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Exploring The Research on Utilizing Machine Learning in E-Learning Systems

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ABSTRACT

Naturally, you are already familiar with the phrase "E-Learning" in a time when information technology rules and everything is digital. electronic learning, e-learning. Through e-learning, anyone, at any time, can participate in the teaching and learning process. Distance and time are no longer impediments to completing activities, including learning in this situation, just like other online activity concepts. Nearly all schools and institutions today use eLearning in some capacity. The COVID-19 pandemic and the rapidly changing globe necessitate that everything is done online in addition to the world being entirely digital. This study employed the systematic literature review (SLR) methodology. The outcomes, which can be employed in a variety of Machine Learning (ML) applications, are acquired. Artificial intelligence (AI) in the form of machine learning (ML) enables software applications to predict outcomes more accurately even when they are not expressly programmed to do so. To forecast new output values, machine learning algorithms use historical data as input.

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1. INTRODUCTION

A learning platform based on technology is called e-learning. Period E-learning is now so widespread that educational institutions at all levels middle schools, high schools, and especially colleges—use it extensively [1]. During the COVID-19 epidemic, E-learning was heavily utilized for distance education. E-learning applications incorporate a variety of technologies, such as machine learning, which is used to automate learning, in addition to learning content [2]. Machine learning is a subfield of artificial intelligence that develops intelligence through training and testing. Many different industries, including traffic, industry, medicine, and technology vehicles, can benefit from machine learning. To determine the many applications of machine learning in e-learning, as well as to identify

gaps and inform future research, this study will examine the implementation of machine learning in e-learning [3].

2. RESEARCH METHODOLOGY

A Systematic Literature Review was the research methodology adopted in this project. Google Scholar and Research Gate were searched as part of the literature evaluation. Discovering the use of machine learning in education is the aim [4]. By using the boolean operators "application" OR "implementation" AND "Machine Learning" AND "E-learning" OR "online learning" OR "online class" OR "LMS" OR "Virtual Learning," it is possible to conduct article searches using the key phrase "Machine learning." Online databases with information on e-learning and machine learning are freely accessible. The 20 publications are based on these data [5]. These articles were once again filtered because they did not match the criteria since they were lacking in information and did not address the application of machine learning [6]. Machine learning research and online learning:

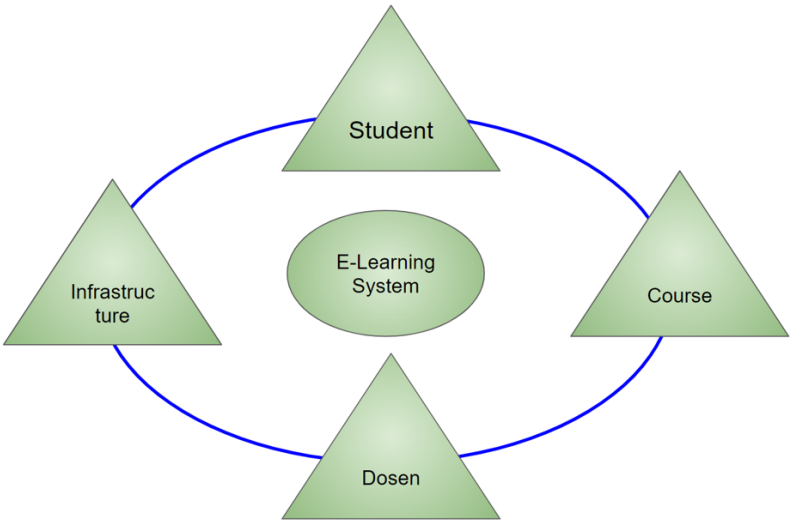

Figure 1. Influence factors.

3. RESEARCH FINDINGS AND DISCUSSION

In this study, we investigate some uses for machine learning in e-learning systems. Several significant conclusions are drawn from our analysis [7]. The use of numerous algorithms and approaches aimed at boosting user involvement, offering material recommendations that suit students' interests, and providing more useful learning feedback has made machine learning a key component of the development of e-learning systems [8]. Second, machine learning can increase learning efficiency by automatically identifying students' learning challenges and allowing modifications to learning strategies. Third, by using e-learning platforms that can modify content, level of difficulty, and teaching style following user choices and needs, learning may be made more personalized [9].

Fourth, improved learning data analysis makes spotting e-learning patterns and issues easier [10]. The application of machine learning in e-learning holds the potential to dramatically enhance the online learning experience, despite some difficulties, including student data protection and technological integration [11]. It is envisaged that the use of this technology will expand and offer more advantages to students all around the world as we become more aware of its potential and constraints [12]. This study is based on a thorough investigation of machine learning's application in e-learning platforms [13]. The usage of machine learning has grown to be a key component in the creation of contemporary e-learning systems along with the quick growth of information and communication technology [14].

In conducting our investigation, we came across several results that show both the beneficial effects of applying this technology to the online learning experience and the enormous potential that still needs to be fully realized [15]. First of all, the use of machine learning in e-learning has made it possible to create more interactive and user-responsive systems [16]. To enhance user interaction with the system and provide more logical and natural communication aspects, natural language processing techniques are implemented. Additionally, it is more beneficial to make content recommendations based on each student's needs and progress, allowing them to access the learning materials at the appropriate level. We also discovered that machine learning holds considerable promise for enhancing learning effectiveness [17].

E-learning platforms enabled by machine learning can change learning strategies in real-time by automatically identifying students' learning challenges [18]. This makes it possible for students to get through learning challenges more quickly and effectively. This improved learning efficiency has a huge impact on preparing pupils for a successful future in an increasingly competitive environment [19]. Additionally, machine learning makes it easier to customize the learning experience. A more relevant and interesting learning experience can be delivered through e-learning systems that can adjust the course's content, level of difficulty, and teaching approach following student choices and needs. This helps each student reach their full potential by boosting engagement among students and encouraging improved personal growth [20].

One of the main advantages of employing machine learning in e-learning is the ability to analyze learning data in a more complex and precise manner, which is no less significant [21]. Learning data can be more thoroughly studied to spot trends, patterns, and potential issues. These insights can be used by educators, curriculum designers, and other stakeholders to take the necessary steps to enhance students' educational experiences [22]. Despite difficulties such as student data privacy issues and difficult technology integration, using machine learning in e-learning has the potential to drastically alter how we teach and learn [23]. The usage of this technology will expand and bring more advantages to students all over the world as we gain a better grasp of its potential and constraints. In other words, investigating the application of machine learning in e-learning is a critical step toward a future where education is smarter, more effective, and individualized [24].

So that this can be accomplished and student performance in online learning is increased, changes must be made to the online learning process [25]. Mochamad Sidqon's research into creating a learning management system that uses machine learning to boost system performance has shown that the testing carried out on the system yielded satisfactory performance good, with the precision test results having a performance value of 86.67%. As a result, the built-in E-Learning system can aid in streamlining the evaluation of student learning. It is envisaged that this implementation will make it simpler to deploy online learning [26].

4. CONCLUSION

After reviewing a range of relevant studies, it can be concluded that there has been significant progress in the application of machine learning technology to enhance the effectiveness and efficiency of online learning. These studies shed light on various strategies and programs that hold the potential to transform the landscape of education in the current digital era.

One of the noteworthy findings is the potential to provide a more individualized learning experience for each student. By harnessing machine learning technology, we can accurately identify the unique learning needs of each student and provide materials tailored to their level of comprehension. This can significantly boost satisfaction levels and overall learning outcomes.

Furthermore, the adaptability of machine learning technology to students' needs and evolving curricula is highly promising. This means that machine learning-based e-learning systems can automatically adjust content and teaching methods in response to curriculum developments and changes in student requirements. This can save educators time and effort in continuously redesigning curricula to keep pace with changing needs.

Moreover, these studies underscore the importance of investing in the development of machine learning-based e-learning systems. Consistently allocating resources for research and development in this field is crucial. In other words, this is a long-term investment that can yield significant benefits over time.

To implement these advancements effectively in online education, collaboration among researchers, educators, and policymakers is necessary. Joint efforts will help ensure that machine learning technology is utilized to its fullest potential and can contribute to the creation of a more responsive and improved educational system that caters to the needs of students.

In conclusion, through continuous research and development efforts, along with strong collaboration among education stakeholders, we have the potential to create a more adaptive, efficient, and effective online learning experience for students in this digital era.

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