

Virtual Overseer for Examination Using Artificial Intelligence

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Abstract. The Virtual Overseer for Examination using AI is a proposed system that utilizes artificial intelligence (AI) to monitor and supervise online exams. The system aims to enhance the credibility and integrity of online exams by detecting and preventing cheating behaviors such as copying answers or using unauthorized materials. The proposed system utilizes computer vision and machine learning algorithms to analyze exam sessions in real time and flag suspicious behaviors for review by human proctors. The system also employs facial recognition technology to authenticate test-takers' identity and ensure that the right person is taking the exam. Overall, the Virtual Overseer for Examination using AI has the potential to revolutionize online education and assessment by providing a secure and reliable platform for conducting remote exams.

Keywords: online exams, machine learning, examination system, artificial intelligence

1. Introduction

Online education and remote learning have become increasingly popular in recent years, especially after the COVID-19 pandemic. The pandemic caused learning loss not only for the students but also for the teachers. With schools closed and everyone in lockdown, teacher professional development opportunities became almost non-existent [1]. With the rise of online education comes the need for online assessments and exams, which can pose unique challenges for maintaining exam integrity and preventing cheating. One of the primary concerns for the educational system is the integrity of online assessments, that is, the need to conduct the exams using the appropriate tools and methods [2]. Online exam supervision technologies were booming due to growing demand for online courses and off-campus assessment options amid COVID-19 lockdowns [3]. In traditional in-person exams, proctors monitor and supervise the exam to ensure students follow the rules and do not cheat. Assessment integrity is an important and challenging issue, especially as testing becomes more commonly distant from the classroom setting. Online exams can be proctored in a variety of ways, and they include: in-person testing, either by requiring students to physically attend a testing session at the institution or arrange for an approved proctor remote from the institution (such as a testing center or individually arranged proctor), relying on an honor system, or utilizing online real-time proctor services [4]. However, this level of supervision is challenging to replicate in online exams where students can take the exam from any location, making it challenging to monitor their behavior. To address this challenge, we propose the Virtual Overseer for Examination using AI, a system that utilizes artificial intelligence to monitor and supervise online exams. Proctoring methods such as identity verification, keystroke recognition, and video proctoring have been

used to protect online exams [5]. The proposed system aims to enhance the credibility and integrity of online exams by detecting and preventing cheating behaviors such as copying answers or using unauthorized materials.

The system uses computer vision and machine learning algorithms to analyze exam sessions in real time and flag suspicious behaviors for review by human proctors. Additionally, the system employs facial recognition technology to authenticate test-takers' identity and ensure that the right person is taking the exam. For the online proctoring system, the examiner/proctor uses a web camera to record the student taking the test and a secure server to save the video, which the examiner can then see. The examiner or proctor may investigate any questionable action [6].

The Virtual Overseer for Examination using AI has the potential to revolutionize online education and assessment by providing a secure and reliable platform for conducting remote exams. This paper will discuss the technical details of the proposed system, including its design, implementation, and evaluation. The paper will also explore the potential benefits and limitations of the system and discuss future research directions in this area. The Virtual Overseer for Examination using AI is a proposed system that aims to address this issue. The system utilizes artificial intelligence (AI) to provide a secure and reliable platform for conducting online exams. The system uses computer vision and machine learning algorithms to monitor exam sessions in real-time, analyze the behavior of test-takers, and flag suspicious activities for review by human proctors. The system also employs facial recognition technology to authenticate test-takers' identity and ensure that the right person is taking the exam.

2. Literature Review

Online examinations have become a popular way of assessing students' knowledge and skills in today's digital age. However, ensuring the credibility and integrity of online exams has proven challenging, as cheating and malpractice remain significant concerns. In response to this issue, researchers have proposed various solutions, including using artificial intelligence (AI) to monitor and supervise online exams. In this literature survey, we will review some existing research on virtual overseer systems for online examinations using AI. Several studies that examine the

Geetha et al. (2021) describe the design and implementation of a system for monitoring students during online exams using machine learning-based face detection and recognition algorithms based on the paper [7]. The authors propose using a face detection algorithm to detect faces in real-time during the online exam, followed by a face recognition algorithm to identify the students taking the exam. The system is designed to help prevent cheating during online exams by ensuring that the student taking the exam is the actual person who is registered to take the exam. The authors provide details about the machine learning algorithms used in the system, the dataset used for training and testing, and the evaluation of the system's performance. The results show that the proposed system effectively detects and recognizes faces with high precision and recall rates. Overall, the paper presents a promising approach to addressing the challenge of maintaining academic integrity during online exams.

Ahmad et al. (2021) describe a novel online proctoring system that uses deep learning techniques to monitor and ensure the integrity of online exams. The system integrates multiple methods, including face recognition, eye blinking, and object detection, to accurately identify the test-taker and detect any signs of cheating. The authors propose using convolutional neural networks (CNNs) for face recognition and object detection, and a custom-designed algorithm for eye blinking detection. The proposed system aims to minimize false positives while maximizing the accuracy of detecting cheating behavior during the exam. The results show that the proposed system accurately identifies test-takers and detects cheating behaviors, with low false-positive rates. Overall, the paper presents a promising approach for addressing the challenge of ensuring academic integrity during online exams using deep learning techniques [8].

Abbas and Hameed (2022) comprehensively review the existing literature on deep learning-based online exam proctoring systems that aim to detect abnormal student behavior during online exams. The authors systematically reviewed studies published in the last five years. They analyzed the different

techniques used for abnormal behavior detection, such as eye-tracking, face recognition, and keystroke dynamics. The paper also explores the limitations of existing systems and identifies areas for future research in this field. Overall, the paper contributes to the literature on deep learning-based online exam proctoring systems and can guide future research [9].

Garg et al. (2020) propose a system that uses convolutional neural networks (CNNs) to control the virtual exam-taking environment and ensure the integrity of online exams. The system aims to prevent cheating by limiting the test-taker's ability to access the unauthorized resources or engage in prohibited activities during the exam. The paper provides details about the system's design and implementation, including the use of pre-trained CNN models for object detection and NLP models for plagiarism detection. The authors also present the results of a pilot study conducted with a small group of participants to evaluate the system's performance. The results show that the proposed system is effective in detecting unauthorized resources and plagiarism during the exam, with high accuracy rates [10].

Prathish et al (2016) propose an intelligent system using machine learning techniques to monitor online exams and detect cheating behaviors. The system aims to address the challenge of ensuring academic integrity during online exams, where test-takers have easy access to external resources and tools. The proposed system uses a combination of supervised and unsupervised machine learning techniques, including decision trees, clustering, and association rule mining, to analyze the test-taker's behavior during the exam and identify any suspicious activities. The system also includes a feature that allows the instructor to review and verify the detected behaviors before making any decisions [11].

Ganidisastra (2021) describes an online exam proctoring system that uses deep learning face recognition to monitor test-takers during exams. The system is specifically designed for mobile learning (m-learning) environments, where test-takers take exams using their mobile devices. The proposed system uses a deep learning face recognition algorithm based on the VGG-16 model and implements an incremental training technique to improve the accuracy of the recognition model. The system also includes a feature that allows the instructor to review and verify the detected faces and ensure the integrity of the exam [12].

Vishnu et al (2015) on the paper [13] proposes an online proctoring system that uses heuristics to monitor test-takers during online exams and detect any cheating behaviors. The system aims to address the challenge of maintaining academic integrity in online exams, where test-takers have easy access to external resources and tools. The proposed system uses a combination of heuristics and machine learning techniques, including decision trees and rule-based algorithms, to analyze the test-taker's behavior during the exam and identify any suspicious activities. The system also includes a feature that allows the instructor to review and verify the detected behaviors before making any decisions.

Chua et al (2019) proposes an online examination system that utilizes question bank randomization and tab locking techniques to prevent cheating during the exam. proposed system randomizes the questions from the question bank, so that each test-taker gets a different set of questions. Additionally, the system uses tab locking, which prevents the test-taker from opening other tabs or windows during the exam, thus limiting their access to external resources. The system also includes a feature that allows the instructor to monitor the test-taker's activity during the exam and detect any suspicious behavior [14].

3. Research Method

The methodology for the Virtual Overseer for Examination using AI involves several key steps. These steps include data collection, pre-processing, feature extraction, model training, and real-time monitoring. Data collection involves collecting data from online exam sessions, including video recordings of the test-takers, keystroke logs, and other relevant data. This data is then pre-processed to remove any noise or irrelevant information and prepare it for analysis.

Next, feature extraction techniques extract meaningful features from the pre-processed data. For example, computer vision techniques can be used to analyze video recordings and extract facial features

and expressions. In contrast, machine learning algorithms can be used to analyze keystroke logs and extract behavior patterns. Once the features have been extracted, machine learning models are trained on the data to detect cheating behaviors such as copying, impersonation, and collusion. These models can be prepared using various algorithms, such as decision trees, support vector machines, and neural networks, depending on the nature of the data and the problem being addressed.

Finally, the trained models are deployed to monitor online exam sessions in real time and flag any suspicious behaviors for review by human proctors. The system can also use facial recognition technology to authenticate test-takers' identity and ensure that the right person is taking the exam.

3.1. Data Collection

In the Virtual Overseer for Examination using AI, data collection is a critical step in the methodology. The system collects various data types to monitor online exam sessions and detect cheating behaviors. One of the most important data collection types is video recordings of the test-takers. These recordings can be captured using webcams or other types of cameras, and they provide a visual record of the test-takers behavior during the exam session. Video recordings can be analyzed using computer vision algorithms to detect suspicious behaviors such as copying, impersonation, or collusion. In addition to video recordings, keystroke logs are another important type of data collected. These logs record every keystroke made by the test-takers during the exam session, including typing speed, keystroke timing, and other behavioral patterns. Keystroke logs can be analyzed using machine learning algorithms to identify patterns of behavior that may indicate cheating [15].

3.2. Pre-processing

In the context of Virtual overseer for examination, pre-processing refers to the set of operations that are performed on input data (such as images or video feeds) before it is fed into the AI models for analysis. The pre-processing step is critical in ensuring that the input data is in a format that the AI models can effectively analyze. This might involve operations such as resizing, cropping, color normalization, or noise reduction to ensure that the input data is consistent and optimized for analysis.

For example, in a face recognition module, the pre-processing step might involve identifying and cropping out the face region from a larger input image, normalizing the color and brightness levels of the image to reduce variation, and resizing the image to a standardized size to ensure consistency across different images. In an object detection module, pre-processing might involve resizing and cropping input images to ensure that objects of interest are centered and have a consistent size and aspect ratio, as well as removing background noise and other irrelevant details.

3.3. Feature extraction

Feature extraction is a crucial step in the design of a virtual overseer system for examinations using AI. In the context of an online proctoring system, feature extraction refers to the process of identifying and extracting relevant features from the pre-processed data (such as images or video feeds) that can be used to distinguish between different classes of objects or events. There are many techniques that can be used for feature extraction in AI-based online proctoring systems, ranging from simple thresholding and filtering operations to more complex machine learning algorithms. Here there is usage of CNN algorithm. For example, in a face recognition module, feature extraction might involve identifying specific facial features such as the shape of the eyes, nose, and mouth, and extracting numerical representations of these features that can be used to identify different individuals. Similarly, in an object detection module, feature extraction might involve identifying specific visual features such as color, texture, and shape, and extracting numerical representations of these features that can be used to identify and classify different objects.

3.4. Model training and testing

In the virtual overseer for examinations using AI project, model training and testing are crucial steps. During the model training phase, the dataset is fed into the deep learning models, such as the DeepFace and YOLOv3, for training. The training process involves the optimization of model parameters using backpropagation algorithms to minimize the error or loss function. This process involves multiple iterations until the model converges to its optimal parameters. After the model training, the testing phase begins, where the trained model is evaluated on a separate set of data. The model's performance is evaluated based on various metrics, such as accuracy, precision, recall, and F1-score, to assess its effectiveness in detecting and preventing cheating during online exams. It is crucial to perform extensive testing and validation of the model on various datasets to ensure its reliability and robustness in detecting and preventing cheating during online exams.

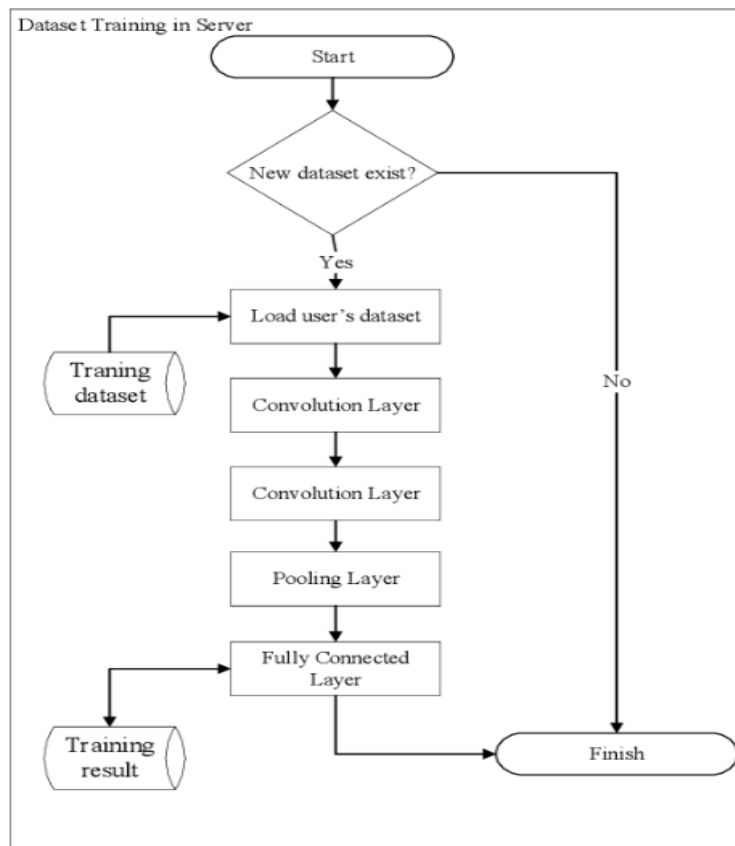


Figure 1. Flowchart of dataset training

4. Results

The design flow followed in the development of software which follows object-oriented approach. The first step is to register and next is login with user authentication. If it is success identify user, if that user is professor redirect to dashboard. In dashboard professor can create exam, monitor student and update and delete questions, report problem if any. After all these steps professor can exit from dashboard. If the user

is student who takes the examination, auto monitored is begun. In auto monitoring mobile detection, auto proctoring, face detection, window change.

A simplified workflow of the proctoring system is given below:

1. Exam setup
The exam details and settings, such as the number of questions, time limit, and exam rules, are configured.
2. Student Login
The students log in to the exam system using their credentials and start the exam.
3. Monitoring
The AI-based monitoring system starts monitoring the students' activities during the exam, including their facial expressions, eye movements, and any suspicious activities.
4. Detection
The system uses deep learning models, such as DeepFace and YOLOv3, to detect any abnormal or suspicious behavior during the exam.
5. Alert
If the system detects any suspicious behavior, it immediately alerts the proctor or the exam administrator.
6. Review
The proctor or exam administrator reviews the alerted incidents to determine if any cheating occurred during the exam.
7. Result
After the exam, the results are generated, and the students' performances are evaluated based on the exam's parameters and the monitored activities during the exam.

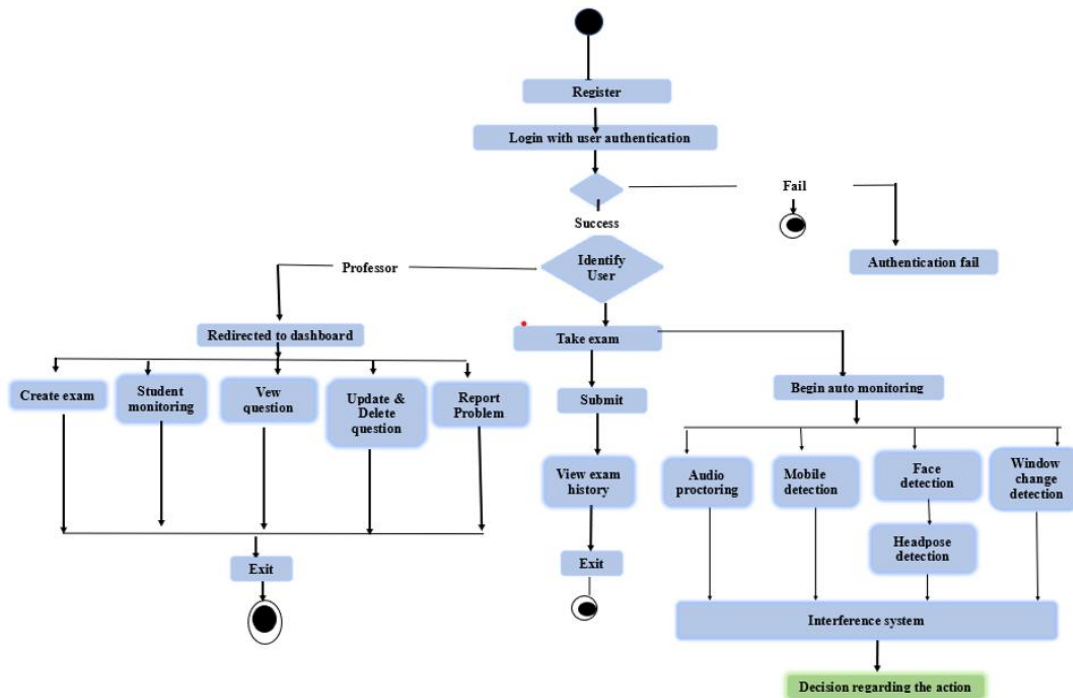


Figure 2. System workflow

The impact of a Virtual Overseer for Examination using AI is significant in several ways. Here are some of the potential impacts:

1. Increased exam security

Using AI, the Virtual Overseer for Examination can significantly increase exam security by detecting cheating behaviors that may go unnoticed during traditional in-person exams. This can help maintain the integrity of online exams and ensure that students are graded fairly based on their knowledge.

2. Cost savings

Using AI, the Virtual Overseer for Examination can help reduce the cost of proctoring online exams by eliminating the need for human proctors. This can make online exams more accessible and affordable for students and educational institutions.

3. Time savings

Automated monitoring and detecting cheating behaviors can significantly reduce the time and effort required for manual monitoring and detection. This can help educational institutions streamline their exam administration processes and save valuable time and resources.

4. Improved student performance

By maintaining the integrity of online exams, the Virtual Overseer for Examination using AI can help ensure that students are fairly evaluated based on their actual knowledge. This can motivate students to study harder and perform better on exams, leading to improved academic performance.

5. Better quality of education

The Virtual Overseer for Examination using AI can help educational institutions maintain the quality of their online education programs by ensuring that exams are taken seriously and evaluated fairly. This can help students gain the knowledge and skills they need to succeed in their careers and make meaningful contributions to society.

Overall, the impact of the Virtual Overseer for Examination using AI can be significant in terms of improving exam security, reducing costs and time, improving student performance, and enhancing the quality of education.

5. Conclusion

In conclusion, the Virtual Overseer for Examination using AI is a promising technology that has the potential to enhance the security and integrity of online exams significantly. By using machine learning algorithms to detect cheating behaviors, the Virtual Overseer for Examination can help ensure that students are fairly evaluated based on their actual knowledge, while also reducing the time and cost associated with traditional proctoring methods. Additionally, this technology can motivate students to study harder and perform better on exams, ultimately improving the quality of education. While there are still challenges to overcome, such as data privacy concerns and the need for ongoing model refinement, the Virtual Overseer for Examination using AI represents a significant step forward in the evolution of online learning and assessment. We know a few aspects of how the procedure for online proctoring the ensuing papers will work. Any possible exam-related misconduct is rapidly discovered using these suggested frameworks. Systems can also show each cheating technique employed and record it separately in a log file. Consequently, keeping an eye on students while they take a test in real-time is simpler.

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