AI Powered Human Behaviour Detection and Monitoring

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Abstract: Examination malpractice refers to any intentional misconduct that violates examination regulations, aimed at providing an unjustly favoured candidate. Essentially known as cheating, this unlawful activity involves students attempting to achieve favourable grades through dishonest means. Such malpractice represents a deviation from the established protocols governing the examination process. The prevalence of examination malpractice has adversely affected students, as many have abandoned their studies, relying instead on the deceptive practices they have come to depend on during assessments. Examination malpractice within the Nigerian educational system has been extensively examined and recognized as a significant obstacle not only for examination authorities but also for school organization, the broader educational framework, governmental bodies, and society as a whole. The identification of impersonators in examination environments is crucial for enhancing the examination management system, which can contribute to the reduction of malpractices occurring in examination centres. A biometric approach presents an effective strategy to combat examination malpractice through the detection of impersonators. Face Recognition Technology is increasingly utilized across various applications, allowing for the identification of candidates based on extracted facial features, which are processed using algorithms and other methodologies. To address this issue, a robust solution that requires minimal manpower is essential. With the progress in deep learning algorithms, resolving this challenge has become more feasible. This project aims to develop a framework for facial recognition and to analyze students' behavioural patterns, employing HAAR cascade and Convolutional Neural Network algorithms.

1 INTRODUCTION

In the field of imaging science, image process refers to the manipulation of images through mathematical operations, employ various forms of signal processing. A single picture, a collection of pictures, or video footage like still photos or video frames can all be included in the input. A collection of traits and parameters related to the original image or a changed image are the possible outcomes of image processing. Conventional signal-processing techniques are typically used to treat images as two-dimensional signals. Images can also be interpreted as three-dimensional signals, with depth or time represented by the third dimension. Although "image processing" refers mostly to digital approaches, it also includes optical and analog technologies. The broad approaches that apply to all of these types are the main topic of this discussion.

The process of producing images begins with imaging. Instead of being taken from real-world settings, as is frequently the case with animated films, computer graphics visuals are painstakingly produced using physical representations of things, surroundings, and lighting. On the other hand, computer vision is frequently seen as a sophisticated type of image processing, in which devices or software attempt In order to identify the physical elements of a single image or a group of photos, like three-dimensional magnetic resonance scans or films. The use of images in modern science and technology has grown considerably, especially as scientific visualization which frequently entails intricate and extensive experimental data becomes more and more relevant. Examples include microarray data in genetic studies and real-time multi-asset portfolio trading in finance. Image analysis is the practice of using digital image processing techniques to extract useful information from images, mostly digital ones. Image analysis tasks might range from straightforward ones like barcode
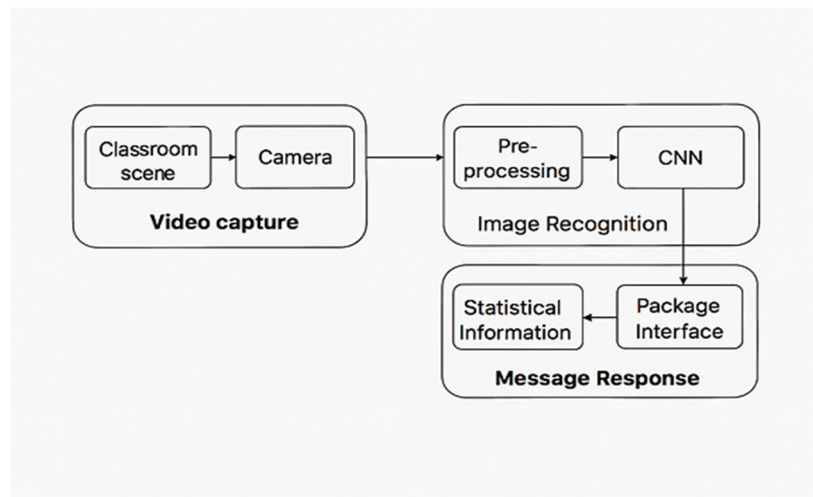
Figure 1: Abnormal Student Behaviour Process.

reading to more intricate ones like facial identification. Figure 1 shows the abnormal student behaviour process.

2 RELATED WORKS

Cerrahoğlu, Enes, et.al 2023. Customized the Twitter API to collect 168,274 English tweets. URLs, hashtags, mentions, and emojis were filtered out from the collected tweets. Subsequently, TextBlob Python package was used to classify the Tweets as neutral, negative, or positive. The classified tweets were tested for classification accuracy using machine learning algorithms such as Support Vector Machines, Random Forest, Naive Bayes, Gradient Boosting, and Logistic Regression. Logistic regression finally gave the best classification accuracy of 94%. Finally, a web interface was created to retrieve the last 50 tweets from a user's profile and based on the sentiment for each, it has an added emoji.

Krishna, P, et.al, 2024. The study reports predictions of conduct modification among SEN children after treatments based on ABA using the MMLA framework. ABA therapy is a specialized education technique to solve the problem of behavioral issues and promote positive conduct. Our deep neural networks and machine learning models accurately predict a 98% change in behavior for SEN children with multimodal educational data, for example, while the precision remains at 97%.

Moreover, we demonstrate that the inclusion of environmental, psychological and mobility sensor data can considerably enhance the predictive performance of models when based on typical educational data. Since DOT, the system has been used to enhance intensive ABA therapies for over 500 SEN students in Singapore and Hong Kong via the Integrated Intelligent Intervention Learning (3I Learning) System.

Chan, Rosanna, et.al, 2023. Suggested In older adults, abnormal behaviour may indicate a medical issue. Our unique unsupervised statistical idea drift detection method employs random variable autoencoders to estimate the parameters for a statistical hypothesis test on anomalous days. The Kullback-Leibler d function was the feature used. Since 2020, our approach with the Integrated Intelligent Intervention Learning (3I Learning) system had improved intensive ABA therapy for more than 500 SEN students in Singapore and Hong Kong. The objective of ABA therapy, which is a form of special education intervention, is to treat behavioural problems and effect useful behavioural changes. When we feed our deep neural networks and machine learning models with multimodal educational data, then we achieve around 98% accuracy and 97% precision in predicting the behavior change on SEN children. We further show that the statistical performance of predictive algorithms using standards educational data can be vastly increased by environmental, psychological, and mobility sensor data. Motion and power sensor maps of activity probabilities come to play. We demonstrated broad feasibility (minimum F1-Score of 91%) on an artificial dataset comprising four concept drift categories. Then we used our new technique to a real-world dataset obtained from the residences of 20 (pre-)frail older persons (average age 84.75 years). Our

technique was able to identify anomalous days when a participant was suffering from a serious medical condition.

Ryu, Riseul, et.al, 2023. Finding out how implicit authentication can track students' behaviour without interfering with their learning activities is the aim of this investigation. To identify and explore context-aware continuous implicit authentication systems' architecture as well as possible future developments, the essay performs a systematic and organized evaluation of the body of existing literature. Future requirements, according to the study, will involve the following: 1) considering a range of appraisers to cover all possible user encounters with online learning environments, including those of students who do not take online tests; 2) investigating template modification to address the issue of biometric template ageing; and 3) looking into evaluation methods for context-aware implicit authentication systems.

Hassan, Bassam, et.al, 2023. Discussed in the study was about data that have been collected using three standardized measures: The Coping Practices Questionnaire, the Brief Resilience Scale, and the Lockdown Fatigue Scale. Also, statistical analyses of descriptive and inferential types were done using SPSS. It is imperative for Iraqi university students to build emotional resiliency, deal with hardship, and recover from loss, for lockdown fatigue reached scary proportions. Students tend to express great trouble experiencing lockdown fatigue (average of about 33.48 out of 50), and the biggest concern is being able to pull through difficult times and unpleasant experiences. Mostly female, urban, and in the sciences, were more likely to express "lockdown lethargy" than men or other backgrounds.

Alafif,et al…,2023. Implemented the study followed a simple structure: first a ten-question set, then followed by a fifteen-question set. The survey was created on Google Form and disseminated through social media outlets such as WhatsApp and Twitter. The data collected were compiled onto an excel sheet to carry out statistical analysis. The average number of students involved in this study was 21.45 ± 23.11. 72.3% of the female students were involved. An estimated 30.2% of the students were overweight or obese. While 32.2% got adequate sleep and 67.8% were deprived of sleep, over 70% of ordinary students fell asleep within 30 minutes after going into bed. Altogether, 71.7% of students noted that sleep was good, while 28.3% noted that it was bad. BMI was further categorized, with underweight students forming 17.7%, normal weight 52.1%, overweight 20.6%, and obese 9.6%. The daily consumption of fruits among the students is 6.4%, while that of vegetables is 12.5%. Breakfast is taken by only 8%. Lunch and dinner are consumed by 62.1% and 29.9%, respectively. To sum up, a relationship was established in this study between the development of obesity and sleep duration. Also, some inroads were taken to establish a relationship between duration of sleep and dietary patterns, especially regarding the intake of fruits and vegetables.

Gupta, Swadhaet al …,2023. Developed the explore the effect size of MBPs in promoting mindfulness and school adjustment, the current meta-analysis controlled for the effects of study and program features, including the program type, the role of comparison groups, the educational level of students engaged in MBPs, the qualification of teachers, and prior mindfulness experience. It was for MBPs conducted by external trainers with prior mindfulness ability that there was a strong effect on school adjustment, or mindfulness, where the view about the outcomes differed for the mindfulness approach and for the educational level of students. After extensive searching through five databases, a total of 46 studies with a randomised controlled design with sampling on students from preschool through undergraduate levels were found. On average, a moderate effect of MBPs for mindfulness, small to moderate for attention, and small for academic performance, impulsiveness, and school overall adjustment were seen. Overall, there were no significant variations in student conduct, school quality, or social skills. This meta-analysis provides promising evidence of MBPs' effectiveness for improving children's school adjustment outcomes in educational settings besides their well-established psychological benefits, especially when such studies employ randomised controlled designs.

Kavitha, S., et al. 2023. Implemented the unique approach proposed predicts student engagement in e-learning by assessing 3 modalities, namely head movement, blink count, and facial expression, based on a live video survey of student behavior. This study illustrates that the proposed multimodal approach based on facial clues makes suitable predictions of real-time student engagement. An experimental study showed the proposed engagement detection mechanism outperformed existing methods by an accuracy of 92.58%. The proposed system is based on the VGG-19 and ResNet-50 deep learning methods for facial expression recognition, and eye-blinking and head motions are based on a facial landmark

approach. The engagement index, which predicts either the engagement or the disengagement of an individual, is derived from the combination of results across multiple modalities, for which algorithms are proposed.

Mettleret et., al, (2023). proposed that we entreat that we build up on previous discussions by way of interrogating the assertions based on document analysis and interviews with EdTech company employees, we contend that automated interventions contribute to arsenization. We trace its techno-commercial logic by viewing learning situational automations contributing to arsenization processes in EdTech, if so, how do situations become concretised through the production of digital objects and then mechanised through specifically computational interventions? Three processes of arsenization were identified: Third place fetishism attacks other forms of work and thus aims to shape student and employee investment and student learning in a way that makes the automation seem possible to be "acted" on by EdTech and higher education stakeholders. First, detaching digital objects from students and employees enables the firms to take control of automated learning interventions, and so forth.

Hansenet et., al, (2023). Described that based on what is proposed, to absolutely measure a learner's performance, attention, and emotionality in one fell swoop, three data types are necessary: the actual score from tests, that of attention scores, and facial expressions of the learner. Applying such techniques as Random Forest Algorithm for computing the test score, Recurrent Neural Network (RNN) for forecasting learners' time series-attention scores as respective for the video lecture, and Convolutional Neural Network (CNN) for the classification of the facial expression pictures taken from online course recordings into distinct emotions, electroencephalography (EEG), facial expressions, and tests by machine learning and deep learning models were the core of the actual study. The test scores, the attentive scores, and the general emotional state of the learner while attending the online class form the anticipated findings. According to study findings, there is a positive correlation between attention scores and test scores. While observing attention variability among various films, the attention in the lecture video seems greater than in the film entertainment. This tends to imply that more happiness was felt while viewing the entertainment video than the lecture video.

3 BACKGROUNDS OF THE WORK

Students have recently adopted a variety of examination misconduct methods. The most popular tactic is impersonation, which can be hard to see, particularly in a big class, and a plot by certain professors or invigilators. The primary objective of this project is to develop a biometric control examination attendance record to prevent impersonation during the test. Among the techniques employed in biometrics are fingerprint, face recognition, DNA, hand geometry, iris identification, and retina. Numerous faces were recognised by the facial recognition biometric technology used in this study. The HAAR cascade algorithm model was used to create the database of gathered photos, and deep learning algorithms were used to start and improve the database model, respectively. Skin segmentation was used for face identification; candidates' faces were searched for and verified, and face images were processed and classified. The entire procedure was developed in Testing of Python and the resultant system showed that the recognition tests for candidates/students used in the training and testing stages were significantly accurate.

4 PROPOSED WORK

Education is not an exception to the gradual digitization of all services and offerings brought online by the advent of technology. The ubiquitous availability of laptop computers and high-speed internet has enabled a smooth transition to the online environment. Learning Management Systems (LMSs), which employ software to manage, report, administer, and document content shared with students, are a development and adaptation of universities, schools, and other educational institutions. A more balanced approach to information transfer and simpler candidate grading are made possible by this teaching and evaluation technique. The purpose of online examinations is to ensure that assessors can change their perspective from offline to online processes. Features like simplicity, scalability, wider reach, and customisation are driving the internet industry's rapid growth. Current evaluation techniques are becoming saturated and may soon become outdated. Examiners can offer tests to remote applicants using the internet or a company intranet using online examination, also referred to as e-

examination. The majority of online assessments feature response processing modules that enable assessors to provide answers as soon as test takers finish. In a lot less time, our fully automated approach provides the findings while carefully evaluating the examines. Furthermore, facial recognition technology is being developed and used more and more for a range of applications, including attendance and security systems. Furthermore, because it deals with managing a person's presence during an activity, an attendance system is a recurring transaction. The examination system is essential to the field of education since student attendance helps ensure that instruction and learning are adequately evaluated. In this project, we will use the HAAR cascade technique to detect faces using the Convolutional Neural Network approach, which has a higher accuracy rate, to identify them based on face feature points. Additionally, give information regarding head movements, gestures, and motions throughout the test and warn of any unruly students. The suggested architecture is depicted in Figure 2.
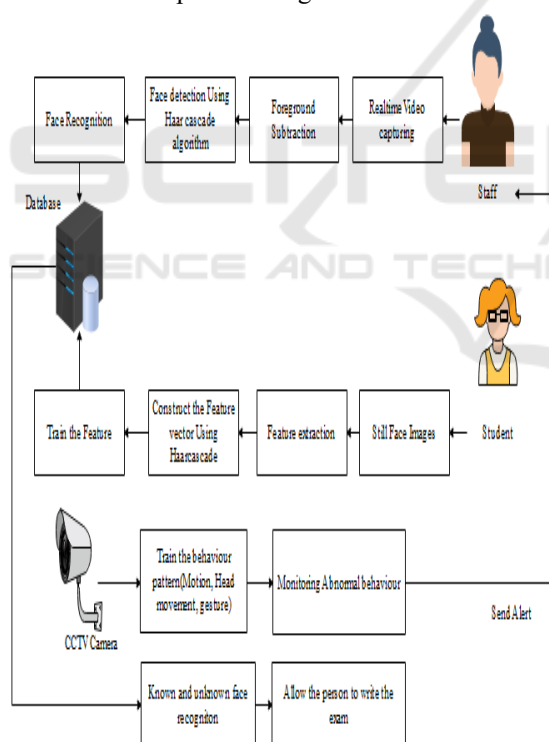

Figure 2: Proposed Architecture.

4.1 Face Image Acquisition

In this module, administrators can train several faces. Webcams or still photographs can be used to capture faces. This picture displays the user's face in a straight line, in regular lighting conditions, and without any occlusion.

4.2 Features Extraction

This module retrieves and represents facial features as feature vectors. The nose, eyes, and lips are examples of facial features. A matrix is used to store these values. In this process, cascade properties are utilized. Features of digital images that help in object recognition are called face-like traits. They were used in the first real-time face identification and got their name from their visual similarity to Haar wavelets. In the past, it was computationally costly to calculate features using just image intensities.

4.3 Register the Face

Converting many data sources into a single coordinate system is known as face registration. Features of the face are labelled. The process of transforming many data sources into a single coordinate system is known as face image registration. Data may take into account several photos, data from different sensors, times, depths, or perspectives.

4.4 Classification of FCE

It is grown in popularity because of the vast range of applications, which include diversion, smart cards, information security, law social control and police investigation. This module is referred to as the login phase or testing phase. The input takes the form of real-time video capture. The features are matched using a deep learning technique. Video sequences' temporal subject matter makes it possible to analyse dynamic facial events and use them as biometric symbols for person recognition.

4.5 Alert System

In this module, we can use neural network proficiency to align the database still faces with the testing face. The face image is classified as a recognised face if the feature vectors match. Let the person write the test after that. If the vectors of the properties don't match, the faces are considered unknown. Set an alert for unclear labelling. In addition, motion, object detection, and gesture recognition are used to analyze behaviour patterns.

5 EXPERIMENTAL RESULTS

The false situation rate measures the likelihood of the biometric insecurity system mistakenly rejecting a malicious behaviour user's activity (figure 3). A system's FRR is commonly expressed as the ratio of the number of erroneous rejections separate by the number of determinations tries.
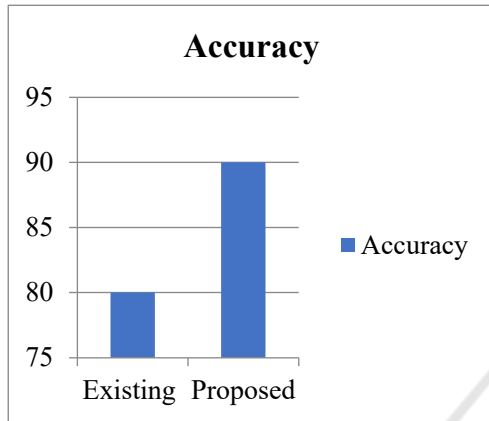

Figure 3: False Rejection Rate.

$$FALSE\ REJECT\ RATE\ =\ FN\ /\ (TP + FN) \qquad (1)$$

Where FN =Genuine Scores Exceeding Threshold
TP+FN = All Genuine Scores

6 CONCLUSIONS

Candidate impersonation, often known as malpractice, is a significant problem in the examination system. Identity cards and hall passes are frequently used in the examination process to identify fraud. To identify, recognize, and categorize applicants, the current exam system mainly uses biometric technology and document image analysis tools. The proposed methodology focuses on image/video analysis, while fraud is typically found through document image analysis. Face recognition techniques can be used in the project. With increasing research and integration, biometric face identification is becoming more prevalent in facial image applications. at order to discourage students from mimicking during exams a practice that is prevalent at many colleges this proposed effort used facial recognition. This approach will be beneficial since it will lessen the issue of student impersonation while enhancing candidate identification and verification.

The staff will be able to monitor the student and record their actions throughout the test.

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