SMART ARTIFICIAL INTELLIGENCE BASED ONLINE PROCTORING SYSTEM

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ABSTRACT
Since COVID 19, there have been significant advancements in the field of teaching and learning. Academic institutions are going digital to provide their students more resources. Due to technology, students now have more alternatives to study and improve skills at their own pace. In terms of assessments, there has been a shift toward online tests. The absence of a physical invigilator is perhaps the most significant impediment in online mode. Henceforth, online proctoring services are becoming more popular, and AI-powered proctoring solutions are becoming demanding. In this project, we describe a strategy for avoiding the physical presence of a proctor during the test by developing a multi-modal system. We captured video using a webcam along active window capture. The face of the test taker is identified and analysed to forecast his emotions. To identify his head pose, his feature points are identified. Furthermore, aspects including a phone, a book, or the presence of another person are detected. This combination of models creates an intelligent rule-based inference system which is capable of determining if any malpractice took place during the examination

INTRODUCTION

Nowadays most educational institutions have been compelled to convert to an online education format, due to the pandemic crisis. Colleges began offering online lessons and assessments for a variety of courses. The COVID-19 Pandemic also had an impact on entrance examinations and the recruitment processes, which uses a written test to select candidates. In this context, academic misconduct is on the rise, whether in the form of plagiarism or cheating during the examination. A proctoring system is required to monitor all students, as there are more methods and possibilities for a student to cheat when tests are conducted online.

Even with numerous checks in place, such as the unique way proposed to electronically invigilate students during tests held in remote places, the possibility of a high incidenc of fraud in online examinations makes monitoring more difficult. As E-Learning courses become popular, so does the likelihood of a student cheating in tests in a number of ways, such as multi-window surfing, asking peers for answers, and even bringing unethical materials into the examination.

There are various proctoring software available to assist instructors in conducting tests online. The usual criteria for taking tests from anywhere is indeed a computer with acamera and an active internet connection. However, they only ensure integrity through the accreditation of professional proctors. But they still continue to bank on the human exam monitoring procedure. As a result, automating the monitoring process while maintaining reliability and low cost is a difficult task that is tackled in this work.

Keeping all this in view, we developed a model that:

• Detects face of the examinee.

• Detects the presence of a cell phone, book or any other person that can be used for malpractice.

• Detects head pose, eye-ball and mouth movement of the examinee.

Apart from that, the speech from the microphone will be recorded, converted to text, and will also be compared to the text of the question paper to report the number of common words spoken by the test-taker.

2. LITERATURE SURVEY

In [1] written by Neelesh Chandra M, Piyush Sharma, Utkarsh Tripathi, Ujwal Kumar, and Dr. G.C. Bhanu Prakash.Several papers are analysed relating to an automated examination system that can identify and flag any fraudulent activity to ensure fair examination concept. The

emphasis is on identifying errors by integrating computer audio and visual motions through camera and microphone. Eye ball tracking, Lip movement, Face spoofing, Mobile phone de- tection, Additional member detection in frame, and more characteristics are included in vision-based tracking. In audio- based flagging, mapping of audio to text conversion using Google voice recognition API is provided, coupled with flagging of significant noise disruptions.

W.Wang, K.Xu, H.Niu, and Xiangrong in [2] focuses on the absence of direct, timely,, and efficient communication in online courses. They also put light on studies mentioning a near and stable relationship between a person's facial expressions and emotions. A method is proposed to use a face recognition (FER: Facial Expression Recognition) system with online course platforms. The FER algorithm collects face photos from students utilising device cameras, and the facial expressions are evaluated and categorised into eight types of emotions. An online course with 27 students was utilised to evaluate the suggested technique, and the results showed that it functions well in a variety of contexts. This approach is also applicable to other comparable contexts, such as online exams.

The authors, Swathi Prathish, Athi Narayanan, and S. Kamal Bijlani in [3], created a well-rounded inference system capable of assisting the instructor in monitoring the students taking an online test. A system with three primary elements is proposed: active window capture, audio capture and video input processing. At the moment of inspection, active window capture allows for the automatic capture of all running processes in the system. The video input allows you to observe the student's face during the exam. The examinee's communication with someone else present can be detected via audio capture. It can also record variations of sounds in the testing environment.

In [4], focus by Aiman Kiun is on fraud detection in video recordings of examinations using Convolutional Neural Networks (CNN), whereby image classification models were built using Rectified activation units (RAU), which in turn displayed fantastic results for big size data sets. An interface, video processing, and frame categorization were all part of their system. The interface feeds the footage of the students taking the test into a pipeline consisting of a number of algorithms. The enormous recording would be reduced to a small number of minimalistic frames, and several duplicate or similar-looking frames would be removed. The aforemen- tioned frames are then sent into a pipeline, where they are used to train CNNs to recognise objects in the second part of the pipeline.

The work given by N.L Clarke and P. Dowland in [5] proposes a realistic strategy to permit remote and electronic proctoring during student examinations. The technique entails using transparent recognition to provide non-disruptive and permanent identification of the student's identity during the test taking process. A model is built, and an evaluation of the technology of the generated platform demonstrates the method's effectiveness.

2.1 OBJECTIVE

- To overcome the difficulties of offline examinations using a better proctored system.
- To provide a hassle-free smart exam proctoring system for conducting online examinations.

2.2 PROBLEM DEFINITION

Due to the current covid situation, it is not possible to conduct paper-based examination. Online examination requires a proctoring system to maintain credibility. An alternative to this is to conduct AI based exam proctoring.

I. PROPOSED SYSTEM

Online exam activity can reduce cost of physical exam up to certain extent. Online Examination Process can eliminate logistical activities related to paper-based exam process significantly.

Throughout the exam, we employed a webcam to obtain video input that was used to identify several factors such as the examinee's emotions, head pose estimate, multiple person detection, cell phone and book detection. When all of these features are integrated, they are utilized to detect harmful behaviors that may occur during the exam. As a result, the system makes a decision on the users' actions. Fig.1 depicts the block diagram of the mentioned system.

The remainder of this section elaborates the following topics:

1) Face Detection

2) Person and Phone Detection
3) Facial Landmarks Detection
a) Eye-ball Tracking
b) Mouth Movement Tracking
c) Head Pose Estimation

FUNCTIONALITIES

It includes four vision-based features as well as speech-to-text conversion:

1. Keep a watch on the candidate's eyes and note whether they're gazing left, right, or up.
2. By measuring the space between the candidate's lips at the start, you can see if he expands his mouth.
3. Find and report any mobile phones or other objects.
4. To figure out where the person is looking, estimate their head posture.
5. Create a text file using the user's words.

1. Face Detection

Face detection is a difficult computer vision task that involves detecting and locating people in images. Faces were previously found using Dlib's frontal face HOG detector. However, it did not produce satisfactory outcomes. Face identification models like Haar, dlib, Multi-task Cascaded Convolutional Neural Network (MTCNN), and OpenCV's DNN module were compared. The DNN module in OpenCV gives the best result. Eye tracking, mouth open close detection, and head position estimation all rely on face detections.

For the face detector, an extra quantized model has been added, which may be used by setting the option quantized to True when calling the get face_detector method(). On our machine, the conventional version of the face detector delivered 17.5 frames per second, while the quantized version gave 19.5 frames per second. Because it is uint8 quantized, this would be extremely handy when distributing on edge devices.

II. RESULTS

8.1 OUTPUT SCREENS

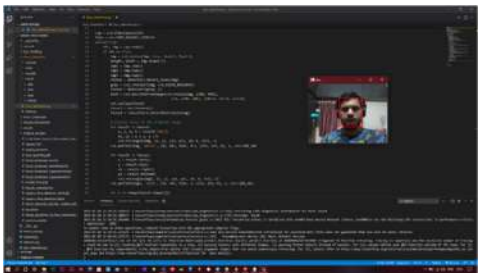

Fig 8.1.1 Detecting Face

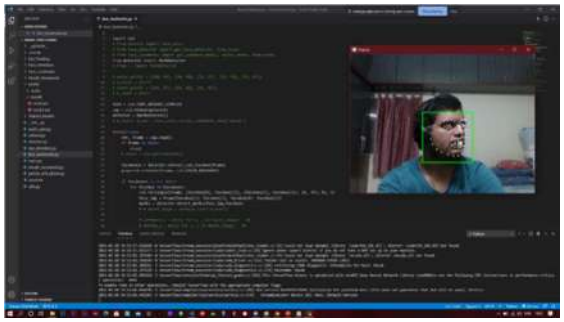

Fig 8.1.2 Detecting Face Landmarks

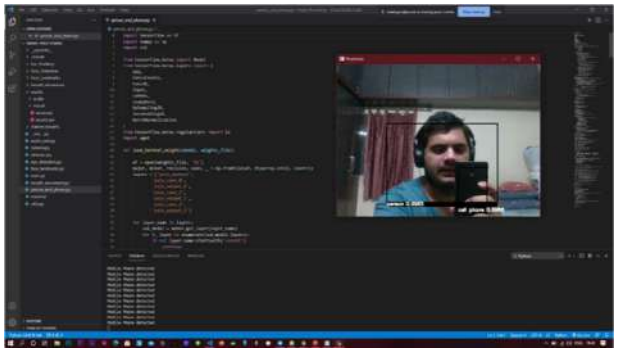

Fig 8.1.3 Detecting phone

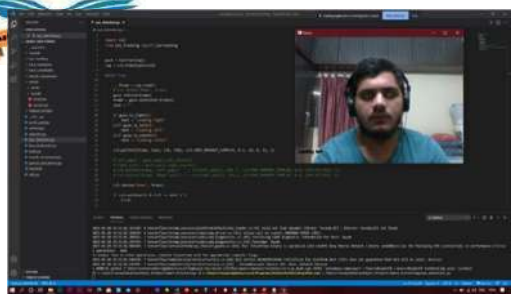

Fig 8.1.4 Tracking Eye-ball

Fig 8.1.5 Detecting Mouth Movement

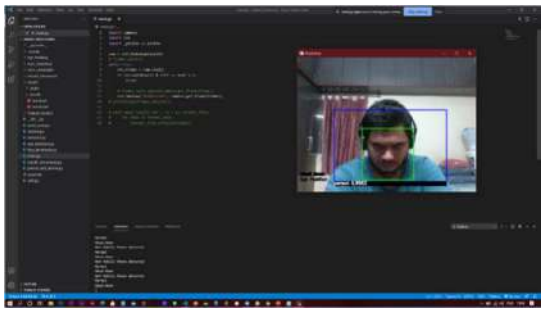

Fig 8.1.6 Detecting Head pose

CONCLUSION

The proposed "Smart Exam Proctoring Using Artificial Intelligence" is a solid and practical system to offer a platform for proctoring online examinations. To conclude, we have built an efficient, practical and accurate proctoring system which overcomes the challenges of the existing systems. This project is devised to replace the conventional offline examination techniques which promotes operational independence.

We have developed a visual model of a proctoring system to prevent harmful behavior during online exams. The functionalities of the system include:

• Emotion detection: Recognizing an examinee's emotions throughout an exam is one of the most important features in determining whether or not he is cheating. Fear expressed by the candidate could indicate that he or she is involved in criminal behavior.

• Estimation of Head Movement: Here, movement of the examinee's head can be an indication to engagement in cheating activities.

• Cell phone, book, and multiple person detection (Malicious object detection): Detecting the aforementioned items in the examinee's exam surroundings can also provide us with information on cheating techniques.

This system can be used in conjunction with a secure exam browser to prevent cheating in online exams. However, because the system will not be completely successful in eliminating all forms of cheating, human intervention may be required in such cases.

The future work could be to enhance the efficiency of models to have better proctoring system. This system can be infused with speech recognition technology to further increase the field of usage. The proposed system could also play a major role in virtual reality and security applications in the future.

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