International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 12 Issue: 04 | Apr 2025 www.irjet.net p-ISSN: 2395-0072

Smart Proctoring System for Secure and Fair Online Exams

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Abstract - *In recent years, online examinations have become more and more popular because of their flexibility. Especially under the effect of COVID-19 pandemic, guaranteeing exam cheat-free becomes a big challenge for educational institutions. In this paper, we propose the AI-based proctoring that does not require continuous human being supervision. The system uses neural networks and machine learning to detect inevitable actions in a test such as eye movement tracking, mouth movement tracking and device using checking etc. Experimental results show that our developed system decreases cheating rate and outperforms other human-based proctoring approaches.*

Key Words: AI proctoring, cheating detection, machine learning, online exam security, proctoring automation, real-time monitoring

1. INTRODUCTION

This research targets with a growing challenge of academic dishonest that has become evident in remote exams, especially after the expansion of online education. That is, the traditional methods for exam proctoring based on human invigilators are no longer applicable and feasible in the digital era. Hence we propose an innovative solution, namely an AI-empowered proctor system as an integrated part in online exam environments to monitor students and maintain the exam integrity during real-time. By employing advanced algorithms and machine learning, AI proctors can recognize facial expressions indications, distinguish screen activities as well as capturing background variances even more sufficiently than human.

The crux of our project lies in merging AI with MERN stack to get a scalable and secure structure for creating an efficient real-time exam monitoring system. The AI track, evaluates and constantly monitor's the examinee throughout the examination duration. Whenever AI finds any deviations or malpractices like unauthorized olding of objects, usage of foreign material or accessing external devices it will alert instantly which together helps us create a cheating free environment along with maintaining excellent user experience. This combination, mixture of artificial intelligence by keeping the web technologies suitable for all kinds of examinations as there are numerous types of tests conducted nowadays.

By converting from a reactive monitoring to a proactive surveillance, our proposed research demonstrates a new methodology of online exam security where the AI proctor doesn't only watch the examination but interacts with the examination and reports about any suspicion at first hand. Such advantage allows educational institutes to conduct secure exams for any number of examinees in different campuses or even time zones. This will be applicable as long as online based-learning becomes more prevalent over conventional courses. And also for e-assessment aspects this manuscript will have an opportunity to establish competition among future works which target ensuring fairness, accessibility and trustworthiness.

2. LITERATURE

In paper [1], authors addressed problem of online education, which became especially popular during COVID-19 pandemic all educational organizations were forced to change teaching process into distant mode and problems associated with academic integrity went up. As for students it now became easier to cheat the system using different services which can write student's paper or make exam instead of him, developers should urgently do something in order to use AI solutions, namely proctor-like systems during test administration on line and especially remotely over the Internet. For that kind of proctoring because of safety requirements new non-intrusive techniques are needed like face recognition and behaviour analysis to prevent from cheating.

In [2], the authors proposed an AI-based online exam proctoring system to guarantee the credibility and security of a remote exam. To monitor that students do not cheat during the exam, a webcam and microphone, as well as sophisticated algorithms, are used. The authors

introduced a concept called "computer isolation" where students cannot open or switch tabs/any other application while they take the exam. For this purpose, they propose AEPS system (AI- based Exam Proctoring System) which uses artificial intelligent based down- streamed processing on facial expression recognition, head movement of candidates and object detection to detect any suspicious activities carried out by candidate during an examination ensuring its reliability.

Research paper [3] describes the usage of live proctoring where trained supervisors view and listen to students in real-time through audio/video feeds during online exams to detect any suspicious behaviors, such as presence of unauthorized devices or unusual location changes. Another method called recorded proctoring is also explored here, in which students can take the exam at their convenience and proctors review their sessions afterwards for any suspicious activities.Regular or recorded proctoring are good way to prevent impersonation or cheating but it also adds additional burden on post-exam human resources and increases the cost.

In paper [4], the authors present the challenges of designing and developing AI based proctoring systems. They use biometric technologies such as fingerprint recognition or behavioural biometrics to perform authentication and verify the identity of candidates to stop any kind of impersonation. Gesture recognition and object detection are also being combined with AI to supervise the activities of students while they are taking exams so that we can get more accurate results without any hassle.

The research in [5] also discusses the application of AI in proctoring systems. It explains that machine learning algorithms can be used to detect fraud by monitoring students' behaviours; for example, typing cadence and facial expressions can indicate whether a student is trying to cheat. The paper also notes that real-time detection and prevention of cheating requires a multi-layered monitoring approach utilizing audio and video analytics, as well.

In study [6], authors presented a hybrid proctoring model which uses both AI and human. In this model, real time supervised interfaces (systems like "ProctorU") are provided to the live proctors for continuous monitoring of the test takers along with the suspicious activities detection algorithms based on AI. This hybrid model ensures high accuracy and trust level of proctoring by maintaining flexibility provided by AI-based system and security ensured via human involvement.

Paper [7] presents another AI-based proctoring solution, the EU-funded TESLA project. It uses multiple biometrics like voice recognition, eye movement tracking and typing patterns for candidate authentication. These methods can also be used as part of the proctoring process to validate the identity of the candidates and the authenticity of answers given by them during an examination. There is a strong emphasis on security in online assessment but little work has been done so far to come up with foolproof systems.

Lastly, the use of advanced object detection system i.e. YOLO (You Only Look Once) to monitor the exam room and identify presence of suspicious objects that might constitute cheating during examinations conducted online are discussed in [8]. The suitability of using AI research by object detections system using YOLO is highlighted particularly when incorporated with AI algorithms providing real time inference. This paper indicated the potential inclusion of AI surveillance system as a major component to enforce academic honesty for online education as it is foreseen there will be increased in demand for online learning in future

3. PROBLEM STATEMENT

The fast development of online education, especially under the influence of COVID-19, raises a new challenge – protecting academic integrity on virtual exams. More convenience in learning process brings also much higher threat of dishonesty when students apply diverse, covert practices to defeat the exam safeguards. Existing proctoring solutions are beneficial but not designed for such multifaceted cheating scenarios like these presented today. We need more advanced and scalable solution which would be provided by Artificial Intelligence technology that will guarantee monitoring and securing online exams on massive scale. The aim is to develop AI driven proctoring system that will not only detect if examinee is cheating but also ensure fair and equal conditions for all examinees thus keeping examinations reliable in digital transformation era.

The increasing reliance on online examinations has laid bare some inherent vulnerabilities of examination administration, putting academic integrity at serious risk. Conventional proctoring mechanisms are either manual or semi-automated and are not well attuned to the massive scale and complicated nature of virtual test-taking, thereby enabling various forms of malpractices. Moreover, the effectiveness of human invigilators is being questioned increasingly: fatigue, inattention/oversight and varying skill-sets would result in inconsistent monitoring. Concerns related to invasion of privacy have also exacerbated tensions around students' acceptance of any invasive technology that invades their personal space during an examination process. In view of challenges aforesaid, there is an urgent need for an advanced, robust, and non-intrusive solution that can ensure fairness and security in online examinations.

An AI-enabled proctoring system appears as a viable option; however, it needs to be judiciously designed so as maintain balance among security efficacy assurance(s), individual privacy preservation, and user trust building.

4. STUDIES AND FINDINGS

A. Study on the Effectiveness in Higher Education:

This study was carried out by the researchers from the Indian Institute of Technology (IIT) to investigate how well AI proctoring fared during remote examinations for engineering and management students. It was found that academicians perceived that AI reduced cheating by 70% when compared to regular online exams held without any kind of proctoring. The perception was that the use of AI's facial recognition and behaviour tracking capabilities helped to uncover suspicious behaviours, for example, unusual eye movements and instances where a student switched between various screens. Students revealed that AI's objectivity had made them feel that such exams were more fair but poor internet connection was an issue highlighted by both acade-micians and students in general.

B. Findings on the User Experience:

A study conducted by University of Delhi measured user experience of students and faculty with AI proctoring usage.500 students and 100 faculty users provided their feedback. Students reported an increased sense of anxietyin AI proctored examination, expressing intrusive monitoring due to cameras and sensors. However, faculty had a favorable opinion related to features where it automated attendance and suspicious behavior alerts; 85% percent of the teachers believed that use of AI will not compromise academic integrity while conducting examinations, but similar perception among only 60% students.

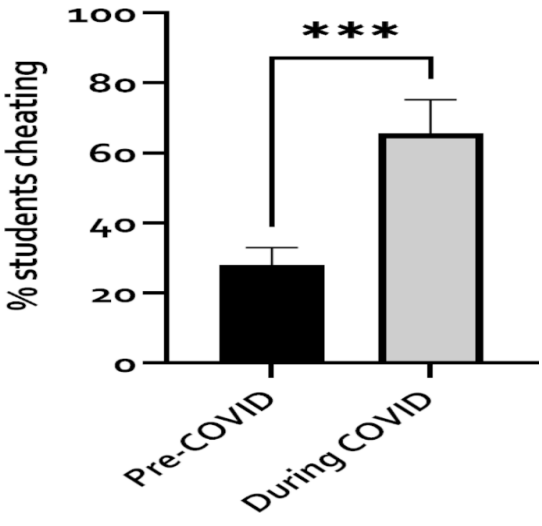

Fig. 4.1: Box Plot (survey)

This study reviewed survey research to determine how common it is for university students to admit cheating in online exams, and how and why they do it. We also assessed whether these self-reports of cheating increased during the COVID-19 pandemic, along with an evaluation of the quality of the research evidence which addressed these questions. 25 samples were identified from 19 Studies, including 4672 participants, going back to 2012. Online exam cheating was self-reported by a substantial minority (44.7%) of students in total. Pre-COVID this was 29.9%, but during COVID cheating jumped to 54.7%, although these samples were more heterogenous.

5. METHODOLOGY

It has a workflow which is structured and well defined because it is necessary to take care of exam's integrity and security in virtual environment also user's privacy. So here given method will give you step by step details of approach followed for implementation of the project:

The system requires following Hardware and Software components.

5.1 SOFTWARE REQUIREMENT

i. VS-Code (IDE)
ii. Tech Stack:
   a. *Frontend*: Reactjs, Redux-toolkit, Material UI, JavaScript.
   b. *Backend*: Nodejs, Express.js
   c. *Database*: MongoDB
   d. *AI/ML Model*: TensorFlow.js, COCO-SSD
   e. *Deployment*: Vercel
   f. *File Handling*: Multer for uploads
   g. *Authentication*: JWT

5.2 HARDWARE REQUIREMENT

i. Processor: - Intel 5th Generation or above
ii. Memory: - 8 GB or above
iii. Hard Disk: - 100gb

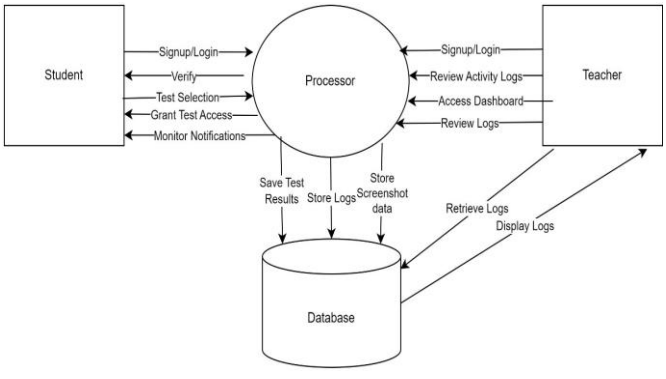

Fig. 5.1: Data Flow Diagram

A. User Authentication and Authorization:

- Step 1: Students have to login before starting the exam with secure credentials.
- Step 2: Multi-factor Authentication (MFA) based Identity verification - Use your biometric (face Me Photo or fingerprint), Enter unique ID.
- Use of email or mobile-based OTP (One-Time Password). This way, you are granted with access to exam platform and your session is locked for any unauthenticated access further.

B. Environment and System Check:

- Step 1: The system will scan the user environment through the webcam in order to detect multiple monitors, mobile phones, or any unauthorized aids which could be used for cheating purposes.
- A browser lock is initiated which will not allow user to open new tab, use any shortcut keys or use external software's etc. System keeps a check on CPU usage if in case any background application helping in doing malpractice.
- An initial network test happen to make sure that they have good connectivity and there won't be any disturbance during the entire proctoring.

C. Real-Time Monitoring with AI Algorithms:

- Step 1: Our system will keep on monitoring user's activity during examination via webcam, microphone and screen sharing. Our AI algorithms will be continuously monitoring your facial expressions, eye movement, body gestures etc. it can detect any kind of suspicious activity like looking frequently here and there or speaking something.
- Step 2. Audio detection keeps check if any abnormal sound or voice clue e.g. external help, conversation and other distracting voices etc.
- Step 3. Recording of screen activity and AI detects if any unusual pattern occurred like copy paste text, tab switch or accessing restricted content.

D. Object Detection Model (COCO-SSD)

- Step 1: The COCO-SSD model is integrated into the system to perform real-time object detection during the examination. It continuously scans the exam environment to identify unauthorized objects such as mobile phones, extra faces, or external devices.
- Step 2: The AI model processes webcam feeds frame by frame, ensuring low latency and high accuracy in object recognition. Detected violations are logged instantly for review.
- Step 3: Performance evaluation is conducted using metrics like accuracy, precision-recall, and F1-score to maintain an optimal balance between detection efficiency and false positives.

E. Automated Screenshot Capture and Logging

- Step 1: The system captures periodic screenshots of the examinee's screen and webcam feed to maintain a visual record throughout the exam.
- Step 2: Each screenshot is encoded into Base64 format, optimizing storage without compromising image clarity.
- Step 3: Using Multer, the system securely stores images on the server while logging metadata such as timestamps, detected anomalies, and session details in MongoDB.

F. Violation Detection and Handling

- Step 1: The AI-powered monitoring system continuously evaluates user behavior, defining strict thresholds for detecting exam rule violations.
- Step 2: If an examinee's face is absent for an extended period, multiple faces appear, or a mobile phone is detected, the system flags it as a potential violation.
- Step 3: Upon reaching predefined violation thresholds, the system can automatically alert the invigilator, issue a warning, or terminate the exam, depending on the severity of the breach.

G. Code Execution

- Step 1: The platform enables real-time execution of programming languages, including Python, JavaScript, and Java, within a secure coding environment.
- Step 2: The system instantly identifies and highlights syntax errors, allowing students to make necessary corrections without external assistance.
- Step 3: In the case of runtime errors, the system logs error details and provides structured feedback to ensure transparency in execution while preventing any unauthorized debugging tools.

H. Backend API Design

- Step 1: The system includes API endpoints for logging and retrieving cheating incidents, ensuring seamless integration with the proctoring platform.
- Step 2: The POST /api/exams/cheatingLogs endpoint is used to store detected violations, including screenshots and metadata.
- Step3:The GET /api/exams/cheatingLogs/:examId endpoint retrieves all logged violations for a specific exam, while POST /api/exams/logViolation updates the violation count per examinee.

I. Suspicion Detection and Alerts:

- Step 1: Behaviors are evaluated by AI driven algorithms with comparison to pre-defined thresholds of suspicion.
- Step 2: In case of any irregularities (like prolonged eye deviation, or multiple faces detected in the frame), automated alerts are sent by the system to the invigilators for further review.
- Step 3: Invigilator is provided with a live dashboard, where he can view each student in detail and high-risk candidates are flagged automatically so that immediate action can be taken.

J. Intervention and Logging:

- Step 1: In the case of repeated suspicious activities the invigilator is prompted to intervene by either pausing the exam or communicating directly with student through the platform.
- Step 2: All suspicious incidents are automatically recorded with timestamps and evidence (videos, screenshots, audio) for post-exam review.

K. Post Exam Analysis and Report Generation:

- Step 1: Once the exam is over, AI models will process the data and generate a detailed report which contains the metrics on student behavior, flagged incidents, system performance and network stability during the exam.
- Step 2: Flagged incidents are reviewed by proctors and if any violations are detected during the exam, students are notified. Step 3: The report is safely kept with audit privacy controls so that authorized only people have access to it.

L. Data Encryption and Privacy Measures:

- Step 1: All collected data (video recordings, audio, screenshots) get encrypted and stored in a secured manner to comply with privacy laws and institutional data policies.
- Step 2: We have tried to intrude into Privacy as minimum as we can. We use minimal data to configure exam monitor and do not capture or deal with any student's personal data.
- Step 3: Students know what is being captured and will have access to their monitoring results for a duration after exams — again complete transparency & trust right there.

M. System Feedback and Continuous Learning:

- Step 1: The AI model is updated after every exam session, by machine learning algorithms trained on detected cheating incidents as well as user patterns, in order to improve future proctoring sessions.
- Step 2: Feedback from students and invigilators is gathered in order to improve the user experience and to fine-tune AI based suspicion detection sensibilities.

6. PROTOTYPE DESIGN

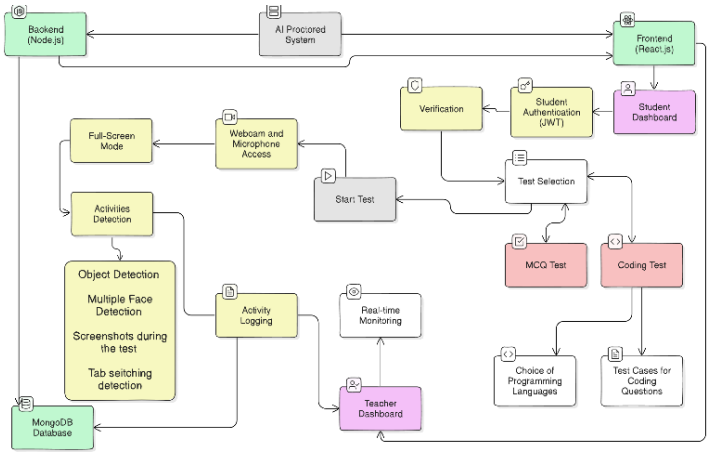

Fig. 6.1: Exam Proctored System Prototype

7. FEATURES

1. Real-time Webcam Monitoring – The system captures a continuous live video stream from the user's webcam, ensuring that the examinee remains present throughout the exam. This helps maintain integrity by detecting any unusual movements or absences.

2. COCO-SSD Object Detection – Using COCO-SSD, the system actively scans for unauthorized objects such as mobile phones or additional faces. This real-time detection enhances security by preventing cheating attempts.

3. Automated Screenshot Capture – The system takes periodic screenshots whenever suspicious activity is detected, providing visual proof of any potential rule violations. These images are securely stored for review by examiners.

4. Violation Detection and Logging – Any detected violations, such as multiple faces, absence of the examinee, or mobile phone usage, are logged in real-time. This ensures a structured record of infractions for post-exam analysis.

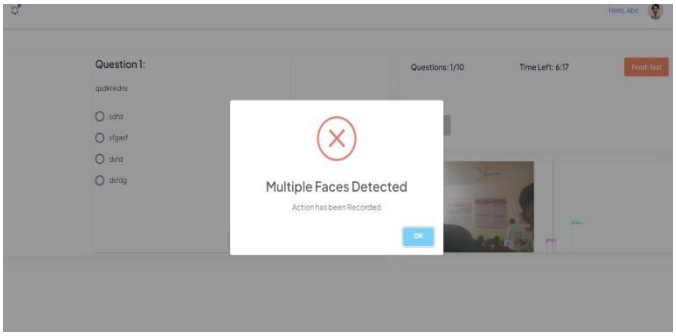

Fig. 7.1: Facial recognition and Eye tracking

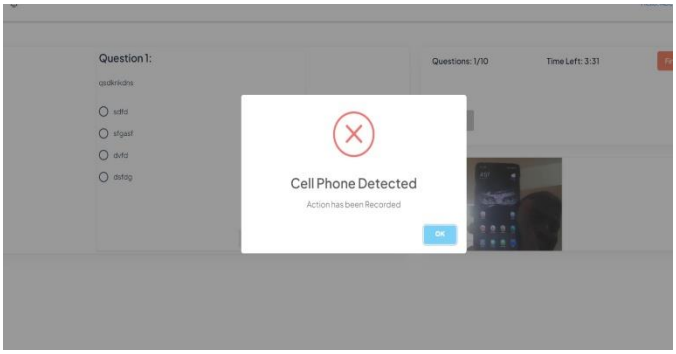

Fig. 7.2: Mobile phone detection while exam is ongoing

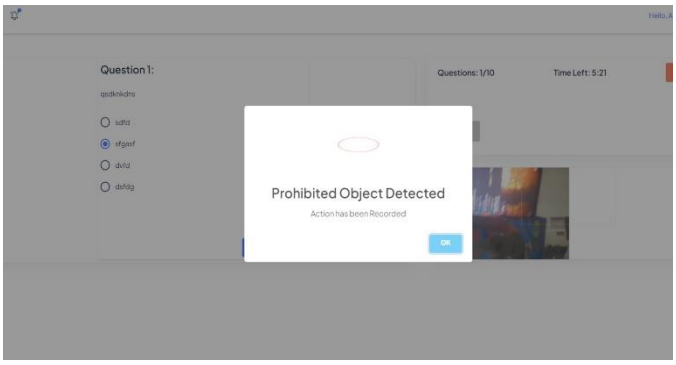

Fig. 7.3: Prohibited object detection

5. Dynamic Violation Threshold – A predefined violation limit determines when an exam should be automatically terminated. If the threshold is exceeded, the system ends the test to maintain fairness.

6. Secure User Authentication – The platform uses JWT (JSON Web Tokens) to manage user authentication and session security, ensuring that only authorized students can access the exam.

7. Code Execution Module – The system allows real-time execution of Python, JavaScript, and Java code, providing instant feedback to students while preventing unauthorized debugging tools.

8. Multer for File Handling – Multer is used for efficient file management, securely handling the storage of exam-related screenshots and logs for later review.

9. Express.js Backend – A Node.js-based backend powered by Express.js ensures smooth handling of exam routes, question management, and logging of cheating incidents.

10. MongoDB Database – A NoSQL MongoDB database stores essential exam details, questions, user information, and violation logs, ensuring structured and scalable data management.

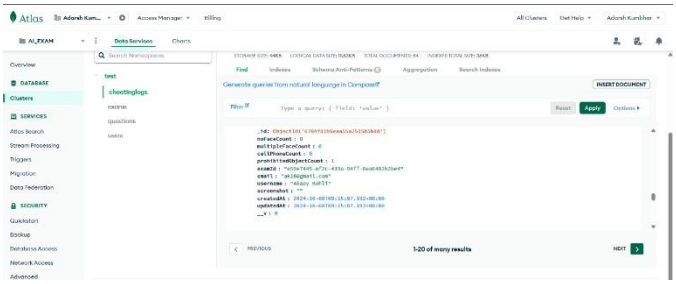

Fig. 7.4: Activity logging in Database

11. Redux for State Management – The system uses Redux to maintain a centralized state, efficiently managing user sessions, exam progress, and violation tracking across the platform.

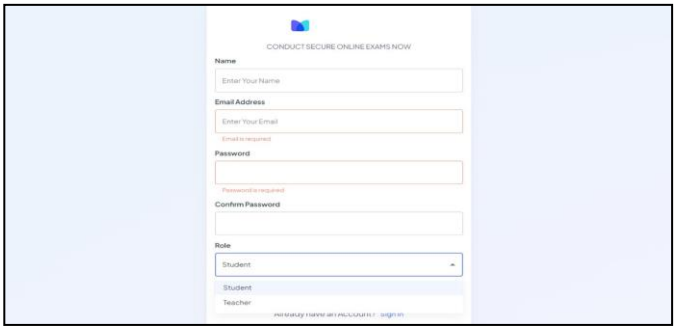

Fig. 7.5: User authentication.

12. Material UI for UI Components – A modern and responsive UI is built using Material UI, ensuring a visually appealing and consistent exam interface for users.

13. Snackbar Notifications – Real-time alerts are displayed using Snackbar notifications, immediately informing users and invigilators of detected violations or warnings.

14. Automatic Exam Termination – If violations surpass the allowed threshold, the system automatically ends the

exam, preventing further dishonest behavior and maintaining academic integrity.

15. Dashboard for Teachers – Teachers have access to a dedicated dashboard displaying real-time cheating logs, flagged screenshots, and violation summaries for fair assessment.

Fig. 7.6: Teacher Dashboard

16. RESTful API Endpoints – The backend provides RESTful APIs for managing exam data, cheating logs, and user sessions, ensuring smooth and efficient data exchange.

17. Object Detection Feedback Loop – The system continuously scans for unauthorized objects every three seconds, maintaining proactive surveillance throughout the exam.

18. Secure HTTPS Connection – Data transmission between the client and server is secured using HTTPS, protecting sensitive exam information from unauthorized access.

19. Cross-Browser Compatibility – The platform is designed to function seamlessly across various web browsers, ensuring accessibility without performance issues.

20. Scalable Architecture – Built to support a large number of concurrent users, the system ensures stable and efficient performance even under high exam loads.

8. EVALUATION AND TESTING

Regarding an AI-driven proctoring system, its assessment procedure is two-fold, referring to the measurement of both the technical capability of the system and its real-world applicability. The system is checked by a mixture of automated and manual tests to validate whether it operates more than one way (small tests, large exams, etc.) at best. Automated testing is used to examine functional parts of it as follows:

Network stability: The system should assure that it is still functional in various internet conditions.

i) Data encryption: Allowing safe data texting and saving of user information, conforming to privacy rules.
ii) Interface responsiveness: Making sure the user interface is self-explanatory and reliable thus allowing invigilators and students to interact with the program smoothly.

In addition to automated checks, real-time user testing is conducted to gather feedback from both exam proctors and students. This, in turn, suggests that besides the technical operation of the system, the user interface is exciting and easy to use. The major elements that have been tested include:

i) Detection Accuracy: How good the AI is at catching things like eye movement anomalies or noises outside the field which will result in misconduct. Moreover, this will make sure all the violations are caught.
ii) Scalability and Performance: The ability of the system to support many users at a time without affecting the performance of the system.
iii) User Privacy: Guaranteeing that the system complies with data privacy laws without compromising the proctoring system.
iv) System Usability: Checking alongside the mentors how easy the technology is to use, if any changes could be applied, and how well it functions in general. These will in turn help the system evolve according to real-world conditions.

All this finally cumulates in feedback-driven improvement to ensure that the system deployed at scale can be confident. Every finding of the testing phase feeds directly into updates to the system, including weaknesses and improving reliability for the overall platform. It's a robust, scalable, and secure solution for online exam monitoring, which ensures fairness, transparency, and user trust.

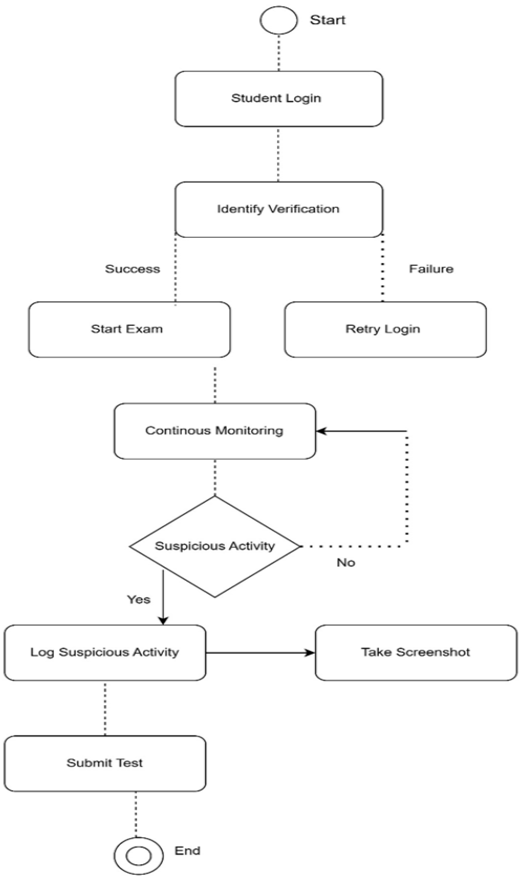

Fig. 8.1: Activity Diagram

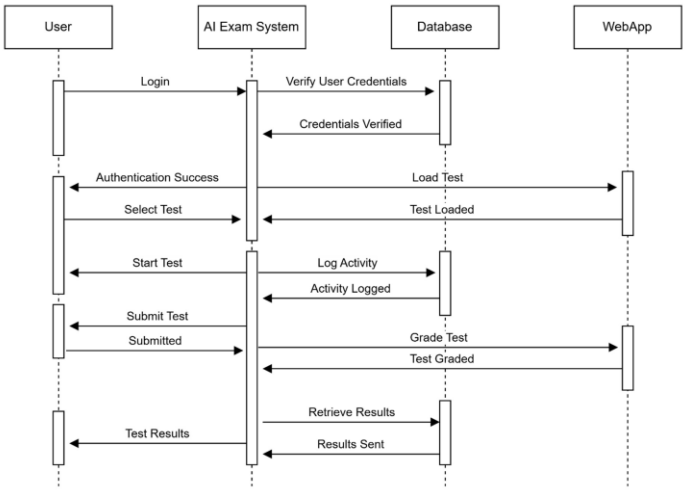

Fig. 8.2: Sequence Diagram

9. RESULTS, PERFORMANCE AND ANALYSIS

1. Accuracy and Efficiency
   - *a.* Average object detection time = 30ms
   - *b.* Screenshot save success rate =98%
   - *c.* Exam termination logic success rate =100%
2. Screenshots Captured and Logged
   - *a.* Number of cheating events logged per session
   - *b.* Average Face detection accuracy=95%
3. Load and Scalability Testing
   - a. Handled 100 concurrent exams with no downtime
4. Data Protection
   - a. JWT-based secure authentication
   - b. HTTPS for secure data transmission.
5. Privacy Handling
   - a. Screenshots are encrypted at rest
   - b. Logs are deleted after session expiry.
6. Comparative Analysis

Feature	Existing Systems	Proposed systems
Human dependance	High	Minimal
Real time detection	No	Yes
Automated Screenshot capture	No	Yes
Violation Logging	Basic	Detailed and Automatic
Code Execution	No	Yes

Fig. 9.1: Comparative plot

10. CONCLUSION

An AI driven proctoring system was developed in the project to cater some of the major challenges of online exam securities. A solution that uses machine learning algorithm and does real-time video based surveillance present a better secure approach for student monitoring during exam without human being involved. The project implements multilevel detections by surveying both environment and behavioral conditions which enhance the sedulity of proctor operation for any online examination. Since, it also considers privacy issue norms and user friendliness feature that makes it composite unique solution according to current new era trend of online education.

Moving ahead with advanced facilities like real-time feedback, multi-language support and more, in this project roadmap along with the collaboration will help us in achieving our final full deployment of proctoring model which will be the most intuitive one, to facilitate that easy-to-use environment and decrease false positive rate modifications are added. Moreover, future work is also focusing on scalability and adaptability of different educational platforms and students. This project provides an extensive modern solution for online examination to

become a secure, time consuming environment friendly user's e-proctor.

11. REFERENCES

[1] Covid-19 pandemic and online learning: the challenges and opportunities https://www.tandfonline.com/doi/abs/10.1080/10494820.2020.1813180

[2] A Systematic Review on AI-based Proctoring Systems: Past, Present and Future https://link.springer.com/article/10.1007/s10639-021-10597-x

[3] Online Student Authentication https://ieeexplore.ieee.org/abstract/document/9427463

[4] A Systematic Review of Deep Learning Based Online Exam Proctoring Systems for Abnormal Student Behaviour Detection https://www.researchgate.net/profile/Saad-Abid-4/publication/363432194_A_Systematic_Review_of_Deep_Learning_Based_Online_Exam_Proctoring_Systems_for_Abnormal_Student_Behaviour_Detection/links/631c31df0a70852150e1d964/A-Systematic-Review-of-Deep-Learning-Based-Online-Exam-Proctoring-Systems-for-Abnormal-Student-Behaviour-Detection.pdf

[5] The Role Of Machine Learning Algorithms In Enhancing The Accuracy And The Reliability Of Facial Identity, Verification In Online Assessment https://www.researchgate.net/profile/Temitope-Adetunji-2/publication/383384321_The_Role_of_Machine_Learning_Algorithms_in_Enhancing_the_Accuracy_and_The_Reliability_of_Facial_Identity_Verification_in_Online_Assessment/links/66ca11fb75613475fe7879e1/The-Role-of-Machine-Learning-Algorithms-in-Enhancing-the-Accuracy-and-The-Reliability-of-Facial-Identity-V

[6] Subramani, R., & Arulpandy, P. (2023). AI-Driven Proctoring System. In Engineering, Science, and Sustainability (pp. 200-205). CRC Press.

[7] Awaghade, A. T., Bombe, D. A., Deshmukh, T. R., & Takawane, K. D. (2017). Online Exam Proctoring System. International Journal of Advance Engineering and Research Development (IJAERD), e-ISSN: 2348-4470, print-ISSN: 2348-6406.

[8] Towards Data Science. (n.d.). Automating Online Proctoring Using AI. Retrieved from https://towardsdatascience.com/automating-online-proctoring-using-ai-e429086743c8

[9] How Common is Cheating in Online Exams and did it Increase During the COVID-19 Pandemic? https://link.springer.com/article/10.1007/s10805-023-09485-5