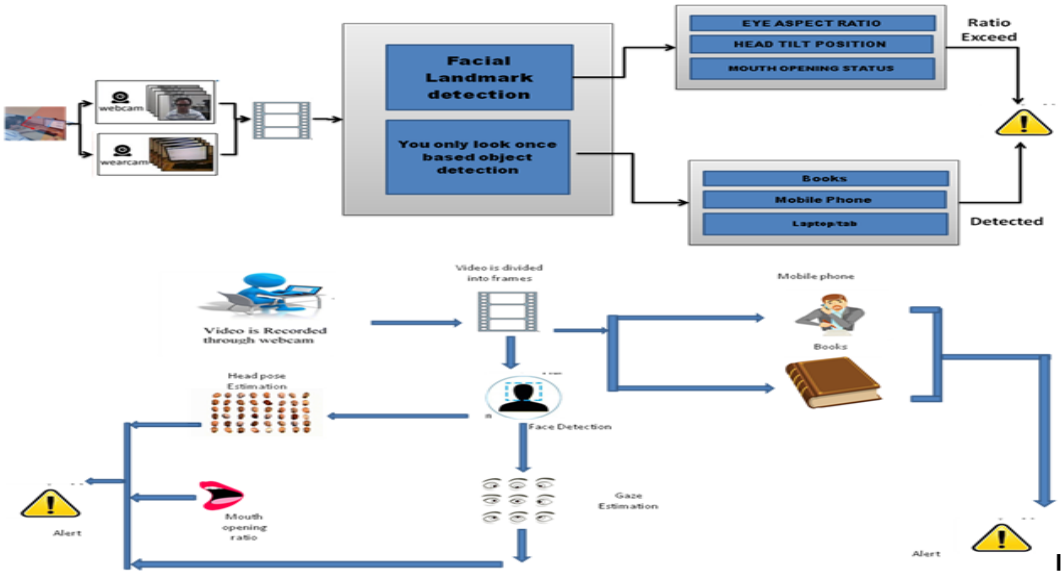
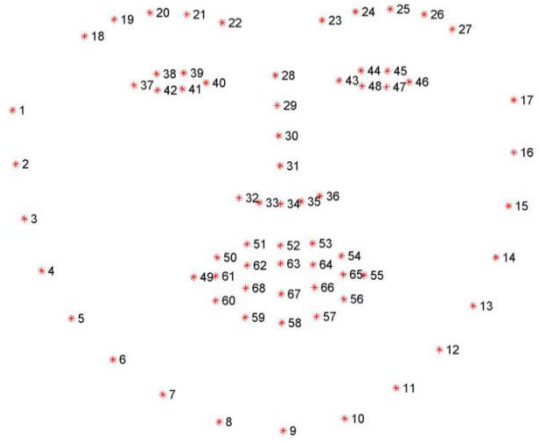


Fig 1: Block Diagram

3.2 ALGORITHM:

- **FACE DETECTION**
- **Facial landmarks recognition – 64 facial points**



3.2.1 EYE ASPECT RATIO:

• The eye aspect ratio is an estimate of the eye opening state, and it can be defined by the equation below
If the Eye Aspect Ratio goes below a certain level, a programme can tell if a person's eyes are closed.
• Another facial landmark planner is Clmtrackr.
FORMULA
$\frac{||P2-P6||+||P3-P5||}{}$

- EAR= $2||P1-P4||$

We determined the Mouth Aspect Ratio using this technique by representing the face with 68-(x,y) coordinates. The mouth, as we can see, is represented by a set of 20-(x,y) coordinates. So, in the same manner as EAR Calculation, we used coordinates 62, 64, 66, and 68 to determine the distance between them.
MAR = $\frac{|CD| + |EF| + |GH|}{3 * |AB|}$

Estimated Head Pose
If the head is inclined to the left, the left eye may seem smaller in the image while the right eye appears larger, resulting in a lower EAR value for the left eye and a higher EAR value for the right eye.
Similarly, the mouth may appear tilted to one side, causing the MAR value to alter.
It may be feasible to quantify the degree and direction of head tilt by analysing changes in the EAR and MAR values.

4.RESULTS AND DISCUSSION

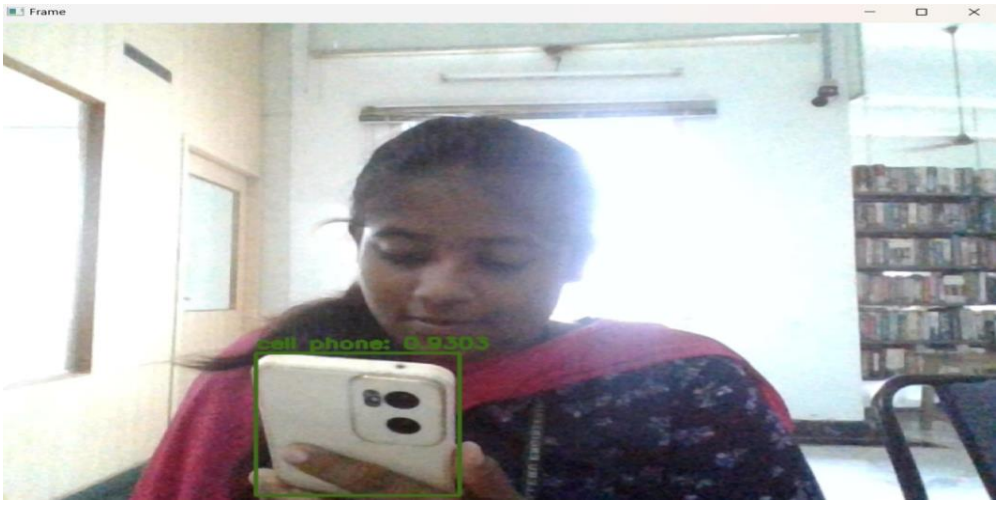


Fig 2: In The Above Screen Shot Object Detected As Cell Phone

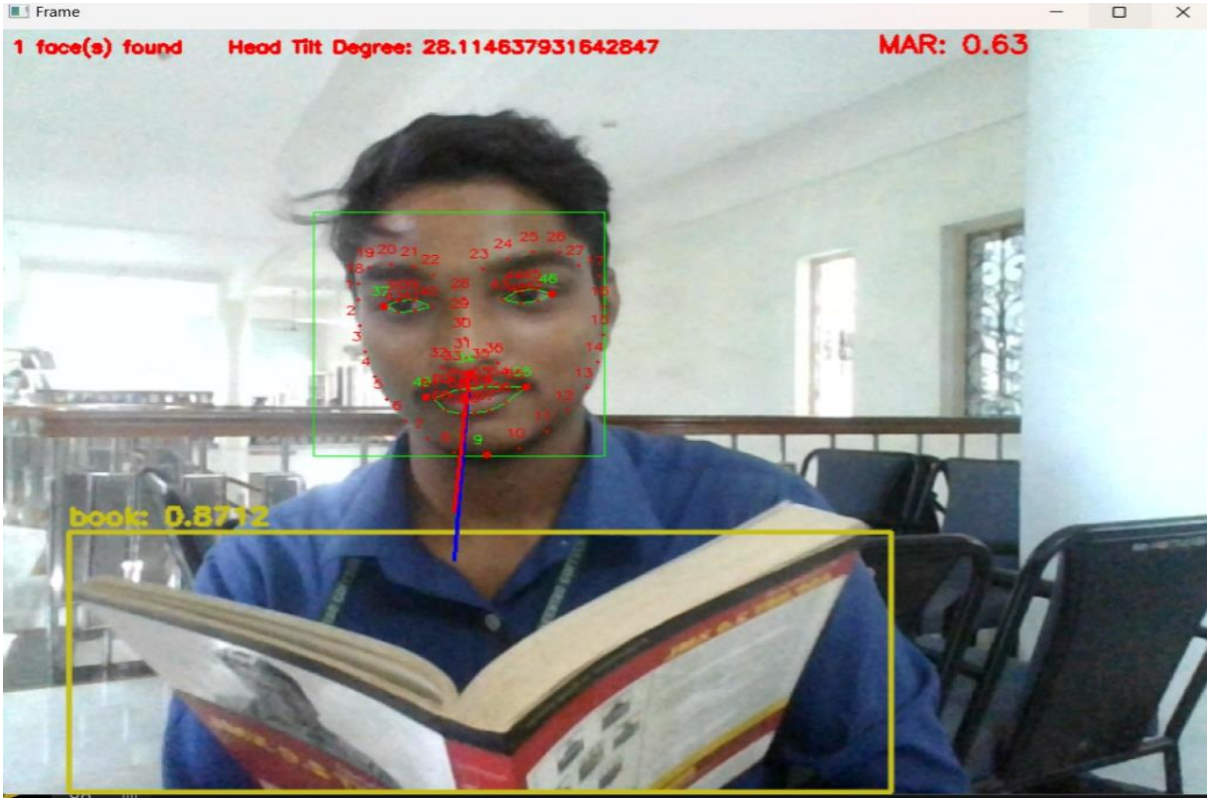


Fig 3: In The Above Screen Shot Object Detected As Book

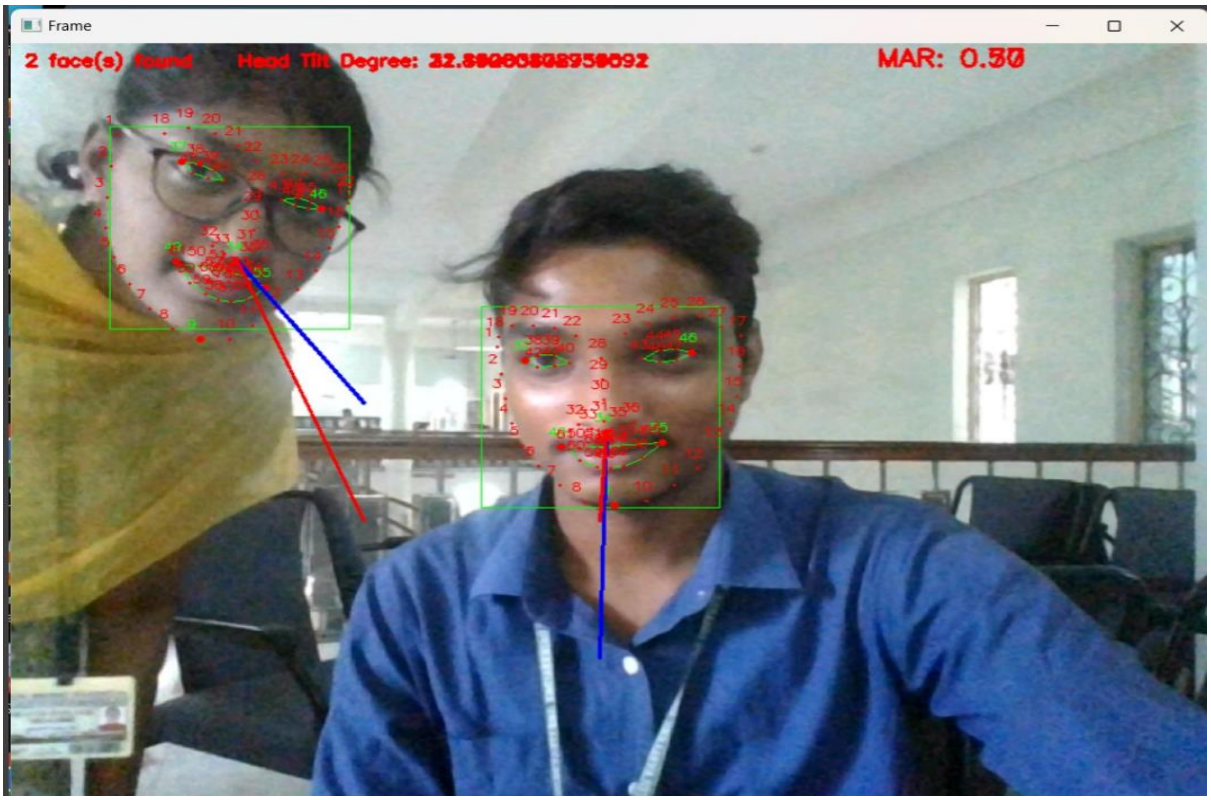


Fig 3: In The Above Screen Shot we founded two faces

5.CONCLUSION

Finally, our research aims to answer the growing demand for secure and dependable online proctoring solutions in the field of digital education. The expansion of online education and tests needs creative ways to ensure academic integrity. To detect and mitigate potential cheating behaviours during remote exams, our proposed comprehensive real-time online proctoring system integrates advanced technologies such as gaze

movement analysis, facial aspect ratio assessment, mouth opening status detection, and You Only Look Once (YOLO) object detection. The gaze movement analysis module monitors and analyses students' eye movements using sophisticated computer vision techniques such as eye tracking algorithms developed in Scipy. This allows the system to detect instances of prolonged off-screen viewing, offering a means to flag potential efforts to access unauthorised materials. Simultaneously, the face aspect ratio analysis component calculates the aspect ratio of important features using facial landmarks, assisting in the identification of anomalous head movements or departures from regular facial expressions suggestive of dishonest behaviour. Our proctoring technology goes a step farther by detecting mouth opening status using deep learning techniques. This feature improves the system's ability to detect instances of verbal communication or whispering during the exam, allowing for a more thorough examination of suspected misconduct. Furthermore, the incorporation of the YOLO object identification algorithm improves the system's ability to recognise forbidden things within the examination setting, such as phones and literature. Using a pre-trained YOLO model, the system detects and flags any unauthorised goods in the area of the students, giving an added layer of caution to the proctoring process.

REFERENCES

1. Alessio, H.M. and Messinger, J.D. (2021), “Faculty and student perceptions of academic integrity in technology-assisted learning and testing”, Frontiers in Education, Vol. 6, 629220.
2. Alessio, H.M., Malay, N., Maurer, K., John Bailer, A. and Rubin, B. (2017), “Examining the effect of proctoring on online test scores”, Online Learning, Vol. 21 No. 1, pp. 146-161.
3. Alessio, H.M., Malay, N., Maurer, K., Bailer, A.J. and Rubin, B. (2018), “Interaction of proctoring and student major on online test performance”, International Review of Research in Open and Distributed Learning, Vol. 19 No. 5, pp. 166-185.
4. Ali, I., Narayan, A.K. and Gedera, D. (2022), “Transforming assessment in accounting education to align with online learning”, Pacific Accounting Review, Vol. 34 No. 4, pp. 536-547.
5. Allan, S. (2020), “Migration and transformation: a socio-material analysis of practitioners' experiences with online exams”, Research in Learning Technology, Vol. 28, doi: 10.25304/rlt.v28.2279.
6. Andreou, V., Peters, S., Eggermont, J., Wens, J. and Schoenmakers, B. (2021), “Remote versus on-site proctored exam: comparing student results in a cross-sectional study”, BMC Medical Education, Vol. 21 No. 1, p. 624.
7. Arnò, S., Galassi, A., Tommasi, M., Saggino, A. and Vittorini, P. (2021), “State-of-the-art of commercial proctoring systems and their use in academic online exams”, International Journal of Distance Education Technologies, Vol. 19 No. 2, pp. 41-60.
8. Barrio, F. (2022), “Legal and pedagogical issues with online exam proctoring”, European Journal of Law and Technology, Vol. 13 No. 1, available at: https://ejlt.org/index.php/ejlt/article/download/886/1054 (accessed 11 August 2023).
9. Baso, Y.S. (2022), “Proctoring and non-proctoring systems. A comparative study of online exam scores for an Arabic translating course”, International Journal of Advanced Computer Science and Applications, Vol. 13 No. 6, pp. 75-82.
10. Berggren, B., Fili, A. and Nordberg, O. (2015), “Digital examination in higher education – experiences from three different perspectives”, International Journal of Education and Development Using Information and Communication Technology, Vol. 11 No. 3, pp. 100-108.