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Online Exam Anti-Cheat Guard

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Abstract

In present world, online education system is more prioritized which is started due to the COVID-19 pandemic therefore online exams also started. students can easily cheat during the online exam; so, we developed a 'Anti-cheat Guard' this will monitor the student's activities like talking with someone, tab-switching, absence of a person during the exam. We have used the facial recognition models for face tracking of the students. This work is real-time live monitoring system, its starts monitoring from starting of the exam to until exam ends, if any cheating occurs that device will alerts the voice message .we made simple web application which is very easy to access by any one, using this we can conduct the fair exams.

Keywords: *Authentication, Twilio, Cheating detection, Face tracking, Tab switching.*

1. Introduction

With the shift to online education, monitoring students during exams has become a significant challenge. Traditional in-person proctoring methods are not applicable, leading to increased instances of cheating. This paper proposes an 'Anti-cheat guard'. so, many students will take the online exam so this will be the big problem for detecting the cheating. In normal writ-ten exam teachers will eye on the students by walking continuously around class for control the cheating, But in online assessments, it was the biggest issue for watching every student. To solve this problem, I developed web app which is Graphical user Interface (GUI) for taking the online exam in any browser. If the any cheating occurs during the exam on the spot it voices over the messages with respect to that what he/she did during the exam, this is done through python libraries i.e. 'win-sound' and also some more cheating activities like tab-switching, more than one person, and etc.
In this work, I was explained the complete proposed system and how it is works, my dream is to conduct the strict exam and deserved students will get the best grade in the exam.

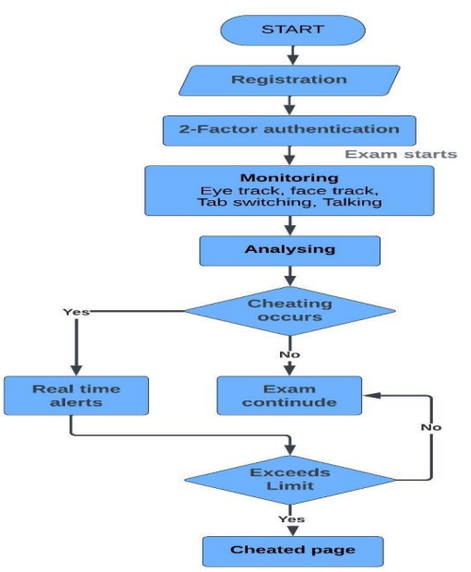

Figure 1:Flow Diagram of Proposed system.

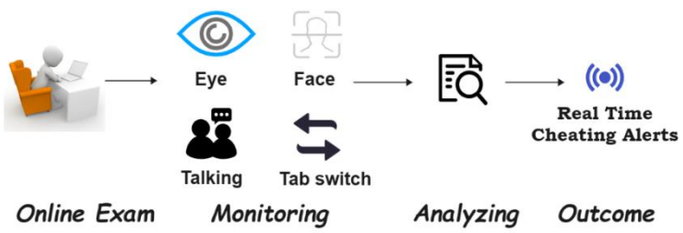

Figure 2 : Architecture of proposed system.

In the figure2, it describes about the complete flow of my proposed methods from beginning to ending. Initially students are going to take the registration process and then will start the online exam after that my proposed technique will monitor the student activities during the exam they are eye tracking, face tracking, more than one student, and tab switching the occurs during the exam and some other also included . After the monitoring starts it will analyze the real time captured frames based on computer vision and face landmark techniques. finally, my proposed system will give real time cheating alerts.

2. Literature Survey

This survey conducted on online exam anti-cheat guard which is done on the several research papers explores the variety of concepts, designs, implimentaion, and development.

Seng Zi ,Tee Connie in [1] proposed the Cheating Detection for Online Examination Using Clustering Based Approach it consists of a pre-determined dataset which is having a cheating behaviour of 50 students and its accuracy is 83%. Razan Bawarith , Dr. Abdullah Basuhail in [2] focused on the E-exam Cheating Detection System this system uses a fingerprint reader authenticator and eye tribe tracker for detecting the cheating. Mohamed Assal et al. [3] described a Smart Online Examination Anti-Cheat System in this system they used a Support vector machine(SVM) to train the pictures and principle component analysis (PCA) for face recognition. Mikel labayen, Ricardo vea in [4] proposed a Online Student Authentication and Proctoring System Based on Multimodal Biometricss Technology used a Biometric authentication, Ai-driven proctoring. Rattaphon Wuthisatian in [5] they focused on the Student exam performance in different proctored environments: Evidence from an online economics course here it is analyses the remote online proctoring versus on-site proctoring. Abdul Wahab Muzaffar, Muhammad Tahir in [6] presented a Systematic Review of Online Exams Solutions in E-Learning: Techniques, Tools, and Global Adoption they analyze the online examination methods of 53 studies from 2016-2020. Kerryn Butler-Henderson, Joseph Crawford in [7] outlined a systematic review of online examinations: A pedagogical innovation for scalable authentication and integrity this study conducts the review of thirty-six papers. Shabnam m, abdul khader jilani, in [8] presented a Feature Evaluation of Emerging E-Learning Systems Using Machine Learning : An Extensive Survey a focuses on elearning models. Seife Dendira, R. Stockton Maxwell, in the [9] described the Cheating in online courses: Evidence from online proctoring this uses a quasy-experimental design to evaluate the proctoring. Yousef Atoum, Liping Chen, in [10] developed a Automated Online Exam Proctoring this system uses a phone detection, window monitoring, voice detection, and gaze detection.

In comparison, our proposed system builds upon the existing systems with integrating multiple technologies to provide a more robust solution. Specially we utilize the face recognition

model and computer vision techniques to monitor the range of cheating behaviors. This approach not only enhance the accuracy of detection but also automates the monitoring process, reduces the human interventions. One key improvement is by performing the real time live monitoring with voice over alerts to the examinees.

3. Proposed method

This section consists of a working process of my proposed system with four stages and each stage plays a major role in this system.

3.1 Online Exam

This is the initial stage which is required for taking the online exam for a student , and this will start through the registration process and this is developed through the markup languages like HTML, CSS, Java script . and then followed by a 2-factor authentication for security, after this online exam will starts with questions and respective options with a timer also included. here I am used a Twilio API for 2-Factor authentication, and this is developed with a python programming language.

3.1.1 Twilio API

This is the cloud communication API this provides to send the One-time password(OTP) to a respective student mobile number, it acts as a 2-Factor authentication for my proposed system, this imported through the Twilio library in python programming code.

3.2 Monitoring

After the online exam starts this stage will automatically run in the background and camera starts functioning with the real-time video capture this will detects the presence of another person, absence of a person for period, talking, and tab switching. And this stage is developed with python programming language , all these tasks are done with the fallowing algorithms.

Here the system initializes the video capture device and loads the pre-trained facial landmark detector. In each frame, faces are detected, and facial landmarks are extracted.

3.2.1 Algorithms

Facial landmark detection with dlib

I am using the pre-processed model , using this we can detect the facial landmark on the face between the points. It calculates the Eye Aspect Ratio(EAR), Mouth Aspect Ratio(MAR), Gaze Ratio to detect the eye movement and mouth movement. The Eye Aspect Ratio(EAR) can be calculated based on this equation:

$$EAR = \frac{(p_2 - p_6) + (p_3 - P_5)}{2(P_1 - P_4)}$$

Equation 1: Eye aspect ratio calculation formula

and the Mouth Aspect Ratio(MAR) can be calculated using this equation:

$$MAR = \frac{(p_2 - P_{10}) + (p_3 - p_9) + (P_4 - P_8)}{3(P_1 - p_7)}$$

Equation 2: Mouth aspect ratio calculation formula

where p represents the point on the facial landmark in both EAR and MAR , based on this we determine the distance which is done through the python library i.e. spatial module.
EAR and MAR values are computed for each detected face.

Computer vision with OpenCV

Using this algorithm we can perform the image processing functionalities; it captures the video through webcam and converts the real image to grayscale image and applies the image processing techniques for eye region and mouth region extraction.

3.3 Analyzing

This stage is for analyzing the values which are generated from the image processing techniques and this is performed regularly until the camera off, and it compare the values with threshold values.

If the EAR falls below the threshold or the MAR exceeds the threshold for a predefined duration, the system triggers an alert.

Table 1:Comparsion b/w Threshold value and detected value

Parameter	value	Threshold value	Cheated
EAR	0.27	>0.25	no
MAR	0.18	>0.2	no
Number of Faces	2	>1	yes
Gaze ratio(Left)	0.6	0.8-1.2	yes
Gaze ratio(Right)	1.3	0.8-1.2	yes

Here Table1 represents the values through this we conclude that student is going to cheat or not, but one condition applies, if the value is remains same until some period then it will tell that he/she cheated because the values are fluctuating regularly so I have given period of time for condition to check ,if the student is doing the same thing during the exam values will not change.

3.4 Outcome

This is the final stage of this proposed system, based on the analysis it will decide the student is cheated or not , if he/she is cheated the real-time alerts will be activated .This is done through the python library 'Win sound'. The alerts are making the voice over messages through the respective speakers in English language., this will be the warnings messages to the students.
The system provides real-time voice alerts using Pygame to notify the proctor or examinee of any detected cheating behavior.

4. Results and Discussion

Online exam registration and 2-factor authentication are included before starting the exam. That is shown in the figure 3, and after the exam starts it will start the exam if the any cheating occurs during the exam cheating page will be displayed.

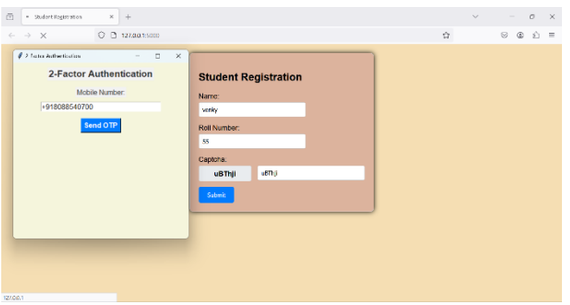

Figure 3: 2-F authentication & registration

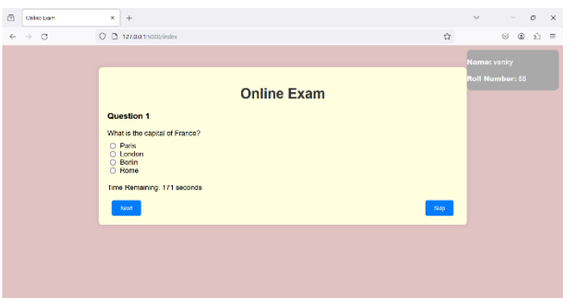

Figure 4:Online Exam

In the figure 4 it shows that user interface of the exam , in this timer also added for controlling the cheating. This is just exam interface in the background it will monitor the cheating activities which is explained the proposed system.

5. Conclusion

This paper is designed for stopping the cheating in online exam through webcam and computer vison. It will notify when the student is speaks, switches other tab, presence of another student and it will notify through the system speaker. With this we can conduct the honesty exams.

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