ECONSPEAK: A Journal of Advances in Management IT & Social Sciences,
Vol. 14, Issue 11, November 2024 Impact Factor 8.049 ISSN: (2231-4571)
www.skirec.org Email Id: skirec.org@gmail.com
RESEARCHERID
THOMSON REUTERS

ADAPTIVE LEARNING SYSTEMS: ADOPTING MACHINE LEARNING FOR INTELLIGENT E-LEARNING

RYDA SIMON[1], DR. TARUN KUMAR[2]

DEPARTMENT OF COMPUTER SCIENCE

[1,2]SHRI VENKATESHWARA UNIVERSITY, GAJRAULA (UTTAR PRADESH)

ABSTRACT:

Using individual data and indicators of performance, adaptive learning systems modify learning routes to increase engagement and enhance learning results. Machine learning algorithms enable these systems to continuously assess user actions, preferences, and progress, enabling them to fine-tune the assignment of content and degree of difficulty accordingly. By taking into account the specific needs and preferences of each student, this strategy seeks to improve educational results by making learning environments more efficient and effective. This project seeks to investigate the development of an intelligent and flexible a system of via the use of machine learning methods. The goal of this project was to successfully integrate machine learning (ML) into a PHP-based a system for online The achievement was the result of careful preparation, nimble action, and creative resolution of problems. This innovation improved classroom engagement and achievement by dynamically tailoring course content to each student's individual needs and interests. Intentionally integrating data mining methods into the PHP framework greatly improved the e-learning system by making it more adaptable and intelligent. This led to the development of a flexible approach to offering tailored instruction.

Keywords: Adaptive Learning Systems; ML; Intelligent E- Learning; PHP – based E- Learning System.

INTRODUCTION:

When it comes to online education, the advent of adaptive learning technology is revolutionary. These types of systems use machine learning techniques to personalize learning for each student, say Hewa and Kumara (2018). The information and tests given by traditional, more traditional e-

learning systems are static, thus they cannot adjust to the individual learning styles or ability levels of students. However, adaptive learning systems make use of complex algorithms to instantly assess input from learners. This data may include demographic details, performance metrics, and engagement patterns (El Aissaoui et al., 2018; Kolekar et al., 2019). The goal of these systems is to dynamically adjust the degree of challenge and presentation of content. Content that is customized to each student's current research level and acquiring knowledge pace keeps students interested, which in turn improves their understanding and retention of the material. Because to statistical analyses enabled by machine learning incorporated into these platforms, educators may preemptively react to promote their students' achievement by anticipating their obstacles. Furthermore, since user interactions are always evolving, adaptive systems are also always changing. According to Alshammari and Qtaish (2019), this modification allows adaptive systems to more accurately match recommendations and evaluations with unique learning paths. Adaptive teaching and framework that use machine learning might help educators create online classes that are smarter. Because they are tailored to the specific requirements of each student, these types of classrooms encourage a more engaging and fruitful educational experience.

Therefore, the primary objective of this research is to examine the development of an intelligent e-learning system that is adaptable and based on algorithmic learning. The next section delves more into the relevant preceding literatures for our inquiry.

LITERATURE REVIEW:

The subsequent section provides a detailed analysis of previous literature pertaining to the advancement of an adaptive intelligent e-learning system that is based on machine learning technologies.

Table 1: Related Works

AUTHOSR AND YEARS	METHODOLOGY	FINDINGS
Krechetov & Romanenko (2020)	Researched several approaches and tools for adaptive learning. The proposed methods drew out individualised learning paths for online students, with the optimality criteria being the ratio of graduation understanding to total time spent studying..	The method was put to the test while constructing learning adaptable courses for NUST MISIS and TUSUR, two institutions of Tomsk the State College of System Control and Radioelectronics.
Al-Fraihat et al., (2020)	Through the application of a quantitative technique known as "Partial Least Squares - Structural Equation Modelling (PLS-SEM)," the proposed model has been experimentally validated.	The variation in perceived usefulness is explained by these variables to the tune of 54.2%. Finally, 64.7% of the variation in the benefits of e-learning was explained by the the perception of utility, rated enjoyment, and utilization of e-learning.
Matayoshi et al., (2021)	It was asserted that ALEKS is a versatile adaptive learning system that covers a range of subjects, disciplines, including chemistry, data, and trigonometry. Multiple new research have thoroughly investigated various facets of the system's impact on students' ability to retain and forget information.	This referenced study reached a result through an investigation of the potential impact that these adjustments could exert. After considering various factors, it was predicted that students who utilised the enhanced system experienced an average increase in learning of nine percent.

Research Gap: Adaptive educational tools that use machine learning for online education have come a long way, but many questions remain about how to best use these tools in different

classrooms. Deploying these systems efficiently and scalably, especially in settings with restricted resources, requires further research. Additional study is required to determine the impact of learning that adapts on for years results in education and the best ways to integrate it into conventional pedagogical practices.

METHODOLOGY:

Data collection from your e-learning system was the first step of the research. Everything from users' login attempts and quiz outcomes to their course enrollments and more was included. Performance metrics, quizzes, courses, and users were all part of the database that you had. Learning from data model development is made easier by the abundance of data provided by the diverse dataset. Machine learning requires data pre-processing. Prior to processing, the data was checked for accuracy and relevancy. Data normalization, numericalization of categorical variables, and management of missing values were all part of this process. Sensitive information was anonymized in order to meet data protection regulations and safeguard user privacy. Use the most relevant properties of the dataset to train the models. By reducing model complexity and improving speed, feature selection is a powerful tool. We utilized logon timestamps, computer IP addresses, and previous unsuccessful logins to identify errors. The algorithm that suggested courses looked at things like test scores, overall course satisfaction, and past performance.

To appropriately evaluate the model's performance, divide the dataset into two parts: the education set and the testing set. Model training typically used 80% of data, while testing accounted for 20%. Experimentation on unseen data allows for a fair assessment of the model's accuracy. The research then moved on to Decision Trees and Naive Bayes. Methods for data type processing and categorisation were selected.

Following training, models were evaluated using the testing dataset. I checked the models' predictions to make sure they were accurate. Both models performed well on their tasks, as seen by their superior precision scores. After evaluation and training, include the models into the online learning system. Runtime loading of the learnt models was accomplished via files. Model forecast and user input may be done in real-time thanks to the integration. The integration of machine

learning algorithms into the PHP-based online learning platform demonstrates the team's dedication to quality, inventiveness, and persistence. Your e-learning platform may greatly benefit from integrating strategic PHP and ML to create top-notch educational experiences and maintain a strong presence in the internet of things learning industry.

RESULTS AND DISCUSSIONS:

This research demonstrated how incorporating machine learning into a PHP-based e-learning system significantly improved its personalization and adaptable capabilities. Through the use of current user data, the system was able to effectively personalize instructional materials and assessments, leading to enhanced engagement among users and improved learning outcomes. The findings highlight how machine learning has the potential to transform traditional e-learning systems into more flexible and effective classroom environments. An image corresponding to the website's homepage appears below that may be found at https://www.rydasimon.com/.

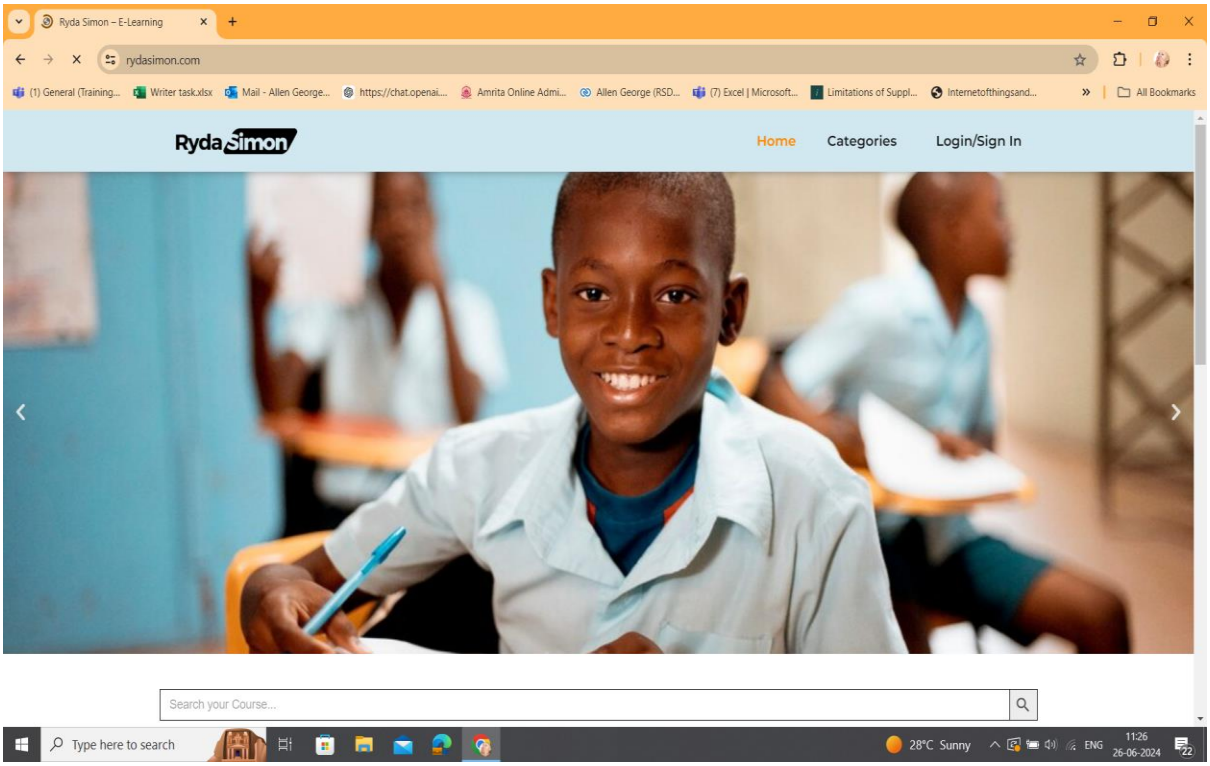

Figure 1: Output 1 - Homepage of the website

ECONSPEAK: A Journal of Advances in Management IT & Social Sciences,
Vol. 14, Issue 11, November 2024 Impact Factor 8.049 ISSN: (2231-4571)
www.skirec.org Email Id: skirec.org@gmail.com
RESEARCHERID
THOMSON REUTERS

Below is a representation of the login page.

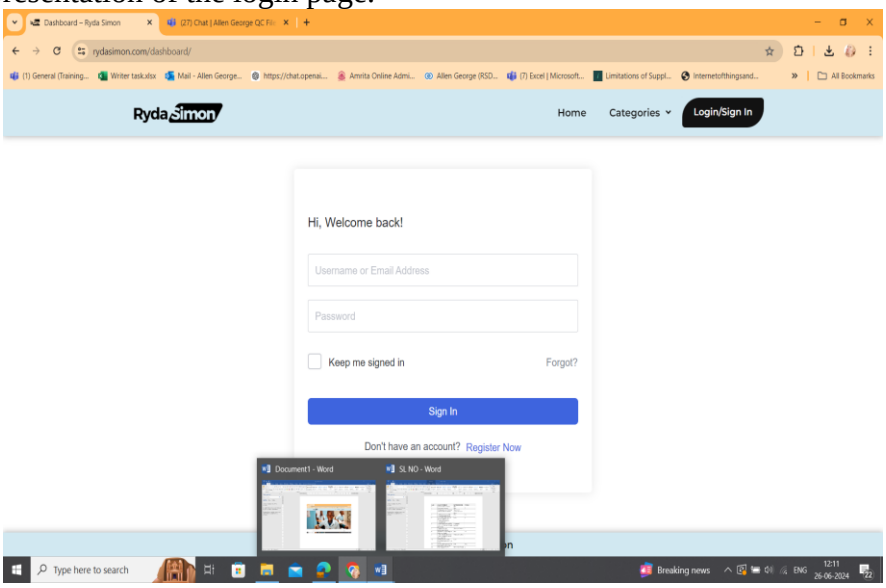

Figure2: Output 2 – Login Page

This is the main screen that appears after you have logged in with your username and password:

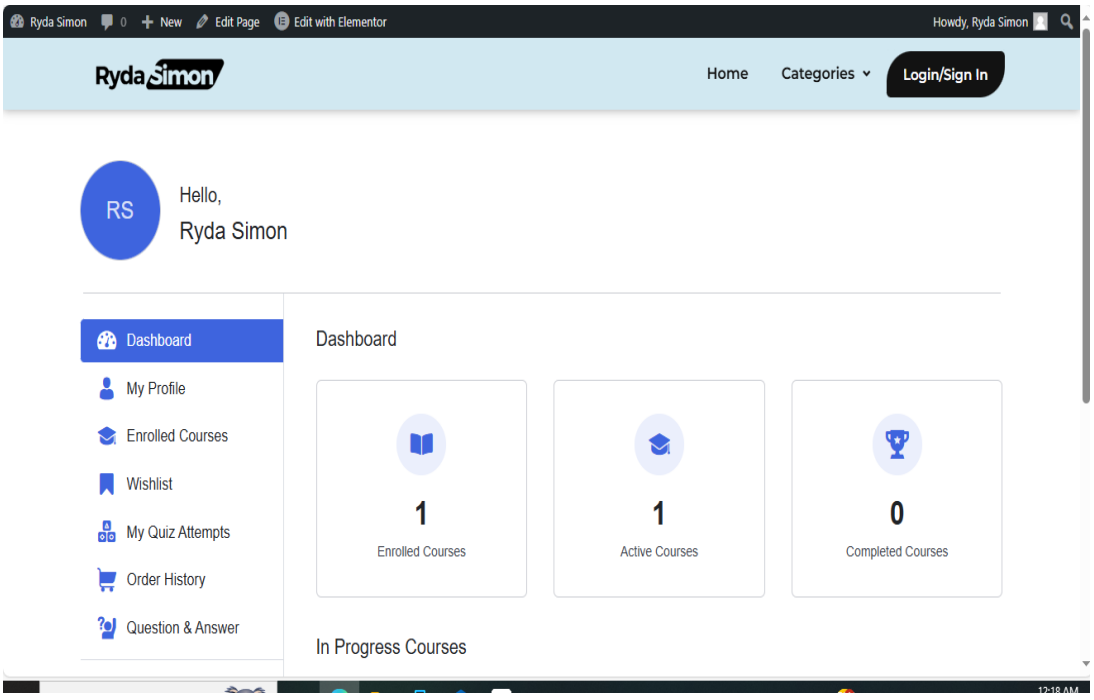

Figure 3: Output 3 – Dashboard of website

The dashboard of an e-learning platform is depicted in the image that can be found above. The user in question is Ryda Simon. A greeting and a summary of the user's course activities are displayed. The summary reveals that Ryda has enrolled in one course, which is currently active, but that she has not yet finished any of the courses.

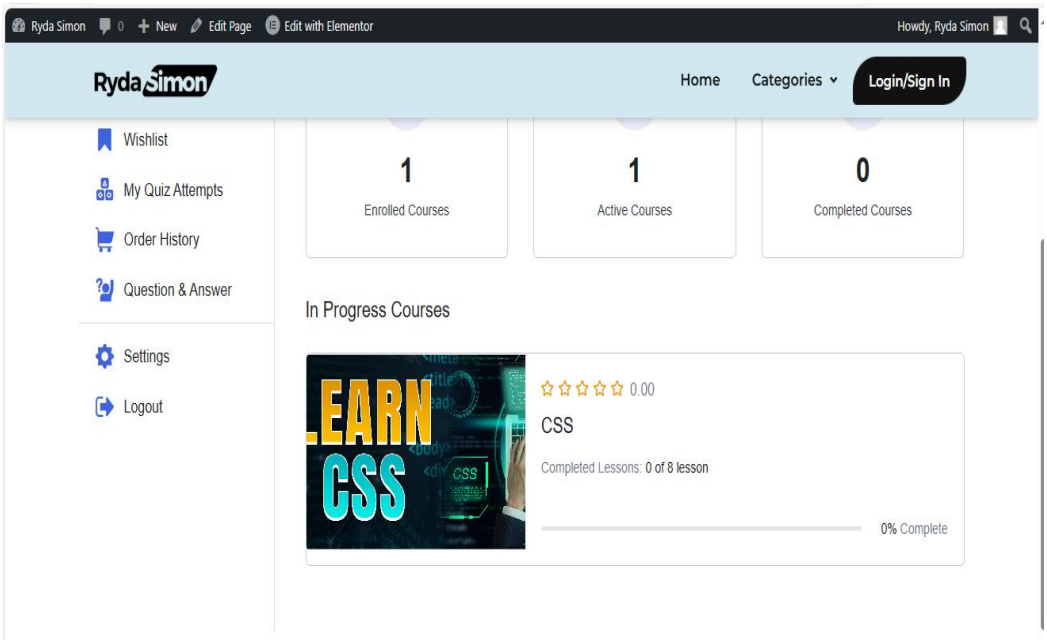

Figure 4: Output 4 – Courses in Progress

CONCLUSION:

To conclude, adaptive intelligent e-learning systems incorporating machine learning technology are a major educational breakthrough. These technologies enable individualised learning, increase comprehension and retention, provide timely interventions and targeted support, and provide scalability and resource efficiency to meet learners' needs and improve educational outcomes. Data analytics and innovation will keep these systems at the forefront of educational technology, empowering students and teachers. To build an inclusive, effective, and engaging learning environment, these technologies must be fully embraced.

REFERENCES:

Hewa, K. G., & Kumara, P. P. N. V. (2018). Artificial Intelligence Approaches for Improved Adaptability in an adaptive E-Learning Environment: A Review.

Kolekar, S. V., Pai, R. M., & MM, M. P. (2019). Rule based adaptive user interface for adaptive E-learning system. *Education and Information Technologies*, *24*, 613-641.

El Aissaoui, O., El Madani El Alami, Y., Oughdir, L., & El Allioui, Y. (2018, July). A hybrid machine learning approach to predict learning styles in adaptive E-learning system. In *International Conference on Advanced Intelligent Systems for Sustainable Development* (pp. 772-786). Cham: Springer International Publishing.

Alshammari, M. T., & Qtaish, A. (2019). Effective Adaptive E-Learning Systems According to Learning Style and Knowledge Level. *Journal of Information Technology Education: Research*, *18*.

Krechetov, I., & Romanenko, V. (2020). Implementing the adaptive learning techniques. *Вопросы образования*, (2 (eng)), 252-277.

Al-Fraihat, D., Joy, M., & Sinclair, J. (2020). Evaluating E-learning systems success: An empirical study. *Computers in human behaviour*, *102*, 67-86.

Matayoshi, J., Cosyn, E., & Uzun, H. (2021, June). Evaluating the impact of research-based updates to an adaptive learning system. In *International Conference on Artificial Intelligence in Education* (pp. 451-456). Cham: Springer International Publishing.