

A STUDY ON MACHINE LEARNING-DRIVEN ADAPTIVE INTELLIGENT E-LEARNING SYSTEMS

RYDA SIMON¹, DR. TARUN KUMAR²

DEPARTMENT OF COMPUTER SCIENCE

^{1,2}SHRI VENKATESHWARA UNIVERSITY, GAJRAULA (UTTAR PRADESH)

ABSTRACT:

A machine learning-based adaptive sophisticated e-learning system is currently under development. By analyzing student data and performance metrics in real-time, this technology enables an application that may modify lesson plans and pedagogy. The system may tailor the learning experience to each student's unique interests and demands by using machine learning techniques, which are often used in recommendation and statistical analysis systems. The goal of this research is to find ways to make learning more engaging, effective, and easier to memorize. Our strategy for achieving these goals involves implementing adaptive exams, providing immediate feedback, and providing personalized content suggestions. Optimal cumulative results for learning may be achieved in a range of online course styles by doing so. A qualitative technique was used by the researchers for this investigation. Findings showed that the intelligence that adapts e-learning system greatly enhanced engagement and performance in the classroom by personalizing the learning experience for each student. The approaches used in algorithmic learning successfully recognized individual learning styles and requirements, allowing for personalized evaluations and remedies. Students ultimately performed better and remembered more information compared to more conventional online learning methods.

Keywords: Machine Learning; Adaptive Intelligent E- Learning Systems; Technologies; Educational Experience.

INTRODUCTION:

As a result of the paradigm shift in education caused by the exponential growth of technology, an increasing number of people are choosing distance education venues as their preferred method of receiving a degree (Gheibi et al., 2021; Amouei et al., 2021). Conversely, conventional online education systems sometimes use a cookie-cutter approach that fails to

take into account the unique requirements and learning styles of each student. Research into more complex methods of personalizing the learning experience has been stimulated by this constraint (Colchester et al., 2017). Algorithmic learning is a potential solution to this problem since it can find patterns in large datasets. The possibility exists for intelligent platforms to be provided by integrating algorithmic methods for machine learning with systems for online learning according to Tan et al. (2018) and Park & Matsuda (2018). Following real-time analysis of student achievement, behavior, and preferences, these systems may modify the distribution and evaluation of material. Potentially, this may pave the way for the creation of adaptive smart systems. Finding out if it appears that these kinds of systems could enhance learning outcomes by providing students with more personalized and interesting courses is the main objective of this study. Online education becomes more effective and accessible when the long-standing issues with conventional e-learning approaches are resolved.

Therefore, the major objective of this project is to develop a machine learning-powered e-learning system that is smart, adaptive, and user-friendly. In this section, we shall provide a synopsis of the relevant prior research on our subject.

LITERATURE REVIEW:

Following this, you will see an in-depth evaluation of prior research that is pertinent to this study on machine learning-driven adaptive intelligent e-learning systems.

Table 1: Related Works

AUTHORS AND YEAR	METHODOLOGY	RESULTS AND DISCUSSIONS
Zine et al., (2019)	The study polled instructors together with economics majors at Algeria's Tlemcen college, and using the five aspects of the ADKAR model: understanding, desire, understanding, ability, and repetition.	According to these findings, colleges should prioritise improving students' abilities and skills to enhance their preparedness for online learning. This research shed light on factors affecting university students' e-learning readiness.

Baneres et al., (2019)	“Technology Enhanced Learning (TEL)” can create effective e-learning models that help students learn and grow. Online learning uses technology to promote new learning methods and performance. Onsite teaching employs active learning, integrated learning, and technology to keep students engaged.	While TEL is developing new teaching methods, For pupils' educational needs, computers is only one tool among many. Ideally, the proposed technique would be evaluated for pedagogical relevance and integrated into education paradigms. Because of this understanding, this theme series emphasises technology-enhanced learning and critical studies rather than technology-compelled ones.
Mujtaba & Mahapatra (2020)	This technique-oriented review examined AI applications in CAT and their benefits, drawbacks, and potential concerns.	This work harmonised psychometrics and AI terminologies and notations for future research and development.

Research Gap: Although machine learning-driven adaptive e-learning systems show promise, there is still a huge research vacuum in understanding the long-term effects of these technologies on various student demographics. Furthermore, there is a requirement for additional research to authenticate the efficacy of particular machine learning algorithms in precisely customising learning experiences in diverse educational settings.

METHODOLOGY:

This in-depth investigation analyzed the development and performance of intelligent, flexible e-learning systems that rely on machine learning. The purpose of this study is to examine existing methods and trends in the field by analyzing secondary data collected from various

sources, including case studies, scholarly articles, and the results of previously implemented e-learning systems. Using a method of qualitative inquiry, we may delve deeply into the different perspectives and experiences of both teachers and students on the individualized virtual classroom. Finding the most important factors influencing these systems' functionality via analysis of information is the primary goal of the study. The results of the lessons taught, the machine learning techniques used, and the adaptive feature implementation will all be examined in this section. One may learn everything about machine learning's capabilities for creating engaging and useful online classes by following this procedure. Future school technology initiatives and advances will greatly benefit from the data it supplies.

RESULTS AND DISCUSSIONS:

Without considering the unique needs and learning styles of each student, traditional online learning approaches often result in disengagement and subpar educational outcomes. Instructional material and distribution techniques may be fine-tuned in real-time with the use of techniques for machine learning such as distributed filtering, deep learning, and analytics that are predictive. The present state, successes, and shortcomings of adaptive e-learning platforms are investigated in this study. It does this by reviewing previously published research, case studies, and implementation records as secondary sources of data. By adapting to the unique requirements of each student, AI online education platforms vastly improve participation and satisfaction among students (Gheibi et al., 2021). Data collected from a variety of classes indicates that these technologies might potentially tailor the delivery of course materials to each student's unique needs. For instance, in the field of higher education, an avenue that used networked filtering algorithms to anticipate student preferences and provide relevant information met with success. The results of this were more tool use and better academic performance. Corporate training could benefit from dynamic evaluations built on neural networks due to the speedy responses and individualized learning pathways they provide (Tan et al., 2018). Workers' capacity to acquire new knowledge and hone their current skills has been substantially boosted by this approach.

Take Byju's app as an example of how algorithmic learning might revolutionize online education. In order to do this, it compiles information on student relationships and accomplishments in order to provide content recommendations and individualised learning

programs. Through the use of algorithms for learning algorithms, Byju's is able to track the development of every pupil, pinpoint areas of weakness, and adjust the course's pace and difficulty consistently. Students are more engaged and retain more information when classes are adapted to their individual needs, strengths, and learning type. This is a prime example of how flexible creativity has revolutionized contemporary classrooms.

This investigation also looked at the difficulties of putting such cutting-edge technology into practice. It may be necessary to invest significant time and energy into collecting and evaluating reliable data in order to integrate machine learning algorithms into online learning programs. Resolving issues with data safety and confidentiality is necessary to protect students' personal information. Investing in advanced, flexible e-learning systems is beneficial since they allow for tailored courses, even if they have certain downsides.

CONCLUSION:

This research demonstrated how e-learning may be enhanced via the use of machine learning. Improving learning environments via innovation and investment in instructional technology is a core theme of the paper. Educators and organizations might potentially help students from all backgrounds succeed in school by using machine learning in general strategies.

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