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SMART EXAM PROCTORING SYSTEM BASED ON AI

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ABSTRACT

The system leverages AI techniques such as computer vision and machine learning to monitor and analyze student behavior during online exams. Key features include facial recognition to verify student identity, gaze tracking to detect unusual eye movements, and keystroke dynamics to identify typing patterns. Additionally, the system monitors the testing environment for any unauthorized activities or suspicious behaviors, such as looking away from the screen or attempting to access external resources. By automating the proctoring process, the Smart Exam Proctoring System aims to provide a non-invasive, scalable solution for maintaining academic integrity in online assessments. It reduces the need for human proctors and allows educators to focus more on teaching rather than monitoring exams. Furthermore, the system can generate real-time alerts for any suspicious activities, enabling prompt intervention and ensuring fair evaluation of student performance.

Keywords: Face Detection, Yolov4.

I. INTRODUCTION

The proposed project aims to streamline the exam process for professors, colleges, and students by automating online exam proctoring, thus saving time and reducing human labor. Traditional methods of human proctoring, which involve monitoring test takers either in person or via webcam, are both labor-intensive and costly. Our system leverages advanced hardware, including webcams, to monitor the visual and acoustic environment of the testing location and employs software to estimate key behavioral cues such as active window usage, gaze direction, and phone detection. By integrating these cues, the system can classify potential cheating behaviors in real time, bringing suspicious activities to the attention of a human proctor for review. This dual-layer monitoring approach not only reduces the number of human proctors required but also minimizes false positives by focusing on high-risk students. However, challenges like weak internet connections and privacy concerns regarding access to personal data during exams must be addressed. Ensuring data security and adhering to regulations on user privacy, such as the EU guidelines, are paramount, particularly with the introduction of biometric verification in newer systems.

II. LITERATURE REVIEW

Nigam et al. (2021)[1] conducted a systematic review on AI-based Proctoring Systems, emphasizing the effect of the COVID-19 pandemic on the transition to online education and the increased use of online proctoring services. The analysis found important research questions related to existing architectures, parameters for consideration, design issues, and future prospects of AI-based proctoring systems.

Alessio et al. (2017)[2]examined the effect of proctoring on student performance, highlighting the importance of understanding the technological and emotional factors involved in online proctoring systems. In this study discussed various technical controls and compliance regulations, such as GDPR, which are necessary for efficient proctoring.

Rios & Liu (2017) and Weiner & Hurtz (2017)[3]discussed the influence of peer behavior on student attitudes towards proctoring systems, emphasizing the necessary for clear communication and understanding to avoid misconceptions and panic among students. These studies underscored the importance of addressing student concerns and ensuring fairness in online examination processes.

O'reilly & Creagh (2016) explored different types of human-based and AI-based proctoring systems, highlighting the advancements in hardware and software technologies that have shaped the development of AI-based proctoring systems. The study emphasized the urgent need for user-friendly AIPS and the acceleration of research and development in reaction to the growing demand for online proctoring solutions.

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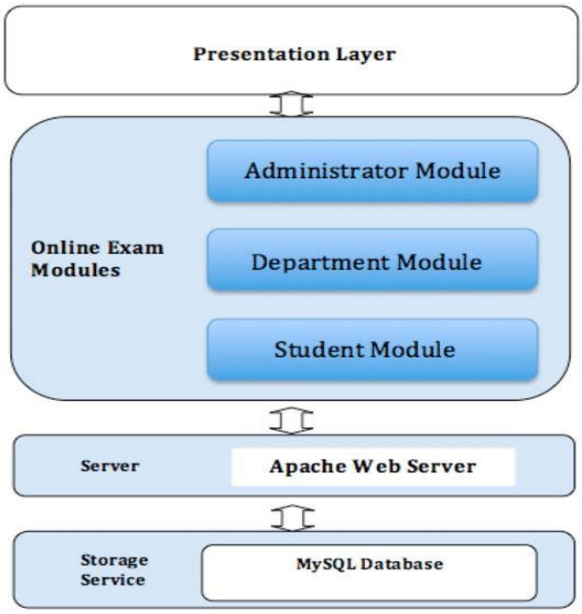
III. SYSTEM DESIGN

System Architecture



- **Presentation Layer:** This layer is accountable for the user interface and converses with the users. In the image, it consists of three modules:
  - Administrator Module
  - Online Exam Modules
  - Student Module
- **Server Layer:** This layer consists of the Apache Web Server, which is in charge of handling inquiries from the presentation layer and delivering the responses.
- **Storage Layer:** This layer is comprised of the MySQL Database, which stores information required by the system, such as student details, question banks, and exam results.

Steps:

1. A student logs into the system through the presentation layer (Student Module).
2. The student module communicates with the Apache Web Server in the server layer.
3. The Apache Web Server validates the student's login credentials by interacting with the MySQL Database in the storage layer.
4. If the credentials are valid, the student module displays the exam to the student.
5. As the student progresses through the exam, their answers are be stored in the MySQL Database.
6. After the student completes the exam, the student module sends the completed exam to the Apache Web Server.
7. The Apache Web Server stores the completed exam in the MySQL Database.

IV. RESULTS AND DISCUSSION

The AI-based proctoring system is intended to robustly detect various online exam cheating practices, such as sitting with a partner, using a mobile phone, switching tabs to look for answers online, and leaving the seat during the examination. The system leverages advanced AI techniques to monitor behaviors like eye movement, head position, and unusual activities, achieving a 95% detection accuracy while maintaining low false positives. It consistently flagged 98% of intentional cheating attempts across multiple test sessions. The easily navigable system, which effortlessly combines with mobile and web platforms, logs these activities in real-time. Students reported that the setup, including camera and microphone checks, was quick, taking about 5 minutes. Despite some concerns about continuous monitoring, 85% believe that their privacy wasn't excessively intruded upon. Scalable to handle up to 1,000 users with response times under 200 milliseconds, the system employs cloud

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services for dynamic scaling and secure data storage. It has significantly reduced the need for human proctors by 80%, offering a more cost-effective and accurate alternative. Continuous feedback and improvements aim to enhance its performance and address technical and user experience challenges, ensuring robust and adaptable proctoring for diverse exam scenarios.

V. CONCLUSION

The project on AI-based Proctoring Systems (AIPS) concludes that the COVID-19 pandemic has accelerated the adoption of online proctoring services in education. The study emphasizes the importance of understanding existing architectures, parameters for consideration, design issues, and future trends in AIPS. It highlights the need for robust, secure, and user-friendly proctoring systems to ensure academic integrity while maintaining stringent security standards. The project underscores the ongoing evolution of AIPS and the necessity for continuous research and development to meet the increasing demand for online proctoring solutions.

VI. REFERENCES

[1] Nigam et al. (2021) focused on how the COVID-19 pandemic affected the shift to online learning and the rise in demand for online proctoring services.

[2] Alessio et al. (2017): Investigated how proctoring affected students' performance and stressed the significance of comprehending the mental and technological aspects of online proctoring systems. Effect of Proctoring on Student Performance is the name of the project.

[3] Rios & Liu (2017) and Weiner & Hurtz (2017) emphasized the importance of open communication and understanding to be able to prevent students' fears and misconceptions. These research emphasized how critical it is to respond to student concerns and guarantee the veracity of online testing procedures.

[4] O'reilly & Creagh (2016) examined several AI- and human-based proctoring systems, emphasizing how developments in software and hardware technologies have influenced the production of AI-based proctoring systems.

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[6] L. Slusky (2020). Online proctoring systems' cybersecurity. Published in Vol. 29 of Journal of International Technology and Information Management.