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Face Recognition Classification in Proctored Exam

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Abstract—As the Covid pandemic has affected the whole world, remote and offline learning has been stopped indefinitely. Schools and Universities have been shut down and are now engaging in online learning and teaching. But there has been no solution for the examinations and how will they be conducted. Some have introduced an assignment-based system where the number will be given according to the assignments, some have changed to an internal assessment system and others have canceled the exams outright. We need to live with this norm now and some solutions need to be there. We shall introduce an Online examination proctored system where we will be able to detect the movements of the test tacker and ban him from cheating including the eyeball movements or if he/she giving a signal to someone and also we will be able to detect if he is using any phone or device. This can be done using YOLOV3, haaracassed face detection, and OpenCV.

Index Terms—Face Recognition, Mobile Tracking, Person movements, OpenCV, Exam

I. Introduction

Education system has been highly affected due to COVID Pandemic and the system needs to be changed and updated. Earlier the system was to conduct the examinations at school and colleges and conduct offline classes but the pandemic has stopped it indefinitely. Current technical advancements are characterised by more sophisticated and complicated uses of technology in everyday life, as well as the fact that humans as users of technology are constantly improving and influencing human actions, allowing every action and activity to function successfully and efficiently with current technological breakthroughs. [14]

Education system needs to be improved and has been improved because of the pandemic as the system needs to be shifted from offline to online so that the system can be used both for learning and as well as for assessments and examinations. The Internet plays a important role here as various domains are being digitalize and shifting towards online work.Over the last several years, e-learning has grown

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in popularity and has been extensively accepted by educational institutions. [10] [11]

It allows for the delivery of knowledge to pupils whenever and wherever they need it via the internet. As a result, it's also known as web-based or online learning. Hence E-learning is now being used but the teachers and students to enhance their skills and knowledge and no one suffers because of the pandemic. And nowadays many examinations are being conducted through online as it saves cost and the evaluation process becomes easy. [13] The authentication of the examine is the fundamental need in conduction of online exam. The main goal of this paper is to have a fool-proof automated system so that the exams can be conducted carefully and without any malpractices. [2] Because conducting tests in an illegal environment creates several opportunities for impersonating an authorised user, these online tests are administered at several licensed centres under the supervision of an authorised invigilator.

Candidate impersonation, often known as malpractice, is a major issue in the examination system. Ticket to the hall and In most cases, identity cards are utilised in the workplace. System for detecting fraud through examination.The current examination methodology is mostly concerned with using image analysis methods for documents in addition to a biometric method for identification, The classification and recognition of the a potential candidate In most cases, fraud is identified by when document image analysis is used. The

suggested model is centred on Analyze a picture or video. Malpractices are the most common problem in the examination system. This is owing to the lack of a trustworthy identity verification method for both offline and online tests. [1] Researchers have concentrated on the use of artificial approaches and biometrics to solve the aforementioned issues. Exam malpractices have been the subject of research in the past.

This paper investigates the methods to solve the problem of online examinations. The problem has been solved using the online examination proctoring system where facial recognition and eye ball tracking and object detection will be used. However, this is not enough; we need continuous authentication all over the exam session. In addition, we need a continuous process of monitoring and

controlling over all students during the exam period.Face recognition is an integral part of biometrics. In biometrics basic traits of human is matched to the existing data and depending on result of recognition system. There is a great diversity in the way facial appearance is interpreted for recognition by an automatic system. [9] [8]

II. RELATED WORK

Technology has provided us with a plethora of advantages and conveniences. One of them is online testing, which is quite important in the recruiting process. The days of applicants having to drive from their home to a designated testing centre to take the exam are long gone. This entire testing procedure takes a great deal of organisation, preparation, people, and money. Proctoring, also known as invigilation, is an essential component of the testing process that assures its impartiality and validity. A proctor verifies the test taker's identity and guarantees that he or she does not commit any malpractice or try the exam in an unfair manner. [4]

Exam proctoring is similar to an actual classroom situation, with proctors monitoring the exam from a location of their choosing. Exam proctoring is done in real time, with the use of artificial intelligence (AI) and human proctors who intervene if any suspicious conduct is detected. An exam proctoring system uses technology to simplify the entire test process for educators and students, providing convenience while still ensuring fairness and simplicity of invigilation. [5] [6]

Exam proctoring allows for test-taking and test-hosting from anywhere in the globe, which means that a web proctored exam or an online proctored exam may be taken at home, at a library, in an exam centre, or in any other secure location. The process of verifying, approving, and controlling the online test process in a scalable manner is known as remote proctoring. It's a tool that allows businesses to conduct assessments anywhere and at any time while maintaining strict security requirements.

In other words, applicants are not need to travel to a certain location because they can administer the examination from the comfort of their own homes. Every event specified in the system is developed, trained, and refined thousands of times using AI-based remote proctoring. An incident might be a single act or a pattern of identity theft, content theft, or deception.

If someone is caught gazing off-screen to the left, for example, it might be deemed a single data point, and that area of the video is separated and tagged as unfair means. When the quantity of such data points for the same behaviour exceeds a certain threshold, a continuous cycle of constructing, training, and refining begins. [6] [7]

Many of the domain names share a rich common literature with face recognition. Face tracking is required for each faces in the film, and there are numerous measures at the same time as detecting the faces, therefore we're going to estimate that exceptional head poses. The digicam, which detects faces, should be positioned within the examining corridor.These are taken from people's faces. To achieve accurate matching, it is necessary to use photo pre-processing to remove elements such as noise and background image.

III. PROPOSED METHOD

The AI will have four vision-based capabilities which are combined using multithreading so that they can work together:

Gaze tracking Mouth open or close Person Counting Mobile phone detection

Apart from this, 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.

A. REQUIREMENTS

- OpenCV
- Dlib
- TensorFlow
- Speech recognition
- PyAudio
- NLTK

B. GAZE TRACKING

We shall aim to track the eyeballs of the test-taker and report if he is looking to the left, right, or up which he might do to have a glance at a notebook or signal to someone. This can be done using Dlib's facial keypoint detector and OpenCV for further image processing. This is very similar to eye detection. Dlib's facial keypoints are again used for this task and the testtaker is required to sit straight (as he would in the test) and the distance between the lips keypoints (5 outer pairs and 3 inner pairs) is noted for 100 frames and averaged. If the user opens his/her mouth the distances between the points increases and if the increase in distance is more than a certain value for at least three outer pairs and two inner pairs then infringement is reported.

C. PERSON COUNTING AND MOBILE PHONE DETECTION

I used the pre-trained weights of YOLOv3 trained on the COCO dataset to detect people and mobile phones in the webcam feed. For an in-depth explanation on how to use YOLOv3 in TensorFlow2 and to perform people counting If the count is not equal to an alarm can be raised. The index of mobile phones in the COCO dataset is 67 so we need to check if any class index is equal to that then we can report a mobile phone as well. [5] [13]

D. COMBINING USING MUTLITHREADING

As eye-tracking and mouth detection are based on dlib we can create a single thread for them and another thread can be used for the YOLOv3 tasks: people counting and mobile detection. First, we import all the necessary libraries and along with the helper functions. Then the dlib and YOLO models are loaded. Now in the eyes mouth() function, we find out the facial key-points and work on them. For mouth detection, the original distances between in the outer and inner points are already defined and we calculate the current ones. If a certain amount is greater than the predefined ones, then the proctor is notified. For the eyes part, we find out their centroids as shown in the article linked and then we check which facial keypoints are they closest to. If both of them are on the sides then it is reported accordingly. In the count people and phone() function, YOLOv3 is applied to the webcam feed. Then the classes of objects detected are checked and appropriate action is taken if more than one person is detected or a mobile phone is detected. These functions are passed to in separate threads and have infinite loops in them which the proctor can break by pressing 'q' twice.

E. AUDIO

The idea is to record audio from the microphone and convert it to text using Google's speech recognition API. The API needs a continuous voice from the microphone which is not plausible so the audio is recorded in chunks such there is no compulsory space requirement in using this method (a ten-second wave file had a size of 1.5 Mb so a three-hour exam should have roughly 1.6 Gb). A different thread is used to call the API so that a continuous recording can without interruptions, and the API processes the last one stored, appends its data to a text file, and then deletes it to save space. After that using NLTK, we remove the stopwords from it. The question paper (in text format) is taken whose stopwords are also removed and their contents are compared. We assume if someone wants to cheat, they will speak something from the question paper. Finally, the common words along with its frequency are presented to the proctor. The proctor can also look at the text file which has all the words spoken by the candidate during the exam. [1] [12]

The function convert() uses the API to convert it to text and appends it to a file test.txt along with a blank space. This part will run for the entire duration of the examination. After this, using NLTK, we convert the text stored to tokens and remove the stop-words. The same is done for a text file of the question paper as well and then common words are found out and reported to the proctor.

RESULTS

To avoid cheating, this technique can be used in conjunction with a secure browser. Because a proctor is necessary to complete some processes, this initiative does not eliminate the necessity for one. There are other methods to cheat with this technology, such as a person sitting behind a laptop conversing with the test-taker through writing. External gear, such as a spectacle camera that covers the whole field of view of the test-taker and applies computer vision to its feed, would be required to entirely exclude cheating. However, this would defeat the purpose of creating an AI that anybody can use with nothing more than a regular laptop, and with this, a proctor can also supervise numerous students at once.

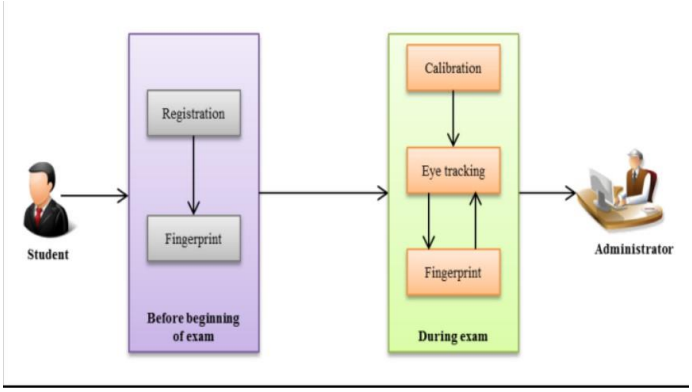

Fig. 1. Exam Management System

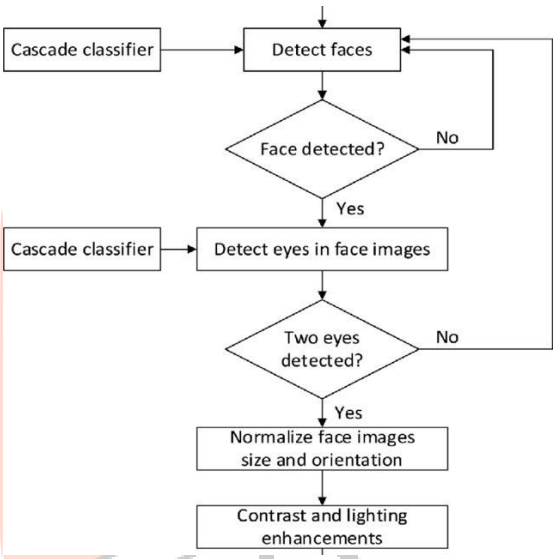

Fig. 2. Flow Chart

In Fig1. it is the system which we will be using in our project whereas the phases are before the exam and after the exam where fingerprints and eye scanner will be used.

A camera at the user's location is utilised to sample all frames required to authenticate and monitor the user. The user's face is identified and retrieved at a predetermined frequency from a single sample frame. The user either successfully enters into the VL or fails to log in and is forced to quit the VL after going through the first-time matching.

- personandphone.py is for counting persons and detecting mobile phones. YOLOv3 is used in Tensorflow 2 and it is explained in this article for more details.
- headposeestimation.py is used for finding where the head is facing.
- facespoofing.py is used for finding whether the face is real or a photograph or image.

If you testing on a different processor a GPU consider making a pull request to add the FPS obtained on that processor in Fig3.

Functionality	On Intel i5
Eye Tracking	7.1
Mouth Detection	7.2
Person and Phone Detection	1.3
Head Pose Estimation	8.5
Face Spoofing	6.9

Fig. 3. FPS

CONCLUSION

This study proposes a visual and auditory examination framework for conducting online tests, with the goal of maintaining academic integrity in e-learning. The framework is simple and easy to use from the perspective of the content creator, as it only requires two inexpensive cameras and a mouthpiece. We isolate low-level highlights from six essential sections using the captured recordings and sound: client confirmation, text location, discourse discovery, dynamic window identification, glance evaluation, and telephone location. These features are then generated in a temporary window in order to get substantial level highlights, and subsequently used for cheat detection. At long last, with the gathered information base of 24 test takers speaking to certifiable practices in online test, we exhibit the capacities of the framework, with almost 87Because many foundations continue to require the real presence of the understudy in a specific location to connect the understudy and the inspector at said location for administrative reasons, web-based instructing does not give comprehensive faraway educating as a rule. Nonetheless, there are now e-administering devices that allow this cycle to be completed remotely, without the need for physical presence. In addition, there is a consistent trend in the application of this methodology in MOOCs and open training throughout the world. [7]

As a result, the goal of this investigation was to discover the motivating factors that influence the execution of this evaluation framework, allowing the creation of a list of persuasive influencing variables when tolerating the use of new mechanical apparatuses (that is, the point at which the instructive framework accepts this device as a strategy for remote management), and determining if this device is a good fit for remote management. The following inspiring components are included in the list: quality administration (QM), open data (AI), outside moulding (EC), trust (T), saw similarity (PC), saw helpfulness (PU), mindset (A), and goal (A) (I). The most decisive aspect in this cycle is trust (T), which refers to the amount of security and protection that businesses have while using this technology (e-delegating). This is consistent with the primary line of inquiry into this device, where a big percentage of the studies focus on trust, as well as the safety of using it. However, despite the great working of the models that were appeared in the scholarly audit and that reviews such as those of Atoum, Chen, Liu, Hsu, and Liu, Davis, Rand, and Seay, OReilly and Creagh, and Kayser, stress the trust and security in e-delegating, and prescribe its utmost importance, this has not changed. This indicates that if merchants of these types of apparatuses want to conquer and solidify their usage in web-based educating organisations, they must conduct extensive correspondence and marketing efforts about the security and safety of this instrument. Not only that, but they should also complement and enhance the rest of the persuasive variables, as the trust factor receives the most influence from the other factors. [1]

As a result, they should also provide satisfactory previous data to these organisations as part of this mission, because many people are unaware of its characteristics (accessible data), the benefits of its use (saw usefulness), similarity to its type of business (saw similarity), and viability and quality with obvious outcomes (quality administration). They should also require their clients to disclose their use of this tool so that they may serve as an example to other foundations (outside molding). [3] The other two variables (disposition and aim), being two of the three factors generally subject to the rest, additionally owe their significance inside the framework and their degree of effect on different components. As a result, in general terms, it could be said that this is intended to change the vision of web-based educating establishments with respect to e-delegating and to energise the use of this apparatus in their foundations, allowing total remote instructing, which is what the online instructive framework requires. This exploration is restricted to the investigation of persuasive elements in the usage of e-delegating in instructive foundations, yet this impediment can be killed in future investigations and expand this examination to different kinds of components that additionally impact this execution, for example, the investigation of the shortcomings of the distinctive innovative instruments utilized by this far off oversight framework. [5]

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