Section A-Research paper

THE APPLICATION OF AI IN DISTANT EDUCATION SYSTEMS AND ONLINE LEARNING

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ABSTRACT

Technologies based on artificial intelligence (AI) are helpful in supporting online learning and teaching, including customizing classes for students, automating routine activities for teachers, and managing portable assessments. Although computer-based intelligence systems have exciting potential, it is still unclear how they will impact students' standards of behavior and how they will cooperate with teachers. Artificial intelligence advances in technology are applied in many aspects of our life, including education. The expanding use of developments in artificial intelligence and the current level of craftsmanship are the driving forces for this paper's examination of artificial intelligence research from the standpoint of online distance learning. China, India, and the US are the top countries for artificial intelligence research in online learning and remote education. Time pattern analysis has recently steadily increased as needed. Three major research areas were also identified by the text mining and interpersonal organization study: (1) educational information mining, learning examination, and artificial intelligence for flexible and customized learning; (2) algorithmic online educational spaces, morals, and human office; and (3) online learning through location, recognizable proof, acknowledgment, and expectation.

Keywords: Artificial intelligence, Distant Education Systems, Online Learning

1. INTRODUCTION

In this information era and great inventions, breakthroughs in artificial intelligence have impacted every part of our lives including education. Artificial intelligence (AI) can be utilized to improve teaching and learning processes and to address a range of challenges that arise in online distance learning. Given the abundance of information, the ability of advancements in artificial intelligence to create their own models, and the unending acceptance of learning examination approaches, we must think about how to successfully integrate artificial intelligence into education generally and online distance education specifically (Andersen, 2013). This study's primary objective is to assess an artificial intelligence test used in online distance learning that was inspired by recent developments in the field.

Online learning and teaching present a plethora of potential for artificial intelligence (computer-based intelligence), from automated student evaluations to individualized instructions. For instance, by tailoring the learning material to the explicit learning examples or informational levels of the understudy, simulated

intelligence mentoring systems can offer tailored assistance, support, or critique. Thanks to computer-based intelligence showing associations, teachers can use the time they save by noting students' straightforward, repetitive questions in online conversation discussions and then apply it to more significant work. Educators can employ artificial intelligence testing to assess students' potential, development, and display by decoding their snap stream data.

Despite the bright future prospects for computer-based intelligence, some educators and students may not be in favor of their effects. Students can consider the haphazard collecting and analysis of personal information by computer-based intelligence systems as a security risk, as demonstrated by the Facebook-Cambridge Analytica data scandal. When artificial intelligence professionals act in a way that ignores the possibility of information predilection or algorithmic predisposition, understudies may find it oppressive. Teacher's stress that children may begin to doubt their capacity for clear thinking, innovative problem-solving and unrestricted growth if they rely too heavily on artificial intelligence systems. It is critical to take into account how instructors and learners view the influence of artificial intelligence systems on online learning environments.

The Artificial Intelligence in Education (AIEd) group is increasingly examining the impact of simulated intelligence systems on online education. For instance, Roll and Wylie advocate for further integrating simulated intelligence systems in applications for education that take place outside of the classroom and in student-teacher interactions (cited in Baker, 2016). The intentional analysis of AIEd distributions from 2007 to 2018 by Zawacki-Richter and colleagues revealed a lack of a fundamental comprehension of the ethical implications and dangers of artificial intelligence systems on the collaboration of students and teachers. A study by Popenici and Kerr (2017) on the effects of AI on education and learning revealed probable conflicts between students and teachers because to issues with security, altering power dynamics, and unneeded control. These inquiries sparked additional study into the impact of computer-based intelligence systems on student teacher associations. This will make it easier for us to spot any weaknesses, issues, or roadblocks that keep artificial intelligence systems from realizing their full potential.

Online learning is undoubtedly greatly influenced by student and teacher collaboration. Kang and Im (2013) gave an example of how elements of student-teacher collaboration, such as presence, support, and communication, improve students' academic performance. The student teacher partnership also has an impact on the student's sense of self-worth, drive to learn, and confidence in their capacity to overcome obstacles. Less is understood, however, about how student-teacher collaboration will be impacted by the use of artificial intelligence in online learning. Artificial intelligence systems are believed to have a profound effect in the homeroom, changing the relationship between educator and understudy. However, more research is anticipated to fully comprehend how and why different computer-based intelligence systems impact student-teacher communication in online learning.

2. LITERATURE REVIEW

Agboola (1981), who focused on the role of the educator in distance education, discovered that during contact meetings, some teachers (coaches) don't show up regularly, some arrive late, and some don't have time to prepare for their examples because of other personal commitments (cited in Bozkurt et al., 2021). In certain seminars, speakers pass out freebies without explaining what they mean, and in other talks, speakers give notes directly without taking into account the need for clarification.

With a focus on adequate on-contact meetings, Freeman (1982) demonstrated that another concern relating to the instructional exercise habitats in acquired premises was some of these foundations' reluctance to provide other sorts of help for students of other establishments.

Pythian and Clements (1982) focused on dropout from third-level mathematics-related courses and found that one explanation for high course dropout rates was confusion between the course's difficulties and the understudies' readiness for school. For a considerable fraction of the pupils, a few courses have been planned at an excessively significant level. Other causes included desolation, a lack of assistance during times of need, and tiredness caused by the total expense of raising a family and an individual.

Keegan (1986) worked to lay the foundation for distance learning and discovered that PCPs can meet a variety of needs on Tributes (cited in Casas-Roma & Conesa, 2021). In any event, there hasn't been any compelling

evidence presented to show the necessity of eye-to-eye components or to dismiss them as irrelevant to the educational framework. However, it is undeniably true that the PCP is an important academic contribution to the framework for separate education.

Thunder (1986) focused on defining remote learning and observed that the majority of what are frequently referred to as "distance education software engineers" are somewhat situated between these two boundaries and engage in some form of interchange in addition to being very well-organized. This conceptualization aids in understanding how an understudy enrolled in a distance education course who regularly meets, communicates with, or calls his coach can be at a more prominent conditional distance than an understudy enrolled in a classroom setting whose job educational action is to attend lectures and take notes.

The effects of language and approach on student control or independence were examined by Post and Baynton in 1989. They have invested a lot of effort in comprehending the relationships between many design elements, such as pacing, goal-exchange, discourse, which they characterize as recurrence, rapidity of correspondence, and independence.

Keegan (1990) focused on the foundations of distance learning and recommended the importance of SLM in any ODL framework because students and teachers experience semi-permanent separation over the course of the learning system. Sharing educational resources across educational organizations can overcome these restrictions. Sharing learning resources not only overcomes the paucity of resources needed for SLM development, but also democratizes access to education by providing high-quality education to significant portions of the general public (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021). Sharing resources also promotes promotion and provides beneficial opportunities for greater recognition of design foundations.

Where printed materials currently exist but are deemed to be lacking, Meldon (1990) read up changing text for distance learning discovered that the equivalent may be changed into self-informative materials (SIMs) through the process of text change.

3. Artificial Intelligence in Online Learning

Many simulated intelligence systems assert to have an effect on the collaboration between students and teachers in online learning. For instance, Goel and Polepeddi created Jill Watson, an AI show partner, to enhance teacher-student interaction by independently responding to student presentations, posting weekly announcements, keeping track of the schedule, and frequently requesting clarification on some pressing issues (Gough & Oliver, 2012). Faster communication of grades between students and professors is made possible by a method of artificial intelligence grading created by Perin and Lauterbach. By providing continuous feedback on how students learn and the progress they are making toward their learning goals, Luckin exhibited artificial intelligence solutions that are advantageous to both teachers and students. Ross et al. created online adaptable tests to help students by offering learning resources catered to each student's unique needs, which enhanced the students' motivation and dedication. As demonstrated by Heidicker et al., virtual symbols increase a sense of presence, enabling a small number of really isolated clients to collaborate in a lively virtual environment. Aslan and her collaborators created artificial intelligence face examination to address how teachers acting as mentors in innovative learning environments interfered with the learning process. It is crucial to fully comprehend how teachers and students view the effects of the simulated intelligence while analyzing these simulated intelligence systems.

The recent introduction of corporate computer-based intelligence systems for online learning highlights the complicated effects of artificial intelligence on student teacher associations. For instance, Proctorio (Proctorio Inc., USA), a system that attempts to deter cheating by checking students and their PC screens throughout a test, appears to be an idiot-proof strategy to screen students in online learning, but students report that it worsens their test anxiety. Proctorio is videotaping understudies while they are occupied, which makes for an uncomfortable testing environment. Because of this, there is a potential that Squirrel artificial intelligence, developed by Squirrel man-made intelligence Learning Inc. in China, which seeks to provide flexible learning by automatically adapting to the optimum teaching approach for a particular student, may limit students' creative learning. Practically speaking, all of these situations have the following in common: Artificial intelligence systems are more independent in how they evaluate knowledge, understand learning, and occasionally make

educational decisions than educational technologies that only enhance interactions between teachers and students.

4. METHODS

4.1. Research Design

In order to efficiently audit and research the use of artificial intelligence advancements in online distance education, this study benefited from traditional bibliometric examination and information mining as well as scientific methodologies like informal community examination, text mining, and t-appropriated stochastic neighbor implanting (t-SNE). Finding the research data was the goal of employing various methods, which would improve the review's legitimacy and dependability.

4.2. Criteria for Inclusion and Sample

The companion audited distributions that were kept for the examination corpus complied with the following standards: (1) English language writing; (2) Scopus listing; and (3) titles that included the pursuit questions (Table 1). It was determined to keep in mind distributions that include the quest inquiries in their titles in order to find peer-evaluated distributions with a strong focus on the study being cited and whose essential goals are aligned with the overarching motivation behind this evaluation (Kurshan, 2016). Last but not least, studying distributions written in English facilitates the direction of exhaustive and trustworthy visual analysis because text-mining research can be carried out more successfully to identify lexical relationships in text-based data when the exploration corpus consists of papers written exclusively in one language.

Table 1: details about the search phrases used for the research corpus' inclusion criterion

Research Corpus	
Database	Scopus
Period	1999-2022
Search Queries	
Subject-specific queries	TITLE (“artificial intelligence” OR “machine learning” OR “deep learning”)
Boolean search parameter	AND
Field-specific queries	TITLE (“distance education” OR “distance teaching” OR “distance learning” OR “remote education” OR “remote learning” OR “remote teaching” OR “online education” OR “online learning” OR “online teaching” OR “online course” OR “elearning” OR “e-learning” OR “m-learning” OR “edtech” OR “educational technology”)

The analysis used the PRISMA methodology throughout the examination cycles and the corpus's age (Table 2), and the final stage contained 276 distributions in total.

Table 2: PRISM Protocol

Identification	The entire set of documents found on Scopus (n = 302)
Screening	Excluding documents in other languages (n = 4)
	(Total n = 19; book chapter [n = 15], editorial [n = 6], book [n = 2], and erratum [n = 2] are non-empirical papers excluded.)
Included	The final research corpus consisted of 276 papers (142 articles and 134 conference publications).

4.3. Procedures for Data Analysis and Research

The title, dynamic, and watchwords in this study's analysis of articles are assumed to be addressing the real content of scholarly distributions. This work investigates articles utilizing four lines of information research methodology. To start, the research corpus is first given an overview perspective using standard bibliometric analysis techniques. Second, in order to separate the various propensities of simulated intelligence in online distance education studies, t-SNE examination is used to assess the titles of the inspected distributions (Lester, 2013). Third, text mining is used to examine the digests of the examined studies in order to create a thematic guide. Finally, informal organizational investigation is used to identify the important watchwords. To identify

extensive exploration subjects in the studied distributions, both text mining and informal community examination returns were used.

4.4. Strengths and Drawbacks

The novel logical methods this work used to assess the enormous amount of literary data and then picture it are what make it special. However, there are few limitations. First, despite being the largest data set, Scopus does not list and retain all distributions for the examination in question. As a result, the researchers of this study are aware that the information found in this concentration only provides a partial picture. Second, only distributions written in English were remembered for the previous examination corpus due to specific reasons; nonetheless, distributions in other languages can still provide a correlative outline.

5. RESULT AND DISCUSSIONS

5.1. A Bibliometric Outlook in General

The authors didn't provide a specific time frame because they wanted to include everything in this review. The exploration corpus includes distributions spread out throughout a twenty-year period from 1999 to 2022. The literature on artificial intelligence in online distance education research has a total of 769 authors, which is more than 276 distributions (Nassoura, 2022). There is just one component in 42 of these distributions.

As depicted in Figure 1, interest in artificial intelligence in online distance learning started to increase in the second decade of the 2000s and reached its peak in 2021. However, these concentrations date back to the latter part of the 1990s and the middle of the 2000s.

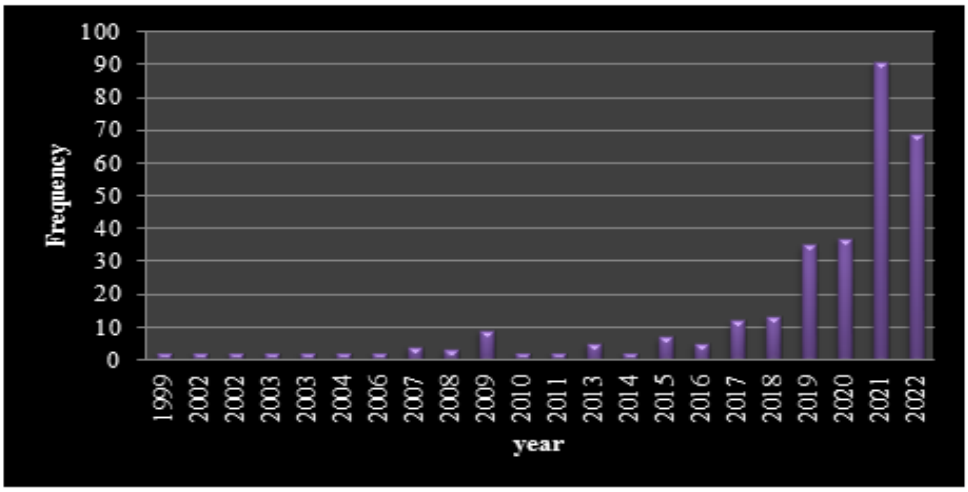

Figure 1: Online publications' AI time trends for distance learning.

The most frequently cited distributions focus on predicting behavior patterns and individually planning intercessions. The most helpful nations are China (n = 88), India (n = 46), and the US (n = 17) (see Figure 2).

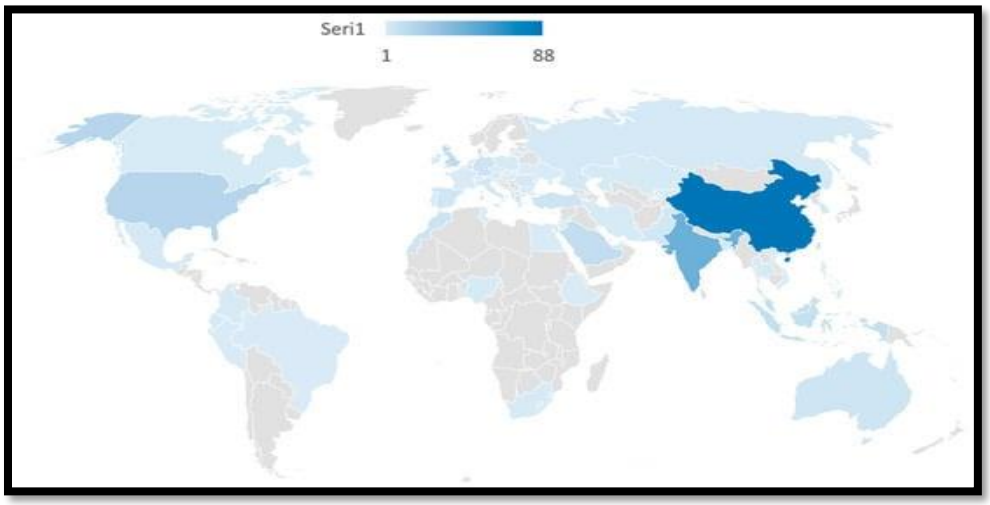

Figure 2: Geographical spread of AI for distance learning in online publications.

The majority of the examination corpus came from the finest five disciplinary streams of knowledge (see Figure 3). As can be expected, specialized fields of expertise like arithmetic, software engineering, and design outweigh other areas of exploration (Ouyang et al., 2022). Surprisingly, sociologies make up only about 13.3% of studies. According to this research, the vast majority of distributes are more interested in specialist elements than educational viewpoints.

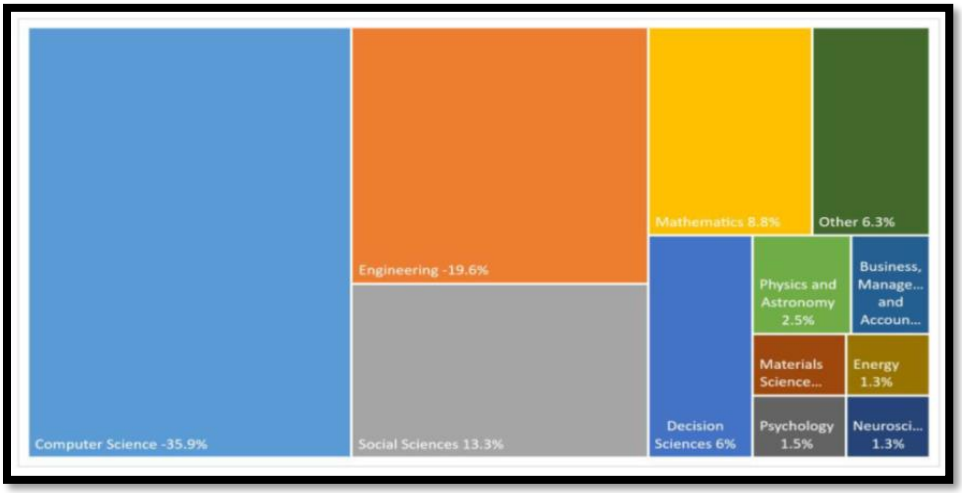

Figure 3: Subject areas covered by publications on artificial intelligence in distant learning (one publication may have more than one subject area coded for it).

5.2. RESEARCH PATTERNS AND TRENDS

5.2.1. Examination of the Titles

T-SNE is a "nonlinear dimensionality decrease procedure that means to protect the nearby design of information" that can be employed on its own when analyzing and envisioning densely layered data. The distributions' foci were determined using t-SNE analysis using literary data derived from the titles of the distributions remembered for the exploration corpus (Figure 4). As needed, there are three main groups. The green cluster shows that online teaching and learning activities are utilizing artificial intelligence breakthroughs in technology (Pelletier et al., 2022). The examples in the green group are consistent with the findings of the Skyline Report, which emphasizes the widespread application of innovations in computer-based intelligence, particularly in higher education. It also adds that "Computer-based intelligence is showing up throughout advanced education instructing and learning, in spaces like learning the executives systems, delegating, reviewing/evaluating, understudy data systems, office efficiency, library administrations, confirm The blue

group gives an example of how calculations are used to identify, separate, and foresee students' behavioral patterns. Wang, for instance, emphasized the significance of students' dedication to online learning and discussed the potential efficacy of deep learning approaches. Ganidisastra and Bandung claim that the administration of m-learning online tests can utilize effective learning approaches through face recognition. According to Feng et al., in online learning environments, students' mental grades might serve as academic feeling acknowledgment. Wang et al.'s main contention was that learning execution may be predicted using AI approaches. Similar to this, Luo et al. showed how AI methods may be effectively applied to forecast learning outcomes in a mixed learning context. Finally, Park and Yoo found that using AI, it may be possible to forecast early dropout among students enrolled in online learning environments. The fourth pink group is concerned with adaptable and customized learning made possible by developments in artificial intelligence. In order to enable individualized learning, AI can be employed, as discovered by Srisa-An and Yongsiriwit. In other words, this large number of clusters demonstrates that artificial intelligence can be applied to online distance learning, but it also implies that there is an algorithmic future that requires careful consideration and a focus on more in-depth research before these advancements are fully incorporated into online distance learning procedures.

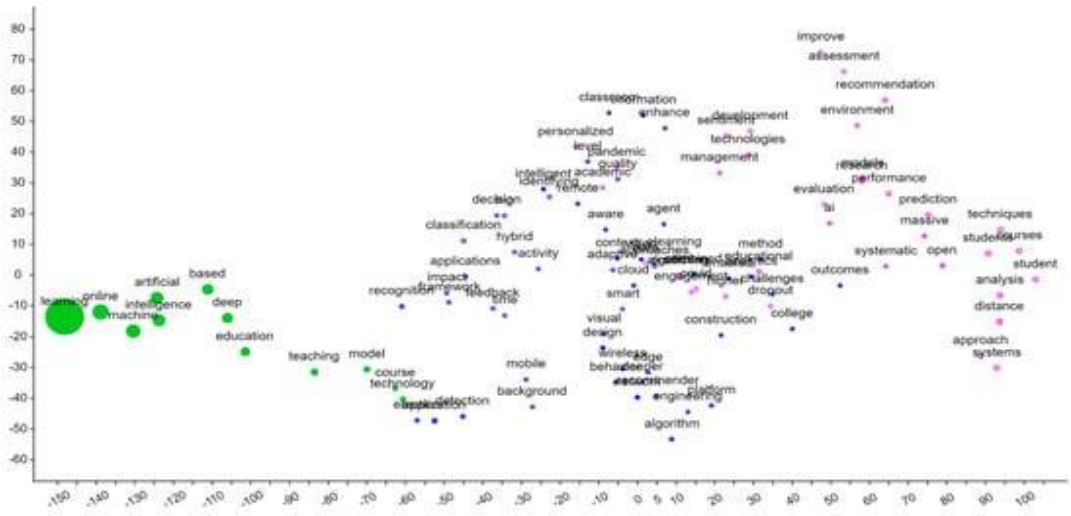

Figure 4: Titles of the sampled publications were analyzed using t-SNE.

5.2.2. The abstract and keywords are examined

This section suggests a variety of emerging study areas that were discovered using the digest text-mining results (see Figure 5) and watchword interpersonal organization results (see Figure 6). The experts used "two phases of co-event data extraction — semantic and social — involving an alternate calculation for each stage" to perform text mining on the digests. The scientists were able to discover hidden examples and visualize them on a subject idea map thanks to text-mining analysis (Miner, 2017). Watchwords are the granular delegates, and SNA was used to analyze the catchphrases. SNA "provides powerful means of summarizing networks and distinguishing key individuals, [entities], or different items that possess key areas and positions inside a lattice of connections." The watchwords were considered in this study in the context of their related events, and an organizational diagram was created. By doing this, the authors had the ability to separate important watchwords and analyze them similarly. Figures 5 and 6 are used as examples to describe the topics that arise, and then those topics are discussed while drawing from the relevant writing.

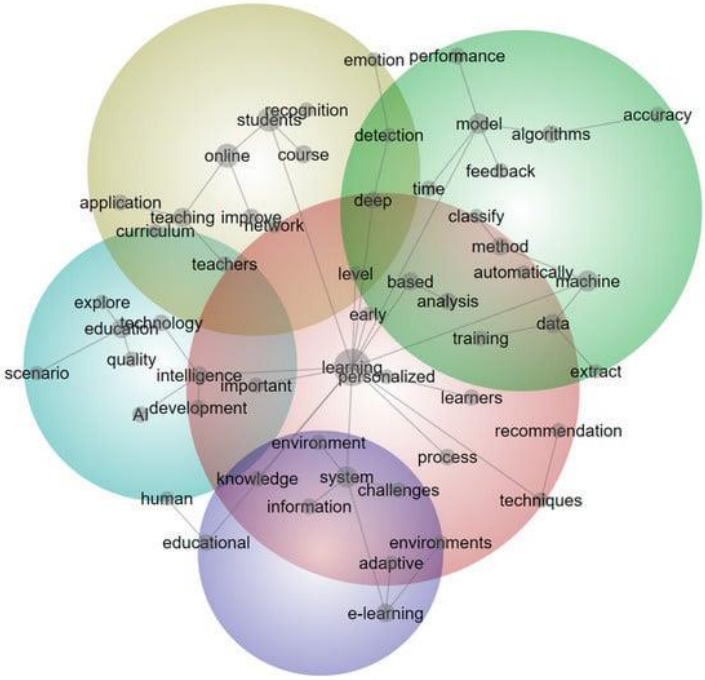

Figure 5: A idea map of abstracts was created via text mining.

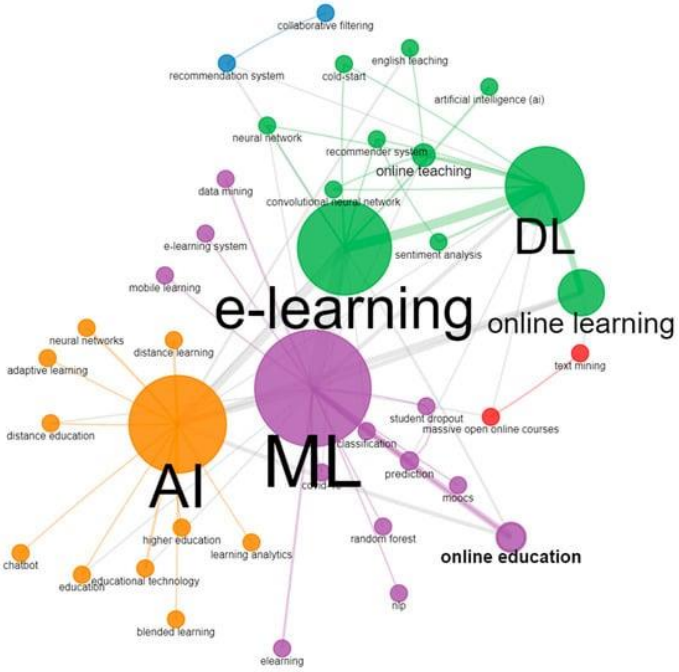

Figure 6: Social network analysis is a key concept.

Before attempting learning courses in online learning settings, RS could advise on boarding exercises. By identifying and finding people's learning advantages, RS provides specialized recommendations for learning techniques and materials (Swartout, 2013). Though some RS provide incredibly detailed advice, they can occasionally be useless in real-world situations for online learning. In order to address the insufficiency of such ideas in an online learning environment, an effective RS should be socially organized. The multiple steps of a student's knowledge gathering process should be able to be tracked, understood, and displayed by a good RS. RS are essential for offering individualized learning methods and materials, which will boost the feasibility of learning in e-learning contexts.

6. CONCLUSION

Man-made intelligence has established itself in every aspect of business. For instance, organizations use computer-based intelligence to handle complex cycles, such as completing work mechanization. It has taken on its own responsibilities in the clinical sciences, which are very much felt in the current scenario. The perspective of visiting a client has altered as a result of artificial intelligence based on computers (Tang et al., 2019). Internet business sites make extensive use of artificial intelligence by recommending products to their target customers in accordance with their own standards of conduct. Simulated intelligence in the classroom is a development. According to a paper released by the Place for Integrative Exploration in Computer and Learning Sciences, the potent uses of artificial intelligence in education have not yet been developed. Therefore, those working on artificial intelligence programs should thoroughly inform the creators of educational materials and curricula. Although there are some drawbacks to incorporating artificial intelligence into education, this is the way of the future, so educational institutions need to start exposing their students to the technology that first used simulated intelligence.

This study used a systematic survey methodology to examine artificial intelligence in online distance learning (Zawacki-Richter et al., 2019). The analysis also revealed that there is a growing demand for research into and a variety of applications for advancements in artificial intelligence, which necessitates a more thorough analysis of its use from a number of perspectives. The results show how much algorithmic thinking and advancements in artificial intelligence will influence our future. The analysis suggested three major areas for further research: (1) educational information mining, learning investigation, and artificial intelligence for flexible and customized learning; (2) algorithmic online educational spaces, morals, and human organization; and (3) online learning through location, ID, acknowledgment, and expectation.

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