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A System to Improve the Monitoring of Paper-Based Exams

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Abstract: Monitoring paper-based tests is critical to ensuring the integrity and impartiality of the testing process. This study presents a system for monitoring paper-based exams that makes use of modern technology to automate and streamline the monitoring process. The suggested system uses cameras and software to gather and analyse video footage of the test room, detect any suspicious behaviour, and inform the exam proctor. The system also includes facilities for tracking the movement of exam papers, detecting abnormalities in the exam papers, and detecting any attempts to cheat. This paper examines the design and implementation of the suggested system, as well as its potential benefits for improving the monitoring of offline exams.

Keywords: Object recognition, Object tracking, Object segmentation, Feature extraction, Face Recognition, YOLO, Image Classification.

I. INTRODUCTION

An examination is one of the most effective methods of assessing and determining student capability, wisdom, intelligence, expertise, and knowledge. Universities are academic institutions. Projects, written examinations, presentations, assignments, and oral examinations are some of the ways used to assess students' competence. In a typical and formal examination, pupils are given question papers to which they react in the form of answers in a certain time period. The invigilators' (examination supervisors') responsibility is to prevent any form of communication during the examination, such as gesture communications, whispers, and motions, and to restrict students from cheating and to prohibit the use of notes or any cheating tools.

II. LITERATURE SURVEY

[1] One of the major issues they encounter in the exam room is malpractice. Electronic gadgets can be destroyed by electromagnetic pulses in a matter of seconds, a specific action range. Supervisors' inability to prevent misconduct results in underqualification in some circumstances, allowing candidates to earn higher grades. The candidate in question is hired by the government as a result of this illegal act. In this case, an EMP destroys the electronic component of the planned system. Candidates will go through a rigorous screening right at the door. EGD (Electronic Gadget Detector), which searches for electronic devices, will find it if it is present. To warn people, an LCD display and alarm system will be deployed. If the candidate doesn't turn it off at the designated time, the real-time clock will start the microcontroller. The accumulator has been activated by the switching device. To convert a DC signal into an AC signal, the inverter receives input from the battery. A 3kV high power pulse is produced as the AC signal travels through the Step UP transformer. Electronic equipment is destroyed by this pulse, called EMP. The key benefits are the electronic device detection and the resulting reduction in grade fraud.

[2] This research article describes a three-module system that operates in real time to detect and keep an eye on suspicious activity in an exam room. The first section of the module covers doing an impersonation check, which includes making sure a real person is in the examination room. A PCA-based facial recognition technique is used to compare the individual's profile with a database. We need to obtain an examinee position using front and top cameras utilising image registration approach in order to ascertain a student's presence or absence. Accurate calculations are made for the examinees' positions on a grid made from registered photographs. As a result, the examinee will be updated in the records if he is missing. By taking into account the height of the mouth and the range of the threshold evaluated to decide whether the mouth is open or closed, it is possible to detect such face misconduct in situations where the student converses with another person, tries to get unauthorised information, etc. The third module focuses on identifying unauthorised individuals, materials, or testing assistance using video from a security camera.

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[3] Due to the high expenses and poor efficiency of the current monitoring system, the use of intelligent video surveillance systems to monitor and react to situations in real time has expanded. To record a moving item of one or more targets in time and space, one uses object tracking. We are able to create a real-time warning system that will enhance continuous monitoring systems based on the localisation and real-time tracking of moving objects in a video sequence. In addition, a subfield of artificial intelligence known as computer vision seeks to make machines capable of comprehending what they "see" when linked to one or more cameras. The recognition of a shape in an image after it has been saved is one of its many applications, along with pattern recognition. Motion analysis in videos has evolved into a vital tool due to the extensive use of digital images in fields as varied as video surveillance, video compression, medical imaging, robotics, etc., human-machine interaction, sports sequence analysis, etc. In reality, the visual system must pay attention to motion zones in a frame sequence since they frequently correspond to certain occurrences.

[4] To record students' unethical behaviour during the offline exam, the suggested methodology includes an Automatic Surveillance System that is built and put into use. In order to categorise students into cheating and non-cheating groups based on head orientation, a binary classifier based on the Deep the Faster RCNN learning model is used. The findings of both modules are merged to produce a student status report after the MTCNN model is used to recognise the faces of the pupils. The proposed methodology is employed to keep an eye on students' exam-related behaviour, as was already described. Cheating falls under the category of unethical. According to head orientation, a classification is made. Cheating is considered unethical. Head orientation serves as the basis for categorisation. The following head movements are regarded as evidence of cheating: Moving one's head downward while taking an exam is not considered cheating, regardless of whether it is done to the left, right, up, or back, or when looking at another piece of paper.

[5] As the number of application-oriented studies focusing on video monitoring systems has grown significantly over the past ten years, this field is getting a lot of attention. The most recent research is attempting to include artificial intelligence, image processing, and computer vision into video surveillance systems. Although they exist, there aren't as many documented accomplishments in getting datasets, methodologies, and frameworks as there are documents that can give a full picture of the current status of the study on video surveillance systems. This article offers a thorough and methodical assessment of numerous research on video surveillance systems that were released between 2010 and 2019. Public datasets are frequently used by researchers as a comparison and means of testing method development, and 220 journal-based publications from the selected study extraction process were identified and analysed to illustrate research trends, datasets, methods, and frameworks used in the field of video surveillance. This analysis provides a detailed explanation of the trends that researchers focus on as a focus in their research to be referenced public datasets. Several chances and difficulties in research on a video surveillance system are mentioned at the conclusion of this study.

[6] Examinations are used by educational institutions to identify a student's strengths and deficiencies. Changing sheets, using secret notes, getting high grades, adhering to parental wishes and expectations, and other methods are just a few of the ways that students will find to cheat during physical exams. Standard surveillance techniques cannot successfully evaluate human guards while retaining their integrity because of their physical constraints. a computer vision-based automated technique for detecting This study suggests abnormal behaviours throughout tests. The primary objective of this study is to deploy closed-circuit television (CCTV) cameras to monitor students' behaviour during physical tests. The suggested approach leverages Residual Networks as the backbone architecture for exam cheating and You Only Look Once (YOLOv3). The findings collected demonstrate the validity and efficacy of the suggested approach. The findings of the experiment are encouraging and show how diligent the students were during the test. Detect cheating in the classroom with an accuracy of 88.03% in this task.

[7] The management of instruction and exams forms two of the foundations of the educational system. Proctoring, which involves keeping an eye on test takers as they take the exam and evaluating the academic procedure, is crucial. Scalability of education depends heavily on the ability to proctor tests. Such methods are time- and money-consuming, though. We introduce a new framework for learning and categorising cheating video sequences in this research. This kind of research aids in the early detection of academic dishonesty. Following that, we present a brand-new dataset called "student cheating events on paper exams." Suspect behaviours in the testing environment are included in the dataset. Five types of cheating were done by eight different actors. Five distinct cheats were used by each pair of subjects. This paper provides an overview of thedifferent machine learning techniques that have been used for detecting exam cheating,including plagiarism detection, handwriting recognition, and gaze tracking. learning techniques can be useful.

III. MODELLING AND ANALYSES

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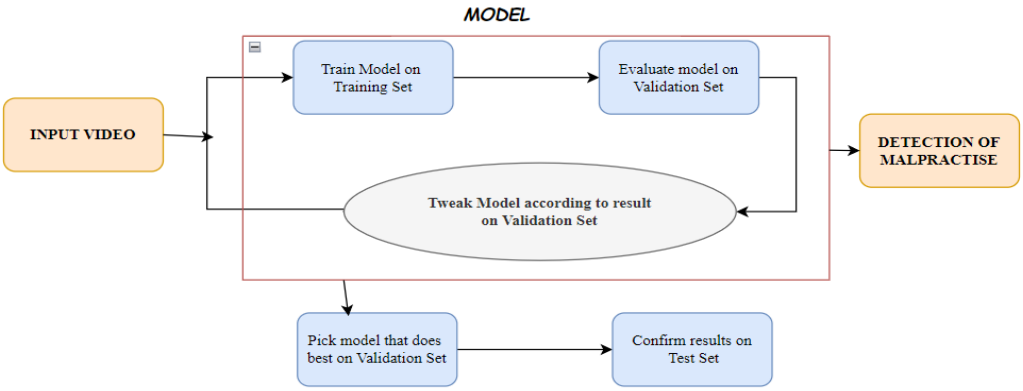

Fig. 1 Block Diagram

Detecting malpractice from video input can be a challenging task that requires careful analysis of body language. However, our trained model uses an input video of students taking an exam to train, test, validate, and confirm the findings on Test Set. Machine learning algorithms can be trained on a dataset of known malpractices to automatically detect any similar patterns in the video input. The model learns to identify the features that distinguish videos with malpractice from those without. The validation set is used to monitor the model's performance and prevent overfitting.
Finally, the model needs to be validated on a new dataset to ensure that it is performing accurately and reliably. This programme ultimately identifies persons engaging in misconduct and alerts the authorities.

Fig. 2 Malpractice

This programme accurately detects people who are engaging in misconduct and alerts them to their actions. More advanced algorithms like deep learning is used to learn and classify data, to get accurate result.The use of sophisticated algorithms can indeed improve the accuracy of identifying improper behavior and enable learning from data. However, it's important to note that the use of algorithms for surveillance must be done with care and consideration for privacy and ethical concerns. It's important to consider the ethical implications of using such algorithms for surveillance. They can potentially infringe on users' privacy and lead to unfair or biased treatment of certain individuals or groups. It's important to establish clear policies and guidelines for the use of these algorithms, including transparency about their use, the purpose of their use, and what data is being collected and analyzed.

In summary, while the use of sophisticated algorithms can improve accuracy and enable learning from data in identifying improper behavior, it's essential to approach this application with caution and consider ethical and privacy implications. Careful design, testing, and oversight are critical to ensure accurate results while respecting the rights of users.

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Fig. 3 Misconduct during exam

This illustrates how installing surveillance systems in college computer laboratories assures data security, data integrity, and efficient resource management.

Surveillance systems can help ensure data security by monitoring who is accessing the computer laboratory and what they are doing on the computers. This can help prevent unauthorized access to sensitive data and protect against potential security breaches. The surveillance system can also record any suspicious activity that may occur, providing valuable evidence in the event of a security breach. Surveillance systems can help maintain data integrity by ensuring that users are following proper procedures when accessing and using the computers. This can include monitoring for the use of unauthorized software, verifying that backups are being performed regularly, and ensuring that proper security protocols are being followed.

Finally, surveillance systems can aid in efficient resource management by allowing lab administrators to monitor the usage of the computers and ensure that they are being used appropriately. This can help prevent abuse of resources and ensure that the computers are available when they are needed.

IV. CONCLUSION

Maintaining the integrity of exams may benefit from the incorporation of machine learning into exam surveillance. Suspicious actions can be recognized in real-time by using machine learning algorithms to analyse numerous data sources, including audio, video, and keystroke patterns. Exam monitoring is much less labor-intensive thanks to technology, which also has the ability to spot cutting-edge cheating methods. The gathering and use of personal data must be transparent, and adequate measures must be put in place to address privacy concerns. False positives and false negatives might happen, thus ongoing algorithm review and development is required to reduce errors and boost accuracy. The successful adoption of machine learning-based exam surveillance depends on finding a compromise between discouraging cheating and preserving individual rights.

V. FUTURE SCOPE

Future research could focus on developing more advanced algorithms that can detect cheating with greater accuracy and reliability. Another area of potential improvement is feature extraction, which involves identifying relevant data points or patterns in the exam data that can be used to identify cheating behavior. Future research could focus on developing more robust feature extraction methods that can handle a wider range of exam scenarios. Biometric data, such as facial recognition or voice analysis, could be integrated with machine learning algorithms to further improve cheating detection. For example, facial recognition technology could be used to verify the identity of exam takers and ensure that the person taking the exam is the same person who is supposed to be taking it.

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