Enhancing Education With Analyzing the Student Attention Levels Use Deep Learning

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ABSTRACT- Machine learning is a branch of artificial intelligence that studies human behavior. It is used for several tasks in a manner similar to how humans solve problems. The delivery of learning and training through digital resources is known as e-learning. However, there is a drawback that needs to be addressed. By using a webcam in e-learning, we can monitor student attentiveness. Additionally, a feature of analyzing students' behavior based on emotional and non-emotional factors. The web is used to obtain a video from which we can analyze the student activities through their faces. This analysis includes eye aspect ratio (EAR),yawn aspect ratio (YAN), head pose, and emotional status.

Index Terms- Machine learning, artificial intelligence, webcam, EAR, YAN.

I. INTRODUCTION

Machine learning is the branch of artificial intelligence and the development of computer systems that are able to learn and adapt without following explicit instructions, by using algorithms and statistical models to analyze and draw inferences from patterns in data. This e- learning platform was established during the COVID-19 pandemic. students who study online and can plan their own schedule without having to make personal sacrifices to meet the attendance requirements of teachers and traditional universities. Teachers need new technologies to improve student education and their skills. During this e-learning process, many students lack concentration.To address this issue, we are introducing machine learning to observe students' attentiveness to get more intraction towards teacher for their academic growth. Technologies like artificial intelligence are used by teachers to educate their students efficiently, providing data mining of students' results and academic information day by day. This will help predict student performance and increase understanding of learning methods, providing a list of students' mistakes and techniques to correct them. The three mentioned techniques are implemented in AI. This data mining in student education will examine their talents and skills. mor0ver AI will suggest to the students what to do next in their academic growth, It will algorithm for education and learning in schools and colleges. Several issues in e-learnig that are poor internet connection, lack of good webcams in students' areas for analysis, errors in technical systems, make it is more difficult to handle all these problems for a teacher, can handle. Hence, using AI to improve students' attentiveness in online classes, has emerged in the last decade. More information on a student's attentiveness is measured through their physical activities, which helps us identify whether the student is engaged in the e-learning system.

Students can feel free to attend this class to clarify their discomfort and doubts in live classes. This will impact student performance and educational growth. Using a webcam, we can take videos to analyze a single student's performance and enhance their knowledge,tohelpingovercome the difficulties faced while using e-learning methods. The administration category focuses on students' grades in exams. AI, in perspective, can be introduced in the education system. Students can make their own class schedule to attend their own classes. Learning analysis can also be used to detect and identify dropout rates to improve school performance.E-learning is used to extract information about an induvidual students gradings to give a perfect pattern of education list to workout to make it perfect. There are two types of methods to develop the educational skills, engagement, and attentiveness of a single student. It will monitor all the single student'sactivitiesto increase their skills. Finally, this project aims to detect students' attentiveness in e-learning and improve their educational analysis. In the future, it will have a massive impact, allowing students to experience live sessions going on online.

III. LITERATURE SURVEY

[1] The classification accuracy reached 93.1%, which has a significant value in real applications. In addition, we proposed a framework consisting of the automatic face detection and feature points detection based on current machine learning models as well.[2]. The results demonstrate the use of emotional and non-emotional measures in developing an ML model for predicting student attentiveness.[3]. This new variable needs to be tested with other variables to see if it would infuence the model's accuracy. We also would like to study gamifcation on this context and understand its impact.[4]. This paper presents an eye state classification model

based on machine learning algorithms. Experimental results show that this method achieves good performance. We systematically compare a variety of pattern classification models combining PCA, Gabor feature extraction algorithms and KNN, NB, SVM classification algorithms.

IV. PROBLEM STATEMENT

Assessing student attention span is a crucial aspect of effective education, yet it presents a multifaceted challenge. Traditional methods often rely on subjective observations or self-reported measures, which can be unreliable and prone to biases. Deep learning offers a promising avenue to address this issue by leveraging advanced computational techniques to analyze complex patterns in student behavior and engagement. The problem statement for employing deep learning in assessing student attention span involves developing robust algorithms capable of accurately detecting and quantifying attention levels based on various input modalities, such as facial expressions,movements, physiological signals, and interaction with educational content. This entails preprocessing and feature extraction from diverse data sources, designing neural network architectures tailored to the specific task, and training models on labeled datasets to generalize well across different contexts and populations. Furthermore, the deployment of such models must consider ethical considerations regarding data privacy, transparency, and fairness, ensuring that the resulting assessments are both accurate and equitable for all students.By addressing these challenges, deep learning has the potential to revolutionize the way we understand and support student engagement in educational settings.

V. ALGORITHM

Linear Regression Used for predicting a continuous value based on one or more input features. It fits a linear model to the data.Used for binary classification tasks. It estimates probabilities that an instance belongs to a particular class.Builds a tree-like structure to make decisions based on the input features. Can be used for both classification and regression tasks.

An ensemble method that builds multiple decision trees and combines their predictions to improve accuracy and reduce overfitting.Effective for both classification and regression tasks, SVM finds the hyperplane that best separates classes or predicts continuous outcomes.
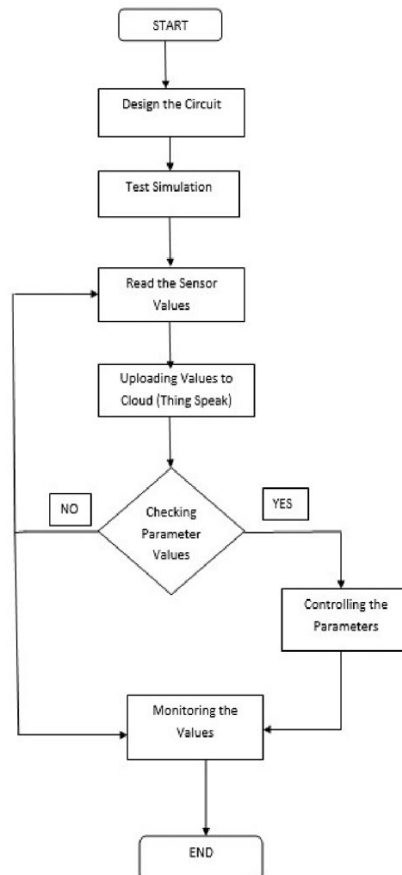
VI.Working

Utilizing deep learning techniques for assessing student attention span represents a groundbreaking approach in educational research and technology. By harnessing advanced neural network architectures, such as convolutional neural networks (CNNs) or recurrent neural networks (RNNs), coupled with sophisticated data processing methodologies, researchers and educators can gain deeper insights into student engagement and concentration levels during learning activities. These deep learning models can analyze various multimodal data sources, including facial expressions, eye movements, EEG signals, and interaction patterns, to infer attentional states accurately. Moreover, by training these models on large-scale datasets annotated with ground truth attention labels, they can achieve remarkable performance in predicting and understanding attention dynamics in educational settings. Such advancements hold tremendous potential for revolutionizing personalized learning experiences, as they enable real-time monitoring of student attention, facilitating timely interventions and tailored instructional strategies to optimize learning outcomes.
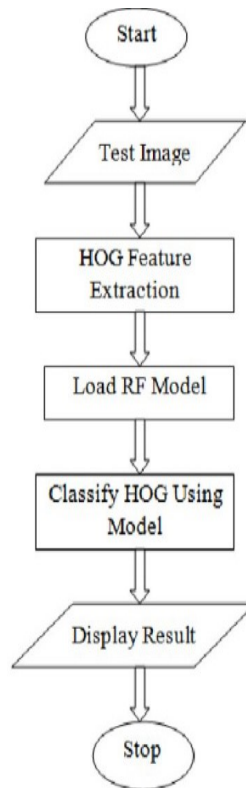
VI. CONCLUSION

In this study, we used ML to predict students' attentiveness in an e-learning setting. Every ML model was estimated using videos from students recorded in their favorable environment, usually their home. For future work, we would recommend getting data from more students to help get more data points in developing the model. We also recommend starting the experiment with a game that would help the students be more relaxed and not focused on the recording.This new variable needs to be tested with other variables to see if it would influence the model's accuracy. We also would like to study gamification on this context and understand its impact on student's attentiveness.

REFFERENCE
[1] alecologists. BioScience. 2002; 52: 19-30. 2. Yang S, Lho H-S and Song B. Sensor fusion for obstacle detection and its application to an unmanned ground vehicle. ICCAS-SICE, 2009. IEEE, 2009, p. 1365-9.
[2] YOUNG J, ELBANHAWI, E., and SIMIC, M. Developing a Navigation System for Mobile Robots. Intelligent Interactive Multimedia. Springer, 2015.
[3] Lowe DG. Distinctive image features from scale-invariant keypoints. International journal of computer vision. 2004; 60: 91-110.
[4] Ke Y and Sukthankar R. PCA-SIFT: A more distinctive representation for local image descriptors. Computer Vision and Pattern Recognition, 2004 CVPR 2004 Proceedings of the 2004 IEEE Computer Society Conference on. IEEE, 2004, p. II-506-II-13 Vol. 2.
[5] Al-Smadi, M., Abdulrahim, K., Salam, R.A. (2016). Traffic surveillance: A review of vision-based vehicle detection, recognition and tracking. International Journal of Applied Engineering Research, 11(1), 713–726

[6]   C.Nagarajan and M.Madheswaran - 'Experimental verification and stability state space analysis of CLL-T Series Parallel Resonant Converter' - Journal of ELECTRICAL ENGINEERING, Vol.63 (6), pp.365-372, Dec.2012.

[7]   C.Nagarajan and M.Madheswaran - 'Performance Analysis of LCL-T Resonant Converter with Fuzzy/PID Using State Space Analysis'- Springer, Electrical Engineering, Vol.93 (3), pp.167-178, September 2011.

[8]   C.Nagarajan and M.Madheswaran - 'Stability Analysis of Series Parallel Resonant Converter with Fuzzy Logic Controller Using State Space Techniques'- Taylor & Francis, Electric Power Components and Systems, Vol.39 (8), pp.780-793, May 2011.

[9]   C.Nagarajan and M.Madheswaran - 'Experimental Study and steady state stability analysis of CLL-T Series Parallel Resonant Converter with Fuzzy controller using State Space Analysis'- Iranian Journal of Electrical & Electronic Engineering, Vol.8 (3), pp.259-267, September 2012.

[10] Nagarajan C., Neelakrishnan G., Akila P., Fathima U., Sneha S. "Performance Analysis and Implementation of 89C51 Controller Based Solar Tracking System with Boost Converter" Journal of VLSI Design Tools & Technology. 2022; 12(2): 34–41p.

[11] C. Nagarajan, G.Neelakrishnan, R. Janani, S.Maithili, G. Ramya "Investigation on Fault Analysis for Power Transformers Using Adaptive Differential Relay" Asian Journal of Electrical Science, Vol.11 No.1, pp: 1-8, 2022.

[12] G.Neelakrishnan, K.Anandhakumar, A.Prathap, S.Prakash "Performance Estimation of cascaded h-bridge MLI for HEV using SVPWM" Suraj Punj Journal for Multidisciplinary Research, 2021, Volume 11, Issue 4, pp:750-756

[13] G.Neelakrishnan, S.N.Pruthika, P.T.Shalini, S.Soniya, "Perfromance Investigation of T-Source Inverter fed with Solar Cell" Suraj Punj Journal for Multidisciplinary Research, 2021, Volume 11, Issue 4, pp:744-749

[14] C.Nagarajan and M.Madheswaran, "Analysis and Simulation of LCL Series Resonant Full Bridge Converter Using PWM Technique with Load Independent Operation" has been presented in ICTES'08, a IEEE / IET International Conference organized by M.G.R.University, Chennai.Vol.no.1, pp.190-195, Dec.2007

[15] M Suganthi, N Ramesh, "Treatment of water using natural zeolite as membrane filter", Journal of Environmental Protection and Ecology, Volume 23, Issue 2, pp: 520-530,2022

[16] M Suganthi, N Ramesh, CT Sivakumar, K Vidhya, "Physiochemical Analysis of Ground Water used for Domestic needs in the Area of Perundurai in Erode District", International Research Journal of Multidisciplinary Technovation, pp: 630-635, 2019

[17] Radhakrishnan, M. (2013). Video object extraction by using background subtraction techniques for sports applications. Digital Image Processing, 5(9), 91–97.

[18] Qiu-Lin, L.I., & Jia-Feng, H.E. (2011). Vehicles detection based on three-frame-difference method and cross-entropy threshold method. Computer Engineering, 37(4), 172–174.

[19] Liu, Y., Yao, L., Shi, Q., Ding, J. (2014). Optical flow based urban road vehicle tracking, In 2013 Ninth International Conference on Computational Intelligence and Security. https://doi.org/10.1109/cis.2013.89: IEEE

[20] Girshick, R., Donahue, J., Darrell, T., Malik, J. (2014). Rich feature hierarchies for accurate object detection and semantic segmentation, In 2014 IEEE Conference on Computer Vision and Pattern Recognition. https://doi.org/10. 1109/cvpr.2014.81: IEEE.

[21] Uijlings, J.R.R., van de Sande, K.E.A., Gevers, T., Smeulders, A.W.M. (2013). Selective search for object recognition. International Journal of Computer Vision, 104(2), 154–171.

[22] Kaiming, H., Xiangyu, Z., Shaoqing, R., Jian, S. (2014). Spatial pyramid pooling in deep convolutional networks for visual recognition. IEEE Transactions on Pattern Analysis & Machine Intelligence, 37(9), 1904–16

[23] Zhe, Z., Liang, D., Zhang, S., Huang, X., Hu, S. (2016). Traffic-sign detection and classification in the wild, In 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR) https://doi.org/10.1109/cvpr.2016.232: IEEE.

[24] Krause, J., Stark, M., Deng, J., Li, F.F. (2014). 3d object representations for fine-grained categorization, In 2013 IEEE International Conference on Computer Vision Workshops. https://doi.org/10.1109/iccvw.2013.77: IEEE.

[25] Yang, L., Ping, L., Chen, C.L., Tang, X. (2015). A large-scale car dataset for fine-grained categorization and verification, In 2015 IEEE Conference on Computer Vision and Pattern Recognition. https://doi.org/10.1109/cvpr. 2015.7299023 (pp. 3973–3981): IEEE.

[26] Zhen, D., Wu, Y., Pei, M., Jia, Y. (2015). Vehicle type classification using a semi supervised convolutional neural network. IEEE Transactions on Intelligent Transportation Systems, 16(4), 2247–2256.

[27] Guerrero-Gomez-Olmedo, R., Torre-Jimenez, B., Lopez-Sastre, R., Maldonado-Bascon, S., Ooro-Rubio, D. (2015). Extremely overlapping vehicle counting, In Iberian Conference on Pattern Recognition & Image Analysis. https://doi.org/10.1007/978-3-319-19390-8_48 (pp. 423–431): Springer International Publishing