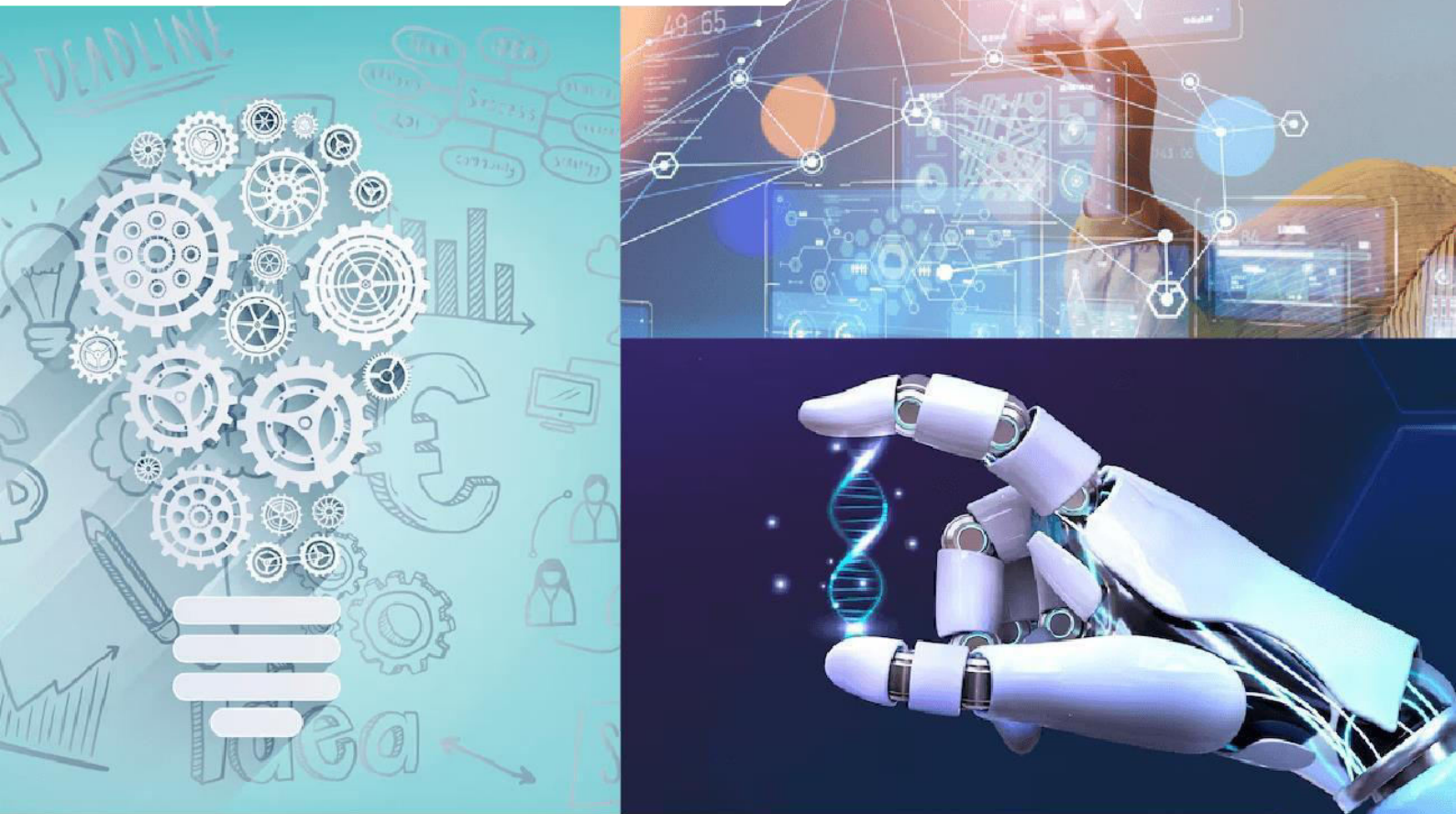




International Journal of Advanced Research in Education and TechnologY (IJARETY)

Volume 12, Issue 3, May-June 2025

Impact Factor: 8.152



Student's Attention Monitoring System in Learning Environments using Artificial Intelligence

Barath D, Anand M, Janani S

B.Sc Computer Science, Department of Computer Science & Information Technology, Vels Institute of Science
Technology & Advanced Studies, Chennai, India

B.Sc Computer Science, Department of Computer Science & Information Technology, Vels Institute of Science
Technology & Advanced Studies, Chennai, India

Assistant Professor, Department of Computer Science & Information Technology, Vels Institute of Science Technology
& Advanced Studies, Chennai, India

ABSTRACT: Educational institutions have rapidly expanded their virtual course offerings and assessment methods. One significant challenge in the realm of online education is the effective assessment of student involvement, engagement, and attentiveness during virtual classes. In this project, a smartphone-based learning monitoring system is presented. During pandemics, most of the parents are not used to simultaneously deal with their home activities and the monitoring of the home school activities of their children. Therefore, a system allowing a parent, teacher or tutor to assign task and its corresponding execution time to children, could be helpful in this situation. In this work, a mobile application to assign academic tasks to a child, measure execution time, and monitor the child's attention, is proposed. The children are the users of a mobile application, hosted on a smartphone or tablet device that displays an assigned task and keeps track of the time consumed by the child to perform this task. Time measurement is performed using face recognition, so it is possible to infer the attention of the child based on the presence or absence of a face. The app also measures the time that the application was in the foreground, as well as the time that the application was sent to the background, to measure boredom. The parent or teacher assigns a task using a desktop application specifically designed for this purpose. At the end of the time set by the user, the application sends to the parent or teacher statistics about the execution time of the task and the degree of attention of the child.

I. INTRODUCTION

In today's dynamic educational landscape, ensuring student engagement and sustained attention during learning sessions has become increasingly challenging. The "Student's Attention Monitoring System in Learning Environments Using Artificial Intelligence" project aims to address this critical issue by leveraging AI technologies such as computer vision, facial recognition, and behavioral analysis. The system monitors students' real-time attention levels by analyzing visual cues like eye movements, facial expressions, and body posture during online or physical classes. By providing immediate feedback to educators and learners, it helps to enhance participation, identify learning difficulties early, and create a more interactive and supportive educational environment. This innovative solution not only improves academic performance but also contributes to building personalized learning experiences tailored to individual student needs.

II. EXISTING SYSTEM

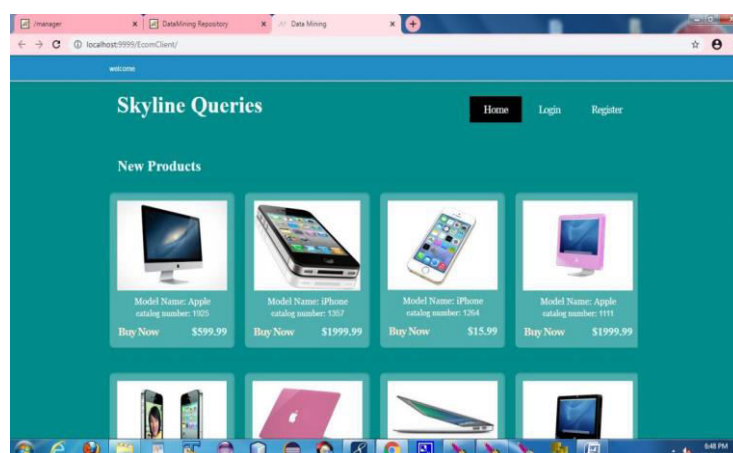
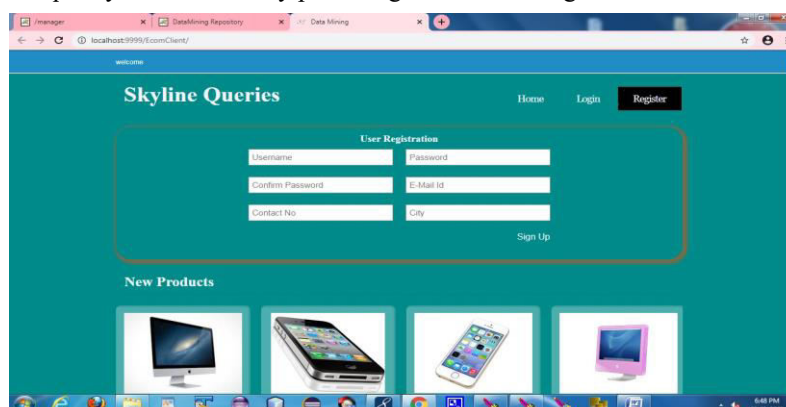
In the existing system, it is difficult to monitor the students during their online exams/daily tests and online classes by their parents, teacher(s) or tutor(s). This may cause a pandemic situation for each and every parent or tutor to know about their children and to grab their attention towards studies. During online classes, the staff may teach the subjects and give some activities through the online class based on the students grade. Some students may complete but some may not. The parents who are working from home may busy with their office activities and may not concentrate on their children. In the existing system, we are not having any methods or ideas to make students to complete these activities within the given time with maximum attention.

III. PURPOSE

The primary purpose of the "Student's Attention Monitoring System in Learning Environments Using Artificial Intelligence" is to enhance the quality of education by accurately assessing and improving student engagement. By utilizing AI-driven techniques to monitor attention levels, the system aims to help educators identify moments of distraction, fatigue, or disinterest among students in real-time. This enables timely interventions, adaptive teaching strategies, and personalized support, ensuring that learning remains effective and inclusive. Ultimately, the system seeks to create a more responsive and interactive educational environment where both students and teachers can collaborate towards better learning outcomes

IV. IMPLEMENTATION

The Students Attention Monitoring System is implemented by integrating advanced artificial intelligence (AI) techniques with computer vision and machine learning models to monitor and evaluate students' attentiveness in real-time learning environments. High-definition cameras are used to capture live video feeds of students during classroom sessions or online learning. These video inputs are processed using AI models trained to detect and analyze key indicators of attention, such as eye movement, head position, facial expressions, and body posture. Convolutional Neural Networks (CNNs) are employed for facial and gaze detection, while machine learning algorithms classify the level of student engagement. The system generates real-time alerts or feedback to instructors if students show signs of distraction or inattention. Additionally, the collected data is securely stored and analyzed to provide detailed reports on individual and group attention trends over time, helping educators personalize and improve their teaching methods. The overall implementation ensures minimal disruption to the learning process, preserves privacy through ethical AI practices, and enhances the quality of education by providing actionable insights.



V. CONCLUSION

A smartphone-based learning monitoring system is presented here. An effective learning environment is evaluated on multiple factors, among which the focus of students is considered a key element in this assessment. The use of Artificial Intelligence (AI) in education to monitor students' concentration levels in uniform classrooms is on the rise. We propose a smart way to proceed the remote learning method more effective by calculating student's attention on their given activities and by motivating the students as well as the staffs and the parents. The system is capable of collecting images in the classroom and detecting the state of focus of each student. The system generates a comprehensive anonymous report on the level of attentiveness of students, accessible through a dedicated webpage. In future, we can propose a method using the advanced machine learning algorithms such as face recognition, hand movements.

VI. FUTURE ENHANCEMENT

We will do research on following area of recommendation as well as pricing. We will try to consider both user and providers concerns of changing demand and its cost. This will ensure both provider and customers benefit. Apart from this we will consider competitive prices and its result on pricing. We will study best fit auction based pricing to support optimized fine grained scheme. Also partial waste issue is a area of study which can result in reduced prices using precise scheduling of users' job. User scheduling behaviors and partial usage waste will be brainstormed to find an effective solution.

REFERENCES

1. J. Steil, P. Müller, Y. Sugano, and A. Bulling, "Forecasting user attention during everyday mobile interactions using device-integrated and wearable sensors," in Proc. 20th Int. Conf. Hum.-Comput. Interact. Mobile Devices Services. New York, NY, USA: Association for Computing Machinery, Sep. 2018, pp. 1_13.
2. J. Kangas, D. Akkil, J. Rantala, P. Isokoski, P. Majaranta, and R. Raisamo, "Gaze gestures and haptic feedback in mobile devices," in Proc. 32nd Annu. ACM Conf. Hum. Factors Comput. Syst. (CHI). New York, NY, USA: Association for Computing Machinery, 2014, pp. 435_438.
3. M. Tonsen, J. Steil, Y. Sugano, and A. Bulling, "Invisibleeye: Mobile eye tracking using multiple low-resolution cameras and learning-based gaze estimation," in Proc. ACMInteract. MobileWearable Ubiquitous Technol., vol. 1, Sep. 2017, pp. 1_21.
4. C. Mesquita and R. P. Lopes, "Head posture detection for measuring concentration," in Proc. INNODOCT/13 New Changes Technol. Innov., 2013, pp. 1_9.
5. Teyeb, O. Jemai, M. Zaid, and C. Ben Amar, "A novel approach for drowsy driver detection using head posture estimation and eyes recognition based on wavelet network," in Proc. 5th Int. Conf. Inf., Intell., Syst. Appl. (IISA), Jul. 2014, pp. 379_384.
6. Hutanu and P. E. Berteau, "A review of eye tracking in elearning," in Proc. 15th Int. Sci. Conf. eLearn. Softw. Educ., 2019, pp. 281_287.
7. E. Chong, N. Ruiz, Y. Wang, Y. Zhang, A. Rozga, and J. M. Rehg, "Connecting gaze, scene, and attention: Generalized attention estimation via joint modeling of gaze and scene saliency," in Proc. 15th Eur. Conf. Comput. Vis. (ECCV), in Lecture Notes in Computer Science, vol. 11209, V. Ferrari, M. Hebert, C. Sminchisescu, and Y. Weiss, Eds. Munich, Germany: Springer, Sep. 2018, pp. 397_412.
8. L. Copeland, "Eye tracking to support eLearning," M.S. thesis, Res. School Comput. Sci., College Eng. Comput. Sci., Austral. Nat. Univ., Canberra, ACT, Australia, 2016.
9. J. Waleed, T. M. Hasan, and Q. K. Abed, "Eye-gaze estimation systems for multi- applications: An implementation of approach based on laptop webcam," Diyala J. Pure Sci., vol. 14, no. 2, pp. 153_173, Apr. 2018.
10. P. Ricciardelli and J. Driver, "Effects of head orientation on gaze perception: How positive congruency effects can be reversed," Quart. J. Experim. Psychol., vol. 61, no. 3, pp. 491_504, Mar. 2008.
11. Fathi, Y. Li, and J. M. Rehg, "Learning to recognize daily actions using gaze," in Proc. 12th Eur. Conf. Comput. Vis. Berlin, Germany: Springer-Verlag, 2012, pp. 314_327.
12. Z. Jiang, J. Han, C. Qian, W. Xi, K. Zhao, H. Ding, S. Tang, J. Zhao, and P. Yang, "VADS: Visual attention detection with a smartphone," in Proc. 35th Annu. IEEE Int. Conf. Comput. Commun. (INFOCOM), Apr. 2016, pp. 1_9.
13. D. Xiao and C. Feng, "Detection of drivers visual attention using smartphone," in Proc. 12th Int. Conf. Natural Comput., Fuzzy Syst. Knowl. Discovery (ICNC-FSKD), Aug. 2016, pp. 630_635.

14. Z. Jiang, K. Zhao, R. Li, and J. Zhao, "I-VALS: Visual attention localization for mobile service computing," IEEE Access, vol. 7, pp. 45166_45181, 2019.
15. X. Xu and X. Teng, "Classroom attention analysis based on multiple euler angles constraint and head pose estimation," in MultiMedia Modeling, Y. M. Ro, W.-H. Cheng, J. Kim, W.-T. Chu, P. Cui, J.-W. Choi, M.-C. Hu, and W. De Neve, Eds. Cham, Switzerland: Springer, 2020, pp. 329_340.
16. S. Asteriadis, K. Karpouzis, and S. Kollias, "The importance of eye gaze and head pose to estimating levels of attention," in Proc. 3rd Int. Conf. Games Virtual Worlds Serious Appl., May 2011, pp. 186_191.
17. F. Sana, T. Weston, and N. J. Cepeda, "Laptop multitasking hinders classroom learning for both users and nearby peers," Comput. Educ., vol. 62, pp. 24_31, Mar. 2013.
18. H. Støle, A. Mangen, and K. Schwippert, "Assessing children's reading comprehension on paper and screen: A mode-effect study," Comput. Educ., vol. 151, Jul. 2020, Art. no. 103861.
19. Chern, Y.-H. Lai, Y.-P. Chang, Y. Tsao, R. Y. Chang, and H.-W. Chang, "A smartphone-based multi-functional hearing assistive system to facilitate speech recognition in the classroom," IEEE Access H. L. Egger, G. Dawson, J. Hashemi, K. L. H. Carpenter, S. Espinosa, K. Campbell, S. Brotkin, J. Schaich-Borg, Q. Qiu, M. Tepper, J. P. Baker, R. A. Bloomfield, and G. Sapiro, "Automatic emotion and attention analysis of young children at home: A ResearchKit autism feasibility study," NPJ Digit. Med., vol. 1, no. 1, p. 20, Dec. 2018.
20. P. Smutny and P. Schreiberova, "Chatbots for learning: A review of educational chatbots for the Facebook messenger," Comput. Educ., vol. 151, Jul. 2020, Art. no. 103862.
21. H. Jones, M. Spichkova, and M. J. S. Spencer, "Chirality-2: Development of a multilevel mobile gaming app to support the teaching of introductory undergraduate-level organic chemistry," J. Chem. Educ., vol. 95, no. 7, pp. 1216_1220, Jul. 2018.
22. D. Mak and D. Nathan-Roberts, "Design considerations for educational mobile apps for young children," in Proc. Hum. Factors Ergonom. Soc. Annu. Meeting, 2017, vol. 61, no. 1, pp. 1156_1160.
23. C.-S. Wang, Y.-M. Huang, and K.-S. Hsu, "Developing a mobile game to support students in learning color mixing in design education," Adv. Mech. Eng., vol. 9, no. 2, 2017, Art. no. 1687814016685226.

International Journal of Advanced Research in Education and Technology

ISSN: 2394-2975

Impact Factor: 8.152