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Online Face and Displacement Authentication System

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***Abstract*- In the era of recent technologies emerging at rapid pace there's not any reason why a big event in educational sector such as detection should be tired the old boring traditional way. Face and displacement authentication system will save lots of time and energy for the both parties' students as well as for the teacher proctors, moreover because the category teachers. Detection is being done by the face recognition algorithm by recognizing the face of the scholars as well as detection of object and other detection like head movement, mobile phone detection etc. To create an automated proctoring system where the user can be monitored automatically through the webcam. The Project is divided in various modules. To evaluate the proposed system, multimedia data has collected from some subjects performing various types of cheating while taking online exams. Extensive experimental results demonstrate the accuracy, robustness, and efficiency of online exam proctoring system.**

***Keywords*-Activity detection, Eye tracking, Face recognition, , Object (like mobile phones) detection, , Online proctoring**.

I. INTRODUCTION

MASSIVE open online courses (MOOCs) offer the potential to significantly expand the reach of today's educational institutions, both by providing a wider range of educational resources to enrolled students and by making educational resources available to people that cannot access a campus because of location or schedule constraints. Exams are a critical component of any program, and online educational programs aren't any exception. In any exam, there's a break of cheating, and so, it's detection and prevention are important. Educational credentials must reflect actual learning so as to retain their value to society. The authors in [15] state that the share of student's committing academic cheating activity is on the increase. Nearly 85% of scholars in 2019 indicated that it might be somewhat easy to cheat in online exams. They also found that in 2019, about 50% of the scholars admitted to cheating in online exams. When exams are administered in a very conventional and proctored classroom environment, the scholars are monitored by a person's proctor throughout the exam. In contrast, there are no convenient thanks to provide human proctors in online exams. As a consequence, there are no reliable thanks to ensure against cheating. Without the power to proctor online exams in an exceedingly convenient, inexpensive, and reliable manner, it's difficult for MOOC providers to supply reasonable assurance that the scholar has learned the fabric, which is one in every of the key outcomes of any program, including online education.

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A typical testing procedure for online learners is that the following: students come to an on-campus or university-certified testing center and take an exam under human proctoring. New emerging technologies, such as, e.g., Kryterion and ProctorU, allow students to require tests anywhere as long as they need a web connection. However, they still depend upon someone "watching" the exam-taking. for instance, Kryterion employs a personality's proctor watching a test taker through a webcam from a far-off location. The proctors are trained to look at and listen for any unusual behaviors of the test taker, like unusual eye movements, or removing oneself from the sector of view. They can alert the test taker orperhaps stop the test. During this paper, there is introducing of a multimedia analytics system to perform automatic and continuous online exam proctoring (OEP). The goal of this method is to keep up academic integrity of exams, by providing real-time proctoring for detecting the bulk of cheating behaviors of the test taker. To realize such goals, audio-visual observations about the test takers are required to be ready to detect any cheat behavior.

II. PROBLEM DEFINITION

A real-world student detection system which recognizes face of Student also their other movements including head movement and eye movement as well as it will also detect the object around the student.

III. LITERATURE REVIEW

Over the years, the demand for online learning has increased significantly. Researchers have proposed several methods to online exam proctor in the most efficient and convenient way possible, but still preserve academic integrity. These methods can be classified into three categories: (a) unsupervised [7], [24], (b) online human monitoring [8], [13], and (c) semi-automatic machine monitoring [17], [22]. No supervision does It does not

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mean that test takers are free to cheat. Instead, cheating is minimized in several ways. In [7], the authors believe they can boost academic honesty by proposing eight control procedures that allow teachers to increase the difficulty and thus reduce the probability of cheating. In [34], the authors offer a secure web-based examination system in conjunction with the network design that is expected to prevent cheating.

Online human monitoring is a common approach to online exam proctoring. The main drawback is that it is very expensive in terms of requiring many employees to monitor the examined. Researchers have also proposed different strategies in full monitoring, as in [13], where they use snapshots to reduce the bandwidth cost of streaming large video Authors files in [24] attempt to make semi-automatic machine supervision, by building a desktop robot containing a 360◦ camera and motion sensors. This robot transmits videos to a monitoring center if any suspicious movement or video is detected. caught. The main problem is that a single camera cannot see what the subject sees, and as a result even humans can have Difficulty detecting many cheating strategies. For example, a partner who is out of camera view, but can see test questions (for example, on a second monitor), you could provide responds to examinee using silent cues or writing on a piece of paper that is visible to the examinee.

Among all the previous works, the most relevant work is the massive open online monitoring framework [17], which combines automated and collaborative approaches to detect cheating behavior in online exams. All hardware includes fourcomponents: two webcams, a gaze tracker, and an EEG sensor. A camera is set up above the monitor. Capturing the face, and the other is placed on the right side of the subject capturing the subject's profile. The movement is used for classification by extracting dense trajectories. features. However, this work is limited to a single type of cheating (i.e., reading answers from a paper), with evaluation in a small set of 9 themes with 84 instances of cheats. As many types of traps do not contain high level movement, it is It is not clear how this method can be extended to handle them. As per author's knowledge , there is no previous work in automated online monitoring systems that detects a variety of deceptive behaviors.

IV. METHODOLOGY

Develop an integrated software which can help in preventing cheating in online examinations. Use this technique to detect cheating in the exams, which was conducted online and mark them for review.In this work, main objective is to develop a multimedia analysis system to detect a decent reasonably cheating behaviors during an online exam session. The proposed online exam process includes two phases, the phase of preparation and the phase of exam. In the preparation phase, the test taker should authenticate himself before beginning the exam, by doing their registration first so their face authentication has been started. This phase also includes calibration steps to ensure that all the connected sensors are functioning properly. Further, the test taker learns and acknowledges the rules of using the OEP system given in the rule guidelines, such as, nobody is allowed within the identical room, the test taker mustn't leave the room during the exam phase, etc. At the time of exam phase, the test taker takes the exam, under the continuous “monitoring” of proposed online exam proctoring (OEP) system for the real-time cheating behavior detection of scholars. In this, there is two sensors (i.e.,webcam and microphone) to capture audio-visual cues of the exam environment and so the test taker.The sensed data is first processed using a number of the components to extract middle-level features. These components are: Gaze tracking, Mouth open or close, Person Counting Mobile phone detection, Head pose estimation. After that is, mid-level features within a floating window are fused to come up with high-level features, which are then used for training and testing a cheat classifier. The high-level features include the component-dependent features, like the mean and variance within a window, and features supported the correlation among the components, like the covariance features [32]. it's crucial to use a various and rich set of features to boost the detection performance of the OEP system, because the detection of some of the cheating behaviors of scholars relies on the ignition of multiple behavior cues. The remainder of this section describes the subsequent topics: (A) the hardware components of the OEP system, (B) through the fundamental components of the system, and (C) the high-level features and classification of the cheating behavior.

A. *A. Hardware Components*

During a test, the test taker may cheat by listening or view prohibited information. Therefore, the OEP system Hardware must be designed in such a way that it listens to what examinee listens and sees what the examinee sees. This leads to hardware component design: a webcam and a microphone. And the webcam is set up on the top of the monitor in front of the examinee and serves multiple purposes, for example, knowing who the examinee is, what he is doing, and where you are looking, Since the webcam also captures the field of view of the test taker, analyzing video content allows us to detect "view-based" deception behaviors, such asreading of books, notes, papers and smartphones. That contributes significantly to the estimation of head gaze, which is an important behavioral signal. Please note that the use of these sensors is a distinctive novelty of the design of propsed system, as well as a advantage over previous exam proctoring systems. This design is not only motivated by the need to see what theexaminee is doing, but also the growing popularity and declining cost of the camera. Finally, as an integrated device of the webcam, the microphone captures

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what the examinee hears: under rules, any detected human voice is considered as a possible trap.

B. Gaze Tracking

There will be try to track the examinee's eyeballs and report whether they're looking left, right, or up, which they might do to glance at a notebook or signal to someone. This can be done using Dlib's facial key point detector and OpenCV for further image processing.The first thing to do is find the eyes before moving on to image processing and find the eyes, there is need to find a face. The face key point detector takes a rectangular object from the dlib module as input, which is simply the coordinates of a face.To find faces it can be use dlib's built-in front end face detector. You can use any classifier for this task. If you want high accuracy and speed is not an issue for you, I would suggest using a CNN as it will give you much better accuracy, especially for non-forward-facing faces and partially occluded faces.

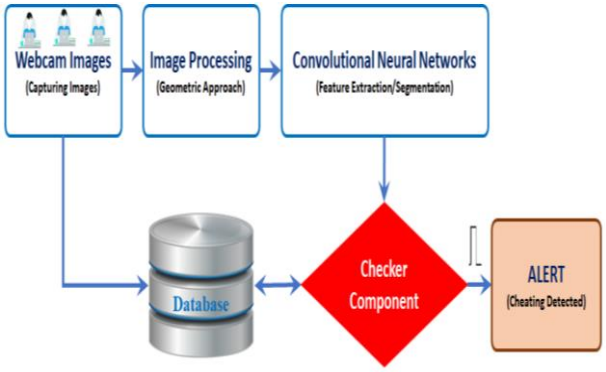

Fig. 2. Arrangement of webcams in the experimental setup to capture the student images

C. Mouth Detection

This is very similar to eye detection. The Dlib facial cues are used again for this task and the examinee is required to sit upright (as they would on the test) and the distance between the lip cues is noted (5 outer pairs and 3 inner pairs) for 100 frames and averaged. If the user opens his mouth, the distance between the points increases and if the distance increase is greater than a certain value for at least three outside pairs and two inside pairs, the violation is reported.

D. Phone Detection

The online exam rule prohibits the use of any kind of mobile phones. Therefore, the presence of a mobile phone in the evidence room can be an indication of potential cheating. With advances in mobile phone technology, there are many ways to trick them, like reading saved notes, send text messages to friends, surf the Internet and take a snapshot of the exam to share with other examinees. Phone detection is difficult because of the different sizes, phone models and shapes (a tablet could also be considered) a type of phone). Some test takers may have a great touch while others may use push-button flip phones. Also, cheating from a phone is often accompanied by various occlusions, such as holding the phone under the desk or covering part of the phone with user's hand. To enable this capability, there is useof the video captured from the webcam as it sees what the examinee sees. Phone detection is based on same approach for screen-based gaze estimation i.e. searching for pixels that they are brighter than the background pixels. The motivation of use screen brightness to detect phone object, is that to affirm that there is a hoax based on the telephone behavior unless the phone is turned on. Through the use of restrictions on the area of potential local regions to exclude large (i.e., monitor) and small (i.e., random noise) objects, whose thresholds are denoted as Tl and Ts respectively, we can estimate a candidate local region for phone display. Us chose to render the estimated phone screen using the local region area.

E. E. Person Detection and Live proctoring

This is a combination of automatic and human supervision (usually used in schools, universities, etc.). The monitoring software helps to generate alert signals on the detection of suspicious behavior and the integrity of the performed examination will be evaluated [16]. Using this method, the chances of cheating are low, and sometimes it is very difficult to scale the integrity. Also, this method has the flexibility to adjust the cost and is generally more expensive compared to the other self-monitoring technique.

V. AUTHENTICATION

Authentication is one of the methods that are designed to protect personal identity; also, it attempts to verify that the users are those who claim to be. Unlike face-to-face exams, the D exam has no proctors or proctors. They take place in a different and uncontrolled remote environment. As a result, authentication targets on the D-exam are important in verifying the identity of students online, as it plays a key role in security. There are two kinds of authentication static authentication and continuous authentication. Static authentication refers to the authentication that takes place at the start of exam access, and will also be valid for the entire period until the user logs out of that exam. Continuous authentication refers to the authentication that will continue after the start of the exam and check whether the current user is the same as the one who started the exam or not.

Identify and measure facial features from a given image. The security and authentication of a person is a crucial part of any industry. There are many techniques used for this purpose. One of them is facial recognition. Facial recognition is an effective means of authenticating a person. The advantage of this approach is that it allows us to detect changes in an individual's facial pattern to an appreciable extent. The recognition system can tolerate local variations in an individual's facial expression. Therefore, facial recognition can be used as a key factor in crime

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detection, mainly to identify criminals. There are several approaches for face recognition of which Principal Component Analysis (PCA) and Neural Networks have been incorporated into current project. The system consists of a database of a set of facial patterns for each individual. Characteristic features called 'eigenfaces' are extracted from the stored images with which the system is trained for subsequent recognition of new images.

III. DESIGN AND IMPLEMENTATION

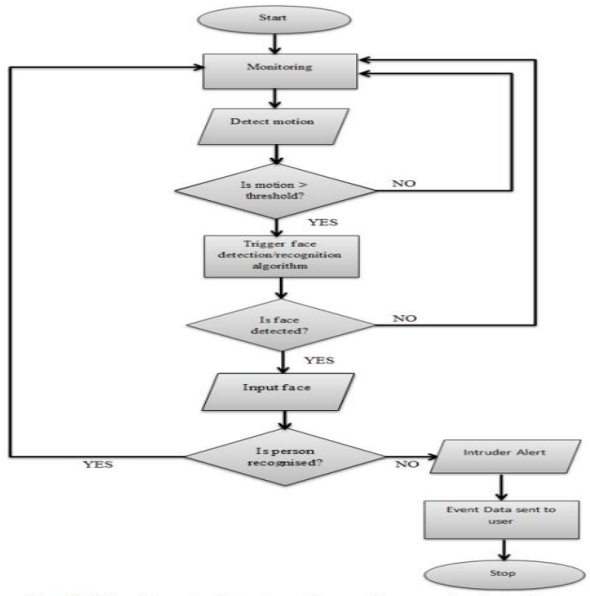

Fig. 1 Algorithm to detect motion and recognise intruder .

VI. RESULTS

The proposed approach using CNN has delivered interesting results by creating a substantial link between the neural networks and adaptive-based image processing filters. The introduction of the CNN-based approach helped improve the speed of image detection and analysis captured by webcams at student locations. Any type of uncertain event is detected at a faster rate and compared to database standards using a verification component In the real-time environment. facial expressions, eye movements, eyebrows and headaction are considered in this analysis to make a final decision. Similarly, objects in a computer the table, the movement of the hands, the head and the postures of the body are also considered at the time of analysis.

The performance parameters of the electronic examination based on CNN Database for which threshold values are calculated and plotted FAR and FRR values as shown in Fig. 5. The accuracy was calculated for the current system turns out to be 97%, which is much better than existing monitoring systems. Some of the observations calculated emotions using the distance between the different key points listed in Table I. these key points (such as Eye to Eye, width and height of the mouth) were key to understanding the emotions of a student Submit for an electronic exam. Most of the time, the distance (measured in pixels) between these key points appears to be changing when the student's emotions are changing from one mood to another mood. The possibility that the student is ignorant at the time of examinations is avoided to some extent by featuring the front camera view and rare camera view in the screen at the time of examination on the computer screen as shown in Fig. 6. This is a kind of alarm so that the student is stable and constant during the examination period.

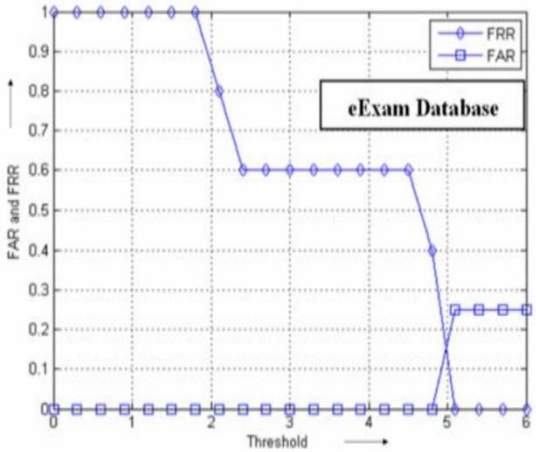

Fig. 5. A plot between the calculated FAR and FRR Vs. threshold values

Environmental disturbance is avoided through the use of software proposed by the temporary stop of the examination process when multiple faces are detected once the exam is in progress. Similarly, any type of new material on the computer table or any type of newly identified object in the hands of students is considered a violation of rules and the system considers this as a negative object to be present at the time of the exam. Therefore, the guidelines are subject to being strictly followed by students appearing for eExam at home.

VII. CONCLUSION

The CNN-based detection given in this work is very useful for universities in other cities. The software tool presented in this work provides extra security for data collection while taking e-Exams. Full block conditions due to Covid-19 needs careful attention to maintain certain guidelines for student safety. However, academic progress with training and learning process should end without exams. Therefore, the proposed approach based on CNN not only helps to detect deception but also helps to carry out the Online supervision automatically. This needs consistent training to improve accuracy in classifying the suitable student attending exams online. Also, it helps to improve face verification by comparing the standard values stored in the database. precision calculations, FAR and FRR with different facial expressions and Lighting conditions have been calculated and it has been shown that give better results compared to previous monitoring systems.

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