

Behavioral Detection and Prevention of Cheating During Online Examination Using Deep Learning Approach

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ABSTRACT

With the expansion of new technologies over the last years learning has grown and universities are utilizing it in offering online exams. Cheating during has also gone up regardless of the technologies or means which universities are using. Detection using traditional method may not be successful in curbing cheating during exams. The study addressed the issues that are experienced during online evaluation of student taking exams, in universities. The focus was on academic dishonesty associated with online examinations done by university student. Currently many students engage in exam malpractice through copying during online exam. The challenge with universities is that it's difficult for them to monitor when student is doing online exam since it's done in different locations. The research investigated the prevalence of potential e-cheating during online exams and proposed preventive measures that could be implemented by university as they offer online exams. The research utilized an E cheating deep learning model to detect the practices of online cheating behavior. The model monitored the behavior of the students when then they are doing online exam. The researcher used Deep learning E cheating intelligence agent as a mechanism for detecting how student behave during online cheating. The developed model agent monitors the behavior of the student during online examination detect and prevent any cheating during the online assessment. The researcher used the dataset collected through the use of WEKA tool. After collecting the data it was cleaned. To analyses the data the researcher used data analysis tools like Keras, tensorflow, pytorch, mat lab to analyze the data and present the output. For plotting of data and functions MATLAB software and MobileNetV2 was used to for graphical interfaces and execution of model. The study was significant to universities that are offering online exams since they will be able to ensure there is monitoring and also reduce the tendency of cheating during online exams. To determine the behavioral metric during online examination the researcher identified, Switching between the examination windows, level of engagement. Typing speed and accuracy, Examining the frequency and duration, Collaboration between students during online examinations as the main behavioral metric of students. To scrutinize the techniques used by student to cheating during online exams the research showed us common techniques used by students to cheat during online exams include, External Communication, Online Search, Collaborative Cheating, Impersonation, Pre-prepared Answers, Screen Sharing, Multiple Devices, Time Extension, Disabling Monitoring Tools.

KEYWORDS; Machine Learning, Deep Learning, Tensor Flow, Keras, Data set, Elearning, pytorch

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I. Introduction

The integration of technology into education precipitated by the COVID-19 pandemic witnessed the haphazard transition of face-to-face teaching to online modes, despite the challenges of teaching online, the laborious task was during online evaluation (Bilen &Matros, 2021). The quality of examinations is a continuous process that serves to not only provide feedback to educators on teaching and learning but is the epicenter of quality graduates produced (Sara et al., 2020). Therefore, necessary measures need to be put in place to ensure the legitimacy, reliability, and authenticity of the examination process as well as the grades obtained (Dadzie &Annan-brew 2023; Noorbehbahani et al., 2022). Examination malpractice is any aberrant behavior demonstrated by a student or anybody assigned with administering an examination before, during or after the examination that breaches the norms and standards governing administration of examinations (Dadzie &Annan-brew 2023). Traditional cheating methods include hiding notes behind rulers, writing on arms and hands, online cheating methods are sharing screens, searching for answers online and social media usage during examinations (Bilen &Matros, 2021). The ability to anticipate cheating by behaviour detection has developed over the years and its application in online examinations has proven to be beneficial to universities (Al_airaji et al., 2022; Alin et al., 2022). The pictorial structure model is one such model that uses video surveillance and intelligent systems to analyze human behaviour and detect unusual events in posture where the student tries peeping at the work of

another candidate (Al-airaji et al., 2022; Lv et al., 2014). Furthermore, observation of the student's iris to detect movement to copy materials from mobile phones is detected and sounds an alarm notifying proctors of the irregularity (Alairaji et al., 2022). Globally, a study carried out by Tweissi et al. (2022) analysing the use of artificial intelligence (AI)-based auto proctoring for online examinations to monitor student behaviours identified that despite errors in the system human observation coupled with AI intelligence was superior in curbing examination cheating. A study by Tiong et al. (2021) demonstrated the use of AI technology to curtail online examination cheating through e-cheating intelligent agent with Internet Protocol (IP) detector and behaviour detector protocols on four deep learning protocols with accuracy levels of 90%. Advances in technology have led to more robust effective and efficient approaches incorporating deep learning models for real time cheating detection from recorded video frames and speech (Kaddoura & Gumaei, 2022). This is achieved by forward-facing camera and speech dishonest detection that extract important items from visual pictures and voice (Kaddoura & Gumaei, 2022).

Regionally, technology can be used to ease examination cheating in third world countries incorporates the use of technologies such as facial recognition technology, biometric systems, and closed-circuit television (CCTV) cameras (Onyema et al., 2019). The context of low- and middle-income countries (LMICs) hampers the adoption of advanced technologies in curbing examination malpractice because of the cost implications associated with such technologies (Nganchi & Charlotte 2020). Further compounding these challenges are infrastructural challenges (internet, power, and manpower) resistance to change and policy gaps (Valizadeh 2022). These challenges have contributed to increased cheating during online examinations within the region attributable to unavailability of resources to support the use of advanced behavioral technology in examination proctoring (Muchemwa 2023). The traditional methods of curbing cheating in examinations by checking students properly, sitting arrangements and banning digital gadgets in examinations rooms are more commonly used in majority of the traditional face to face examination centers within the African region (Dadzie & Annan-brew 2023). These traditional face to face approaches however effective might require additional support in online examinations.

Locally, the surge in examination malpractice among Kenyan universities has reached worrying trends and while most universities during the COVID-19 pandemic opted to have online classes but delayed examinations till normalcy resumed (Mulongo et al., 2019; Macharia, 2022). Majority of the universities that administered online examinations observed considerable numbers of cheating in examinations hence hampering the integrity of the exercise (Macharia, 2022). There is limited literature on the application of advanced technology such as AI in reducing examination cheating since most universities have resulted to traditional pen and paper examinations. This study therefore will focus on the use of behaviorometrics based on Information Technology and machine learning where patterns will be recognized, anomaly detected, visualized, and detecting examination cheating during online exams.

II. Literature Review

Artificial Intelligence

In Artificial intelligence computers makes judgments from large data that is analyzed repeatedly using the appropriate algorithm (Kurt Cagle 2019). Artificial Intelligence (AI) has been in existence for several decades, and it has evolved over time. AI is a broad field that includes various branches, including Machine Learning (ML), Deep Learning (DL), Natural Language Processing (NLP), Robotics, Expert Systems, and Fuzzy Logic. Machine Learning involves the development of algorithms that enable computer systems to learn from data without being explicitly programmed. This branch of AI has been instrumental in the development of various applications, including image and speech recognition, recommendation systems, and fraud detection. Deep Learning is a subfield of Machine Learning that involves the use of neural networks to model complex patterns in data. This branch of AI has been critical in achieving breakthroughs in computer vision, speech recognition, and natural language processing. Natural Language Processing is a branch of AI that deals with the interaction between computers and humans using natural language. This technology has been instrumental in the development of chat bots, virtual assistants, and language translation systems. Robotics involves the development of intelligent machines that can perform various tasks autonomously. This branch of AI has been critical in the development of robots for manufacturing, healthcare, and exploration. Expert Systems are computer programs that can simulate the decision-making ability of a human expert in a particular domain. This branch of AI has been instrumental in the development of decision support systems for various industries. Fuzzy Logic is a branch of AI that deals with reasoning that is approximate rather than precise. This technology has been critical in the development of control systems for various applications, including industrial automation, home appliances, and vehicles. (Zulaikha 2019)

Deep learning

Another Artificial intelligence is deep learning method that uses neural network architecture where different layers of processing unit is used in analyzing large volumes of images in recognition and natural

processing in business and in different industries. The algorithm has gained popularity in analyzing large volumes of data in the whole world where different fields use it.

Deep learning can be subdivided into the following categories that is: According to Ethen 2019, Deep learning can be categorized into three main categories: Supervised Learning: In supervised learning, the deep learning model is trained on labeled data. The input data and the corresponding output data are given to the model, and the model learns to map the input data to the output data. The model is then tested on new input data to predict the corresponding output. Unsupervised Learning: In unsupervised learning, the deep learning model is trained on unlabeled data. The model learns to identify patterns and relationships in the input data without any explicit feedback. The aim is to discover hidden structures or features in the data that can be used to perform tasks such as clustering, dimensionality reduction, and anomaly detection. Reinforcement Learning: In reinforcement learning, the deep learning model learns to take actions in an environment to maximize a reward signal. The model interacts with the environment and receives feedback in the form of rewards or penalties based on the actions it takes. The aim is to learn a policy that can maximize the cumulative reward over a sequence of actions. Reinforcement learning has been successfully applied to various domains such as robotics, game playing, and autonomous driving.

Deep learning can be used for detection on how student cheat during online examination. Deep learning can be used for detecting cheating during online examinations. It is an increasingly popular approach for many applications, including human activity recognition, image recognition, natural language processing, and more. To detect cheating during an online examination, and deep learning algorithms can be trained on data from previous exams to identify patterns of behavior associated with cheating, such as copying answers from another source or accessing unauthorized materials. Once trained, the algorithm can analyze data from current exams in real-time to identify suspicious behavior and flag potential cases of cheating for review by a human proctor. Deep learning algorithms are well-suited for this task because they are able to automatically extract relevant features from the data and learn complex patterns without the need for explicit programming. This makes them highly effective at detecting cheating even when the techniques used by cheaters are novel or sophisticated.(Yulita 2017)

CNN is a popular deep learning algorithm used for object detection and recognition, including in the context of cheating detection during online assessments. MobileNet is a specific CNN architecture that has some unique design features, such as matching the thickness of the convolution filter to the input and using depth-wise and point-wise convolution to enable faster and more accurate training. MobileNetV2 is an updated version of MobileNet that incorporates additional features like linear bottlenecks and shortcut connections between bottlenecks to further improve accuracy with fewer parameters. The input to the application in the context of cheating detection during online assessments could be a video of participant recordings. (Ayachi 2021)

MobileNet is a popular CNN architecture that is designed to be computationally efficient and well-suited for mobile and embedded devices. Its unique design allows it to achieve high accuracy while using fewer parameters than other architectures. It is commonly used for image detection and classification tasks, but can also be applied to other types of data, such as videos. In the context of detecting cheating during online assessments, MobileNet could potentially be used to analyze video feeds and detect any suspicious activity, such as the presence of unauthorized materials or the involvement of third parties. (Krizhevsky, Sutskever and Hinton, 2012).

III. Conceptual/Theoretical Framework

In this section, we break and convert the research study ideas into common meanings to develop an agreement among the variables (Sequeira, 2014). Academic fraud can occur in various settings, including online environments. The conceptual framework presented in this text highlights several factors that contribute to academic fraud in online settings. These factors include: Behavioral Metrics: Online environments often provide data that can be analyzed to detect cheating behaviors. Such data includes timing, frequency, and duration of engagement, mouse clicks, keystrokes, and other behavioral patterns that indicate unusual or suspicious activity. Techniques of Cheating: There are various techniques of cheating in online environments, including plagiarism, unauthorized collaboration, and impersonation. These techniques can be facilitated by online tools such as copy-paste, messaging apps, and screen-sharing. Prevention of Online Cheating: There are several approaches to prevent academic fraud in online settings. These include using plagiarism detection software, designing assessments that are difficult to cheat on, establishing clear rules and guidelines for online assessments, and using online proctoring tools that monitor student behavior during exams.

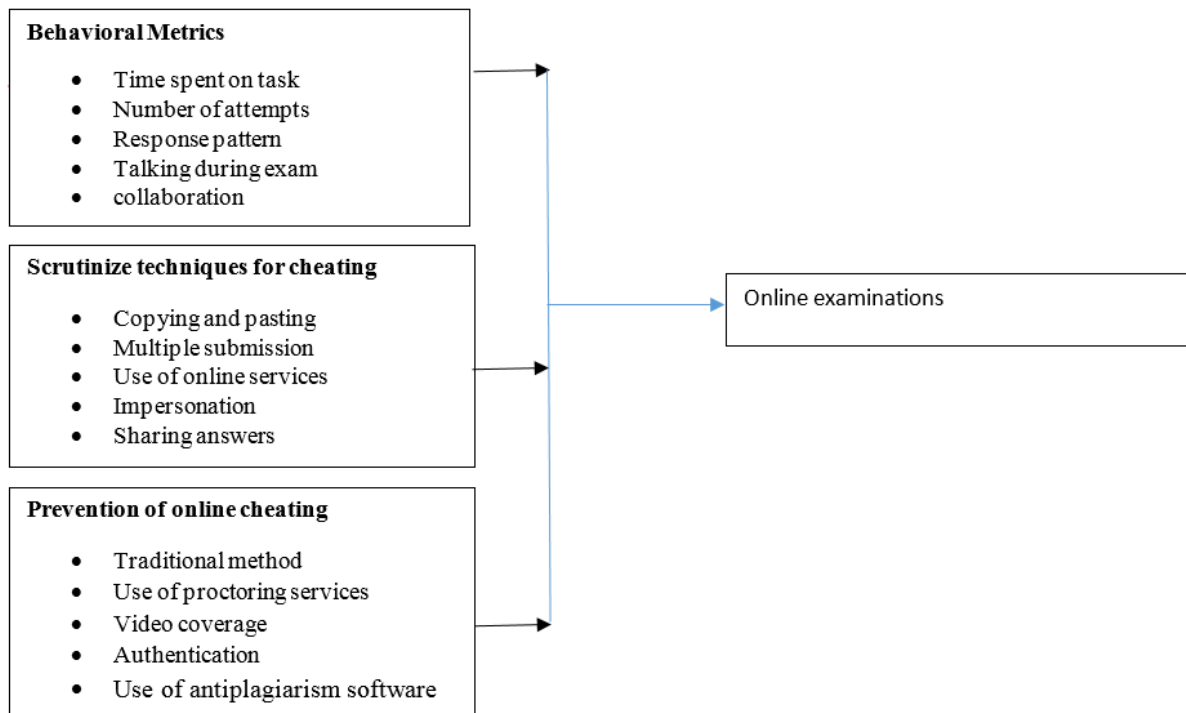


Figure 2.0 Conceptual frame work

Research question

What deep learning techniques exist that are used for image processing and how can these techniques be used to identify cheating during online examination?

Dataset and Methods

Majority of work from the literature reviewed had no specific organization or trend that one could pick from. We were forced to create that trend based on the framework outlined above. The dataset was searched randomly from various databases and from the Internet in general. The framework provided the guide because we had to look at each category of the interdisciplinary levels to find out what contributions came from each as well as the number of efforts made. We needed to understand; first, about deep learning techniques; second, how can we use this deep learning technique to detect cheat during online exams. Using the frame work as our base, the need to understand formed our study design. Being random search method, we were satisfied by data we got from each discipline and thus did not tabulate the number of efforts made in each category. We adopted the above strategy because we were convinced that the above will answer our research questions

IV. Results and Discussions

Our study revealed that Convolution Neural Network in Deep Learning is an effective algorithm that can be used to identify features or cheating in pictorial images. It showed that the same algorithm can be used to identify features of cheating from images/photos taken during online exams. Again, after reviewing and examining most of the documents, we concluded that when student are left to do exams online they are tempted to cheat and with the use of deep learning algorithm universities can run the model and have evidence of student cheated during online exams Many research adopting Artificial Intelligence tried a mix of different algorithm and Machine Learning which did not give much of a result. A lot of research has been done regarding the same. A number of solutions have been seen, however implementation of some of the models are prohibitively expensive. Few researchers in IT have tried the same but somehow used some of the science lab techniques in conjunction with AI, especially Machine Learning algorithms such Naïve Bayes, kNearest Neighbor and so on. The models are still expensive to implement. Further research is need to see how pictures can be used together with Deep learning to detect the cheating during online exams and also provide solution to the problem.

V .CONCLUSION

Deep learning approaches can be used to detect and prevent cheating during online examinations by analyzing the behaviors of learners.

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