

Exploring the role and scope of Artificial Intelligence in teaching, learning and evaluation process

Jayant Gondane

Dr. Ambedkar institute of management studies and research, deekshabhoomi, Nagpur

Designation: Asst. Professor

Abstract - With the advancement in computing and educational technologies, the trend of online education has become popular. Covid-19 pandemic has augmented the urge of online education. Online education has become part and parcel of our daily life. Though still in its development stage, artificial intelligence (AI) and machine learning (ML) playing a key role in improving eLearning. AI technologies and applications simulate human intelligence to make inferences, decisions, analysis and predictions. AI has the scope in multiple fields of human life but in this paper we will focus on education field. Different learners have different way and different pace of learning. AI can personalize the learning process according to learner's requirement which is also called as adaptive learning. AI also assists the teacher in imparting education more effectively by automating the different task related with online education. In this paper we will see overview of how the AI is impacting online education. What are the role, scope and challenges of AI in teaching learning process?

Keywords: online education, artificial intelligence, machine learning, adaptive learning.

I. INTRODUCTION

Technology is the main growth factor to many sectors of society and its inclusion into the education process has great benefits for teaching and learning. Conventional education systems are rapidly changing in order to encash benefit of technological advancements. The change is occurring because of the easy and widespread access to various educational sources of information online.

Artificial intelligence is not the new concept; in fact it is approximately as old as computer itself. But its application in the real life is few decades old and it is continue to evolve. It is difficult to give exact definition of AI because of the two reasons i.e. first AI is the continuously evolving field of technology and second AI is itself belong to the interdisciplinary field where expert from varying fields like computer science, linguistic, psychology, mathematics etc. making contribution in its development.

Russell and Norvig (2016) indicated that AI was used for describing machines or computers imitating "cognitive" functions, for example, "learning" and "problem solving," associated with the human mind.

AI makes use of computers and algorithms to complete the given task that was earlier needed human intellect. By making the use of algorithm machine/computer collect, classify and analyse the user data to draw inferences which is called as machine learning. Artificial Intelligence (AI) technologies have been researched in educational contexts for more than 30 years (Woolf [1988](#); Cumming and McDougall [2000](#); du Boulay [2016](#)).

The application of AI in educational field is growing rapidly such that by 2024 it is predicted to become a market worth almost \$6 billion. (AI in Education Market Growth - Global Industry Report 2024) The major organizations like google, amazon, Microsoft, IBM and many others have invested millions of dollars in the development and research of AI and ML.

Artificial intelligence continuously evolving and affecting our lives. Even in our mobile devices, an Artificial Intelligence engine is incorporated to help with studying our patterns in order to create likely suggestions during texting.(Artificial Intelligence-Based ELearning Platform, 2019)

Google using neural matching technology for approximately 30% of searches, voice searches has become standard on all major smartphone operating system. Social media also makes use of AI for delivering the content to its user.

II. CURRENT APPLICATION OF AI IN EDUCATION

There are number of applications currently making use AI and ML in education. We will review some of them-

Duolingo: Today duolingo is one of the most popular AI-based applications for learning foreign languages. The app uses small lessons with simple interface and integrated gamification activity to keep the learner engage and motivated. Duolingo uses wide variety of exercises with AI enabled chatbots to help learners in real time conversation and improve their skills.

MOOCs: In current time massive open online courses become very popular among students as it gives them opportunity to learn from anywhere in the world. Many MOOCs platform such as Coursera, edX, Canvas Network, FutureLearn, and Udacity are delivering different courses to millions of users. In addition to this, leading online universities like Oxford, Harvard, MIT etc. are

also providing the online education. MOOC platforms are making the user of AI for suggesting the new courses to students and for language transcription.

Netex: Netex Learning is a website that makes use of AI and It allows the teachers to design the curriculum which is shareable across different digital platform. Netex provide the tools for video conferences, digital discussions, personalised assignments, and learning analytics that depicts visual representations of each student's progress.

Brainly: brainly is a platform where students from all over the world collaborate to solve homework questions on their own and they also receives the verified answers for their questions.

Thinkspter Math: Thinkspter Math is a Math tutor application that uses AI and ML algorithms. This app track how students thinking as they arrive on solutions of different questions answer. This allows the app to identify learning gaps and weak points of students and then it assists the students using immediate personalized feedback.

MATHiaU: Carnegie Learning's MATHiaU offers AI-based tutoring tools for students who feel lost in general populated classrooms. The app tracks the learning process of each student and inform them about their daily progress. It also helps the teacher to customize lessons to make the students learning personalised.

Cram101

Cram101 is another example of AI-enhanced online service developed by Content Technologies, Inc, It converts the textbook into smaller chunks of lessons that is easy to learn in a short amount of time. It also generates multiple choice questions, saves time and makes the students learn more effectively.

III. ROLES OF AI IN EDUCATION

Personalizing Teaching and Learning

Generalised classroom education is not suited to everyone. Students learn differently and at different pace, and Artificial Intelligence tailors and personalizes learning for every individual. Also, AI systems are being utilized to augment tutoring with a personal approach and conversational education assistants. This autonomous tutoring helps students learn at their own pace. Artificial Intelligence is vital for checking a learner's past performance and understanding their learning style. AI uses the data to make changes to the new learning material before delivering a personalized learning experience.

It collects data from our in-app or online movement and can figure out what method of learning is best for us. It knows how quickly or slowly we grasp knowledge. This also predicts which form of content that we are most likely to engage with. AI will ensure a personalised learning journey.

Smart content creation

Creating course content is one of the factors of eLearning professionals that consumes a lot of time. AI systems, if well trained, can help to draw out valuable information and convert it into smart content for digital learning. The traditional textbook content is broken into interactive content, practice sessions and comprehensive assessments. Educators can customize the content as per the requirements and include audio and video lessons for realistic classroom environments.

Natural Language Processing

Most of the learner naturally wanted to communicate with the machine as they communicate with other human being using text or speech. Well artificial intelligence can process natural language and enable the machines/system to quickly and efficiently process human language. Artificial intelligence is capable of understanding, analysing, and extracting meaning from text and speech.

Online assessment and evaluation

Teachers don't only teach, they also spend hours in assessing and grading papers of individual students. Teachers also have to create questions papers and multiple choice questions and other assignments. With the help of AI the task of assessment and grading can be automated and teacher will get more time for interacting with the students. Machines with AI technology already able to grade multiple choice questions and in near future it will also be able to assess handwritten answers.

Identifying and filling the learning gaps

Teachers may not always be aware of gaps in their lectures and educational materials that can leave students confused about certain concepts. Artificial intelligence can identify the gaps in teachers teaching material and lecture. The teacher will get the notification when large number of students opts for wrong answer for the specific part of the assignment or homework. The teacher will come to know where students are facing difficulty and in the next class he/she can emphasize on the required information or correct answer.

Real-time Feedback

AI not only helps the teachers in the development and delivery of course but it also provides them real-time feedback about the progress of individual students. Teachers or educational organizations can use this feedback to improve and customize the course content as per the requirement of learner.

Creation of updated content

We're in the age of a content explosion; new knowledge is created every day. Students look for updated and interactive content at their disposal. Here AI brings solution and harnesses fresh content for eLearning, which includes high-resolution interactive images and content structure to engage students and help them learn better.

Gamification

Gamification is an important approach in online education to keep the students engage and motivated for acquiring knowledge. AI helps in Planning and developing online games based on training material. It helps to process large amounts of data, which is then used to determine learners' behaviour and to provide them with updates about their learning progress.

IV. SCOPE OF AI IN EDUCATION

Creating customized courses

That day is not far away when AI will be able to create the course for particular subject. Artificial intelligence, machine learning and big data technology will help the educational organizations or learners to create the new course along with assignment and MCQ in large. However few applications are doing so but it didn't become common practice yet.

Automating Administrative task

Like traditional method of teaching learning, online education also includes some tedious tasks which are essential. For example, planning a time table, scheduling coursework for online learners, readjusting the schedule to suite for individual learner or providing study material to students based on their online learning assessment results. Artificial intelligence may be able to handle these operations in the near future.

Assessment of Handwritten work

In the current time AI is capable of assessing and evaluating the multiple choice questions but in the near future with the advancement in educational technologies (AI and ML) it will become possible to evaluate handwritten assignments. Software providers are coming up with better ways of grading written answers and normal essays.

V. CHALLENGES OF AI IN EDUCATION

Emotional well-being:

AI based online education makes the use of machines to interact and deal with learners and we all know machines are devoid of emotions. Emotional state of the learners affects how well student can focus and perceive the subject knowledge. It is always said that necessary part of the effective education is interaction with human. It is challenge for scientist and engineers to make the machine identify the learners or students emotion and present the relevant education material accordingly to keep the student motivated.

Teachers employment

With the advancement of Artificial intelligence and machine learning most of the teaching, learning job will be done by machine. Advancement in AI and ML will further improve the online education. Increasing number of students and learners get the education through online media and robots. There is possibility that the robots with AI technology will replace the human teachers. The challenge is to provide job to these teachers. However, with the advancement in AI, the new jobs will be created which requires new skills related to AI, ML and Big data.

Ethical Education

Advancement in Machine learning and AI will make the robots to learn and create the courses on their own. The process on online learning and teaching will be automated with the help of robots. In such scenario, the major challenge and issue of concern is to provide ethical online education. AI based education should promote creativity and thinking in students. Governments of the world should make policy in this regard.

Sustainable growth

The rapid development of AI is now starting to exceed the computational capacity of the largest AI developers. This pace of development in data driven AI may not be sustainable. Also the success of AI based educational technology depends on many educational, social and political factors. AI based education should be persuasive and easily accessible to all the section of society.

VI. CONCLUSION

Even though the AI-based eLearning platform hasn't become a standard learning approach amidst most learning organizations, but the rate of adoption of AI in teaching learning and evaluation process by educational organizations will be continue to grow. AI is making positive contribution toward the effectiveness of eLearning. Artificial intelligence paving the way for student centric personalised learning. AI based online education will fill the teaching learning gap, save the learning time and accelerate the student's performance with better understanding. Since, most of the education related tasks will take over by AI, role of teachers will be shifted to that of facilitator. The key challenges of AI based online education system will be keeping the sustainable growth of AI, simulating the intelligence of human expert from many fields and delivery of ethics and emotion related education.

VII. REFERENCES

- [1]. Ahmad, K., Qadir, J., Al-Fuqaha, A., Iqbal, W., Elhassan, A., Benhaddou, D., & Ayyash, M. (2020). *Artificial Intelligence in Education: A Panoramic Review*. <https://doi.org/10.35542/osf.io/zvu2n>
- [2]. *AI in Education Market Growth—Global Industry Report 2024*. (n.d.). Global Market Insights, Inc. Retrieved January 9, 2021, from <https://www.gminsights.com/industry-analysis/artificial-intelligence-ai-in-education-market>
- [3]. *Application and theory gaps during the rise of Artificial Intelligence in Education—Google Search*.
- [4]. *Artificial Intelligence trends in education: A narrative... - Google Scholar*. (n.d.). Retrieved January 9, 2021, from https://scholar.google.co.in/scholar?q=Artificial+Intelligence+trends+in+education:+a+narrative+overview&hl=en&as_sdt=0&as_vis=1&oi=scholar
- [5]. *Artificial Intelligence-Based eLearning Platform*. (2019, October 6). ELearning Industry. <https://elearningindustry.com/artificial-intelligence-based-platform-impact-future-elearning>
- [6]. Chassignol, M., Khoroshavin, A., Klimova, A., & Bilyatdinova, A. (2018). Artificial Intelligence trends in education: A narrative overview. *Procedia Computer Science*, 136, 16–24. <https://doi.org/10.1016/j.procs.2018.08.233>
- [7]. Cumming, G., & Mcdougall, A. (n.d.). *Mainstreaming AIED into Education?* 12.
- [8]. Cumming, G., & Mcdougall, A. (2000). Mainstreaming AIED into Education? *International Journal of Artificial Intelligence in Education (IJAIED)*, 11, 197–207.
- [9]. Göksel, N., & Bozkurt, A. (2019b). *Artificial Intelligence in Education: Current Insights and Future Perspectives* (pp. 224–236).
- [10]. Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education*. Boston: Center for Curriculum Redesign.
- [11]. *How Is AI Being Used in E-Learning in 2020? - LearnDash*. (n.d.). Retrieved January 9, 2021, from <https://www.learndash.com/how-is-ai-being-used-in-e-learning-in-2020/>
- [12]. Popenici, S. A., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning*, 12(1), 22.
- [13]. *Research for CULT Committee—The use of Artificial Intelligence (AI) in education—Think Tank*. (n.d.). Retrieved January 9, 2021, from [https://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_BRI\(2020\)629222](https://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_BRI(2020)629222)
- [14]. *AI in Education Market Growth—Global Industry Report 2024*. (n.d.). Global Market Insights, Inc. Retrieved January 9, 2021, from <https://www.gminsights.com/industry-analysis/artificial-intelligence-ai-in-education-market>
- [15]. *Artificial Intelligence-Based eLearning Platform*. (2019, October 6). ELearning Industry. <https://elearningindustry.com/artificial-intelligence-based-platform-impact-future-elearning>
- [16]. *How Is AI Being Used in E-Learning in 2020? - LearnDash*. (n.d.). Retrieved January 9, 2021, from <https://www.learndash.com/how-is-ai-being-used-in-e-learning-in-2020/>
- [17]. <https://www.gminsights.com/industry-analysis/artificial-intelligence-ai-in-education-market>
- [18]. <https://www.investopedia.com/terms/a/artificial-intelligence-ai.asp>
- [19]. <https://www.sciencedirect.com/science/article/pii/S2666920X20300023#sec4>
<https://www.britannica.com/technology/artificial-intelligence>