



Applications of Artificial Intelligence in Open and Distance Learning

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ABSTRACT

As per the change in trend it is seen that emerging technologies are revolutionizing education. In digital education the use of laptops, tablets, computers and interactive boards are common in schools and colleges. In the modern knowledge-based society there is importance given to distance and e-learning as an innovative approaches in the field of education. The application of Artificial Intelligence (AI) in Open and Distance Learning (ODL) has led to bridge the gap between student and teacher. ODL relies on the use of machine as it provides opportunity of learning to the students who are not studying in regular mode. Here, AI acts as a means to provide learning opportunities to students, helps the teacher in effective teaching, improves pedagogical methods and enhances learning experiences of students. For instance, AI based tools such as ezTalks Cloud Meeting, WeVideo, scribe and Dropbox etc. are used in ODL mode of education so as to provide learning platform to students. The questions that further arises in the mind of the researcher are whether AI could provide a significant and highly intriguing paradigm shift in the deployment of ODL and whether AI can greatly influence the future of all open and distance learners or not? In this research paper, the researcher will explore several fields whereby AI could be potentially utilised in an ODL institution.

Keywords: Distance learning, e-learning, Artificial Intelligence (AI), Open and Distance Learning (ODL), Paradigm shift

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In human life with the passage of time the machines are becoming smarter, active as well as intelligent which lead to an active role of them in present era. As human being faces complexity in their life such as dealing with problem so AI acts as a prominent factor which deals with the problem, provides information and solution to that problem. According to Woolf *et al.* (2013), growth of different sectors has improved because of AI such as:

- ❖ Information
- ❖ Transportation
- ❖ Finance
- ❖ Communication and e-commerce

Another contribution of AI is creation of virtual reality environment. Dialogue based conversation has been established between the intelligent machines and human beings. According to Dickson (2017), the education system is being reformed tangibly of available computer devices and online services. It is rightly said that if we want to prepare the young generation as per the change in time then new strategies are needed to be adopted in our education system (Woolf *et al.* 2013). According to TeachThought (2014), the AI has the ability to alter and modify the teaching method so as to impart education. The disruption will happen when AI will change teaching and learning process. AI will empower the learner by providing them learning opportunities and experiences. According to Conati and Kardan (2013), for designing AI based education system it is important to consider student domains, knowledge of their behaviour and their mental framework. The need of AI application in education is the need of hour hence Kurshan (2016) says that “*AI could play a role in the growing field of learning analytics, evaluating the equality of curricular material, and in adaptive learning and recommendation engines*”. She emphasised that AI has the potential usage for personalised learning such as MOOCs, blended learning and online learning environment.

HISTORICAL PERSPECTIVE

The concept of AI started in the year 1950 when Turing discussed about the thinking machine. As per his report it was discussed that whether the machines could act intelligently. In 1973, Lighthil contradicted to the point of Turing by saying that machines could not understand human language. The two countries UK and Japan took the initiative of funding the ‘expert system’ which is also known as “narrow AI” (Corea, 2017). The human behaviour and skills of each domain were imitated by the machines. In 1997, there was a new phase in the development of AI where there was a defeat of Gary Kaparov who was world chess champion by DeepBlue that was a super computer developed by IBM so as to play chess (Corea, 2017). This is called as incremental learning which helps in:

- ❖ Building knowledge based on previous knowledge;
- ❖ Making use of new knowledge.

As per Corea, 2017 the following factors are going to boost up the area of AI and that are:

- ❖ Huge data feeded in terms of complex algorithms.
- ❖ Increasing the capacity of computing machines for storage and processing.
- ❖ Processing cloud-based services for resource democratisation.

DEFINING ARTIFICIAL INTELLIGENCE

“The ability to perceive information, and retain its knowledge to be applied towards adaptive behaviours within an environment or context”

— **Castrounis, 2016**

“Any technique which enables computers to mimic human behaviour”

— **Rapid Miner, 2017**

These definitions gives us an idea of how to apply knowledge and also provides us assistance in learning and understanding. Therefore, we can say the application of AI has its own limits.

APPLICATIONS OF ARTIFICIAL INTELLIGENCE

As per Castrounis (2016) AI has the different applications such as “ *patterns, text, audios, images, videos, facials, autonomous vehicles, medical diagnoses, gaming, search engines, spam filtering, crime fighting, marketing, robotics, remote sensing, computer vision, transportation, music recognition, classification*”, etc. AI is used in the field of transportation for intelligent parking assist system and lane changing on highways among others (Colyer, Partner & Accel, 2016). Example of AI are Amazon’s Alexa, Apple’s Siri & IBM/S Watson which handles the complex questions and responds to them in an intelligent manner.

1. Manufacturing Industry

AI plays a vital role in manufacturing industry such as learning analytics and intelligent machines. The robots are used for automation work i.e. performing repetitive activities. In automobile industry the intelligent machines are used in assembly line activities.

2. Healthcare

With precision, operations and surgical procedures has the capability of detecting the diseases through scanning and comparing the medical issues which is difficult to be analysed by human eye.

3. e-commerce and Social Networking

According to Lynch, 2017, AI is used in different aspects of our daily life. The e-commerce

website make purchasing suggestion on the basis of past behaviour of the customer. For instance, Google provides customized suggestions and information to the user which suits their local context.

4. Public Safety and Security

AI is useful for the security purpose as well. The cops can easily locate the criminals by finding out their locations. AI helps them to detect the white coloured crimes. There are two premises on the basis of which the intelligent machines functions and that are 'machine learning' and 'transfer learning'. Here the problem is solved first and then similar type of problem is solved by using the previous solution (Wikipedia, 2017). AI technology is also used in terms of CCTV and alarm systems.

5. Household Service

The robot plays an intelligent role in the household tasks. For instance, the cleaning robots handles the cleaning activities with perfection. The sophisticated robots handles the kitchen tasks with diligence. The example of AI can be personal home assistance which helps in regulating and controlling household lighting system.

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN EDUCATION

AI brought changes in different fields and further it is moving towards the field of education (Shokeen, 2019). Due to increase in student teacher ration there is need of robots who can assist teachers as well as students in teaching-learning process. The AI system provides personal assistance to all the learners in the form of intelligent tutoring system which focuses on specific needs of the learners (Pulist, 2017). The applications of AI in education are:

- (a) Adaption of Educational Software:** AI can make an impact at different levels of education whether it is at kindergarten level or graduation level. Adaptive learning programs such as Khan Academy have made an impact in the education system of our country. The software's are used so as to cater the needs of the students. Such AI based software helps the learner to learn at their own pace i.e. without any hurry. Though teacher will also help the learners in learning.
- (b) Self-operating activities:** Doing assessment of students on the basis of homework is a time consuming task. The teachers can utilise this time in doing some productive work such as for their own professional growth and solving them. We cannot deny this fact that AI based grading can completely replace the least reduce the work load of teachers. The automated grading system is successful in objective type questions while it is still upgrading for subjective type questions (Shokeen, 2019).

- (c) **Areas of improvement:** The teacher tries her best so as to make the student understand about the concept but if still some gaps remain in the student learning than it can be filled by using AI in the form of Massive Open Online Courses (MOOCs). The system not only alerts the students but also the teachers by providing them customized message.
- (d) **AI tutors:** It cannot be rightly said that the machine tutor can completely replace the human tutor. But in future, the rapid growth in technology can lead us to machine tutoring.
- (e) **Role of teacher as a facilitator:** Hands on experiences as well as supplement AI lessons are provided by the teacher to the students.
- (f) **Learning from trial and error:** AI provides judgment free environment to the students so that they may learn in an environment where they are not afraid of failing.

Now these applications of AI in Education will act as an influencer in the following manner (Conati & Kardan, 2013):

- ❖ Changing educational platform as per the needs of the students
- ❖ Change in role of teacher i.e. Acting as a facilitator
- ❖ To take away the load of grading from the teacher
- ❖ Finding out the scope of improvement in curriculum
- ❖ Providing continuous and customized feedback to learners
- ❖ Learning without judgement i.e. incare free environment

AI empowers the upcoming generation of educational technology to improve the educational outcomes. The uses of AI will facilitate the students of today and tomorrow because now it is becoming a fundamental part of classroom. In modern society, AI is playing a vital role.

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN OPEN AND DISTANCE LEARNING

In open and distance learning the learners belong from heterogeneous group which is based on various factors such as educational qualification, socio economic background, age, etc. Even they vary in their learning styles and habits. Therefore, it becomes difficult for the institution to prove education as per the individual need so they resort to one size fit for all category (Lynch, 2017). Though the individualised service are difficult to be provided but with the concept of virtual learning the learner can interact with the material and with learning packages provided to them based on their individual learning styles. This will improve the learning of

substantially (Koedinger *et al.* 2013). The potential use of AI will help in customizing solutions and advancing the student's learning.

1. **Pre-counselling and Post-guidance:** The intelligent tutoring systems provides customized services to the learner. The vital role is played by learning analytics which provides assistance to the learner to choose the specialisation courses which is based on their performance in specific courses and their level of understanding (TechThought, 2014). The AI system acts as a personal guide for the learner. The AI based system can detect what the learner has not understood based on the pattern of interaction.
2. **Instruction/ Tutoring:** The AI can provide personal attention to the learners which is required at some crucial points. With the help of AI one can identify the gaps in the instructional design which is based on behaviour of the learners and can also observe the unsuccessful attempts which are made by the learners. Due to large number of wrong responses the AI system identifies and report to the teachers so that the teachers can provide correct answer to the student. According to Dickson, 2017, AI is capable of:
 - ❖ Giving respond to questions,
 - ❖ Offer customized dynamic solution,
 - ❖ Providing examples that are based on the current knowledge level of the learner,
 - ❖ Optimising the instructional system,
 - ❖ Helping learners to adopt productive learning behaviour.
3. **Gamification/Simulations:** Through gamification and simulation the behaviour of the learner can be observed and also required skills can be developed. The personalised learning can be ensured through gaming and simulation software (TeachThought, 2014). When the AI system along with animated platforms are integrated with learning environments then they act as a catalyst in the learning of the learner (Swartout *et al.* 2013; Lester *et al.* 2013; VanLehn *et al.* 2009). According to Arroyo *et al.* (2011), AI system has the potential to adapt to the real life situations, therefore it acquires the role of virtual companion and teacher.
4. **Immediate Feedback:** When the feedback is provided to the learner in the form of small message then it acts as a motivation for the learner. There is integration of messaging platform with the virtual environment which is effectively handled by the part of AI system i.e. chatbot. According to TeachThought, 2014, AI system provides instant feedback and along with specific suggestions. Therefore, it reduces the dependence of learner on teacher for the purpose of receiving feedback. The AI uses learning analytics along with big data so as to provide customized learning packages and extra learner

support and guidance (Dickson, 2017). Through evaluative questions the learners responses are monitored and based on the analysis feedback is given.

5. **Learner Support:** For completing the programme successfully it is essential for the learner to be provided support services in the form of adopting different strategies and instructional methodologies. The crucial aspect for ODL institutions is to provide personalised support services.
6. **Collaborative Environment and Community of Learning:** Collaborative environment can be created along with personal touch to instruction. According to Conati & Kardan, 2013, AI has the ability to make cluster of the learners in different groups who possess different learning abilities and is based on user behaviour in the virtual environment.
7. **Learner Performance Evaluation:** Individualised evaluation system can be promoted through AI which provides facilities on demand system without pressuring the students. For providing self-evaluation facility to learners at different levels of system. According to Lynch (2017), the time of the teacher can be saved by automated learner grading system so as to evaluate learner's performance.
8. **Training of ODL Functionaries:** On demand training programme can be organised for the ODL institutions with the help of customisation and will also lead to professional development of ODL staff. The training environment is interactive in nature and it also helps the trainees to get the responses to the queries which they have during the training duration. For instance, 'Adobe Captive Prime' LMS has the following features-automatic scheduling of reports, checking of delay in submission of assignments and sending reminders.

CONCLUSION

AI has made its contribution in every sector of the industry such as organisations making use of AI in handling sophisticated processes such as doing automation of work. It has made its own contribution in medical sciences which is well recognised in present scenario. The perspective of reaching to customer has been changed because of AI. Extensive use of AI is made by e-commerce website as they suggest the product to their potential customers as per their behavioural pattern. By looking at the present use of AI it can be said that it's high time that the ODL institutions shall integrate AI based technologies for the purpose of effective development of the academic programmes and for other various purposes.

REFERENCES

- Arroyo, I., Woolf, B.P., Cooper, D., Bursleson, W. and Muldner, K. 2011. The Impact of Animated Pedagogical Agents on Girls' and Boys' Emotions, Attitudes, Behaviors, and Learning. *In Proceedings of the 11th IEEE International Conference of Advanced Learning Technologies*, pp. 506-510. Piscataway, NJ: Institute of Electrical and Electronics Engineers.

- Castrounis, A. 2016. *Artificial Intelligence, Deep Learning and Neural Networks*. Retrieved from <http://www.kdnuggets.com/2016/10/artificial-intelligence-deep-learning-neural-networks-explained.html>
- Colyer, A., Partner, V. and Accel. 2016. *Artificial Intelligence and life in 2030*. Retrieved from <http://www.kdnuggets.com/2016/12/artificial-intelligence-life-2030.html>
- Conati, C. and Kardan, S. 2013. Student Modeling: Supporting Personalized Instruction, from Problem Solving to Exploratory, Open-Ended Activities. *AI Magazine*, **34**(2): 13-26.
- Corea, F. 2017. *A brief history of Artificial Intelligence*. Retrieved from <http://www.kdnuggets.com/2017/04/briefhistory-artificial-intelligence.html>
- Dickson, B. 2017. *How Artificial Intelligence enhances education*. Retrieved from <https://thenextweb.com/artificial-intelligence/2017/03/13/how-artificial-intelligence-enhances-education/>
- Koedinger, K., Brunskill, E., Baker, R.S.J.D., Mclaughlin, E.A. and Stamper, J. 2013. New Potentials for DataDriven Intelligent Tutoring System Development and optimization. *AI Magazine*, **34**(3): 27-41.
- Kurshan, B. 2016. *The future of Artificial Intelligence in Education*. Retrieved from <https://www.forbes.com/sites/barbarakurshan/2016/03/10/the-future-of-artificial-intelligence-ineducation/#75d64f2a2e4d>
- Lester, J.C., Ha, E.Y., Lee, S.Y., Mott, B.W., Rowe, J.P. and Sabourin, J.L. 2013. Intelligent Game-Based Learning Environments. *AI Magazine*, **34**(3): 31-45.
- Lighthill, J. 1973. *Artificial Intelligence: A General Survey*. In *Artificial Intelligence: a paper symposium*, Science Research Council.
- Lynch, M. 2017. *How to use Artificial Intelligence in the classroom*. Retrieved <http://www.theedadvocate.org/howto-use-artificial-education-in-the-classroom/>
- Pulist, S.K. 2017. Harnessing the Mammoth through Artificial Intelligence: Managing Number in ODL. *International Journal of Engineering Technology Science and Research*.
- Rapid Miner, 2017. *What are artificial intelligence, machine learning and deep learning*. Retrieved from <http://www.kdnuggets.com/2017/07/rapidminer-ai-machine-learning-deep-learning.html>
- Shokeen, A. 2019. Artificial Intelligence in Education: Future of Learning. *University News*.
- Swartout, W., Artstein, R., Forbell, E., Foutz, S., Lane, H.C., Lange, B., Morie, J., Noren, D., Rizzo, S. and Traum, D. 2013. Virtual Humans for Learning. *AI Magazine*, **34**(3): 13-30.
- TeachThought. 2014. *10 Roles for Artificial Intelligence in Education*. Retrieved from <http://www.teachthought.com/the-future-of-learning/10-roles-for-artificial-intelligence-in-education/>
- Turing, A.M. 1950. Computing Machinery and Intelligence. *Mind*, **49**: 433–460.
- VanLehn, K., Corbett, A., Ramachandran, S., Underwood, J. and Jensen, C. 2009. *Intelligent Virtual Environments*. Paper presented at the *Global Resources for Online Education (GROE)*, Tempe Arizona, 23–26 April.
- Wikipedia, 2017. *Transfer Learning*. Retrieved from https://en.m.wikipedia.org/wiki/transfer_learning
- Woolf, B.P. 2009. *Building Intelligent Interactive Tutors: Student-Centered Strategies for Revolutionizing E-Learning*. San Francisco: Morgan Kaufmann Publishers.