

ROLE OF ARTIFICIAL INTELLIGENCE IN EDUCATION

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ABSTRACT

Artificial Intelligence (AI) has emerged as a transformative technology that holds great potential to revolutionize various sectors, including education. This research paper investigates the role of AI in education and explores its applications, benefits, challenges, and future prospects. The paper examines how AI can enhance personalized learning, improve student engagement and assessment, facilitate administrative tasks, and contribute to overall educational outcomes. It also addresses the ethical implications and concerns associated with the integration of AI in education. Overall, this research highlights the significant role that AI can play in transforming the education landscape by creating innovative and effective learning environments.

Keywords: Artificial Intelligence, Education, Personalized Learning, Student Engagement, Assessment, Ethical Implications

Introduction to artificial intelligence :

Artificial intelligence (AI) is the ability of machines to replicate or enhance human intellect, such as reasoning and learning from experience. Artificial intelligence has been used in computer programs for years, but it is now applied to many other products and services. For example, some digital cameras can determine what objects are present in an image using artificial intelligence software. In addition, experts predict many more innovative uses for artificial intelligence in the future, including smart electric grids.

AI uses techniques from probability theory, economics, and algorithm design to solve practical problems. In addition, the AI field draws upon computer science, mathematics, psychology, and linguistics. Computer science provides tools for designing and building algorithms, while mathematics offers tools for modeling and solving the resulting optimization problems.

Although the concept of AI has been around since the 19th century, when Alan Turing first proposed an “imitation game” to assess machine intelligence, it only became feasible to achieve in recent decades due to the increased availability of computing power and data to train AI systems. To understand the idea behind AI, you should think about what distinguishes human intelligence from that of other creatures – our ability to learn from experiences and apply these lessons to new situations. We can do this because of our advanced brainpower; we have more neurons than any animal species.

Today’s computers don’t match the human biological neural network – not even close. But they have one significant advantage over us: their ability to analyze vast amounts of data and experiences much faster than humans could ever hope.

AI lets you focus on the most critical tasks and make better decisions based on acquired data related to a use case. It can be used for complex tasks, such as predicting maintenance requirements, detecting credit card fraud, and finding the best route for a delivery truck. In other words, AI can automate many business processes leaving you to concentrate on your core business.

Research in the field is concerned with producing machines to automate tasks requiring intelligent behavior. Examples include control, planning and scheduling, the ability to answer diagnostic and consumer questions, handwriting, natural language processing and perception, speech recognition, and the ability to move and manipulate objects.

History of AI and how it has progressed over the years :

With so much attention on modern artificial intelligence, it is easy to forget that the field is not brand new. AI has had a number of different periods, distinguished by whether the focus was on proving logical theorems or trying to mimic human thought via neurology.

Artificial intelligence dates back to the late 1940s when computer pioneers like Alan Turing and John von Neumann first started examining how machines could “think.” However, a significant milestone in AI occurred in 1956 when researchers proved that a machine could solve any problem if it were allowed to use an unlimited amount of memory. The result was a program called the General Problem Solver (GPS). Over the next two decades, research efforts focused on applying artificial intelligence to real-world problems. This development led to expert systems, which allow machines to learn from experience and make predictions based on gathered data. Expert systems aren’t as complex as human brains, but they can be trained to identify patterns and make decisions based on that data. They’re commonly used in medicine and manufacturing today.

A second major milestone came in 1965 with the development of programs like Shakey the robot and ELIZA, which automated simple conversations between humans and machines. These early programs paved the way for more advanced speech recognition technology, eventually leading to Siri and Alexa.

The initial surge of excitement around artificial intelligence lasted about ten years. It led to significant advances in programming language design, theorem proving, and robotics. But it also provoked a backlash

against over-hyped claims that had been made for the field, and funding was cut back sharply around 1974.

After a decade without much progress, interest revived in the late 1980s. This revival was primarily driven by reports that machines were becoming better than humans at “narrow” tasks like playing checkers or chess and advances in computer vision and speech recognition. This time, the emphasis was on building systems that could understand and learn from real-world data with less human intervention.

These developments continued slowly until 1992, when interest began to increase again. First, technological advances in computing power and information storage helped boost interest in research on artificial intelligence. Then, in the mid-1990s, another major boom was driven by considerable advances in computer hardware that had taken place since the early 1980s. The result has been dramatic improvements in performance on several significant benchmark problems, such as image recognition, where machines are now almost as good as humans at some tasks.

The early years of the 21st century were a period of significant progress in artificial intelligence. The first major advance was the development of the self-learning neural network. By 2001, its performance had already surpassed human beings in many specific areas, such as object classification and machine translation. Over the next few years, researchers improved its performance across a range of tasks, thanks to improvements in the underlying technologies

The second significant advancement in this period was the development of generative model-based reinforcement learning algorithms. Generative models can generate novel examples from a given class, which helps learn complex behaviors from very little data. For example, they can be used to learn how to control a car from only 20 minutes of driving experience.

In addition to these two advances, there have been several other significant developments in AI over the past decade. There has been an increasing emphasis on using deep neural networks for computer vision tasks, such as object recognition and scene understanding. There has also been an increased focus on

using machine learning tools for natural language processing tasks such as information extraction and question answering. Finally, there has been a growing interest in using these same tools for speech recognition tasks like automatic speech recognition (ASR) and speaker identification (SID).

Meaning of Artificial Intelligence :

The history of Artificial Intelligence (AI) can be traced from 1950 when Allen Turing, recognised as the father of AI, developed a 'Turing Machine' which was enabled with like a computer programme that shows human like intelligence. But, the term AI coined by John McCarthy in 1956 who has defined AI as "the science and engineering of making intelligent machine." Further, he defined it as "the study (of artificial intelligence) is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can be in principle be so precisely described that a machine can be made to simulate it" (in Russel & Norvig, 2010). Artificial Intelligence (AI) is a machine which is considered to have the ability to perform assignments and resolve the certain issues and problems as a human being does. It may also be explicated as a system of computer programme which can do tasks which generally required human intelligence like resolving complicated problems, making choices and decisions, objects deduction, images and faces recognition and so on. (Zulekha, 2019). In general, it is an electro mechanical process of a machine that thinks, understands the languages, solves the problems, perceives and anticipates the environment, adapts the situations, anticipates the actions and so on. Adaptability, learning and anticipatory actions are considered as the key characteristics of AI (Ilkka, 2018, p.7).

Types of Artificial Intelligence (AI) Based on the functions :

AI can be categorised into four types.

1. Reactive Machine Artificial Intelligence (RMAI): Such kinds of machines work only on present data by considering the present situations. RMAI cannot decipher inferences from the data in connection to evaluations of their futures course of actions.

2. Limited Memory Artificial Intelligence (LMRI): As the name advocates, it has limited memory and can have refined, informed and improved decisions from the memory of its past data. This kind of AI has the memory useful to store past experiences and for the evaluation of future course of actions.

3. Theory of Mind Artificial Intelligence (TMAI): It is regarded as the advanced kind of AI, and is predicted to have vital role in human psychology. The theory of Mind Artificial Intelligence puts emphasis on emotional intelligence for having better understanding about the pattern of human thoughts and believed. However, such kind of AI is not found fully developed yet but in this perspective many researches are going on round the clock.

4. Self-aware Artificial Intelligence (SAAI): It comprises the machines which may have the power of their own developed consciousness that may lead to become self-aware. Like the theory of Mind Artificial Intelligence, it is also not developed yet. In this regard, Elon Musk (n.d.) has warned that “AI is a fundamental risk to the existence of human civilization.”

Domains of Artificial Intelligence :

Following are the different domains Artificial Intelligence (AI).

1. Machine Learning: It is a science that gets involve the machines in order to solve the problems by processing, analysing and interpreting the data. Machine learning can supervise the unsupervised and reinforcement learning.

2. Deep Learning: It is also called as neuron network. The deep learning is concerned with executing neuron networks on high demands data to deal with insights and formulate solutions .The logics

behind it are the face verification algorithm on Facebook and self-driving cars that said to have assistants like Siri and Alexa.

3. Robotics : It emphasises on the applications of robots. AI robots are like the artificial agent which works in real world situations for producing results by taking into account the some actions. Sophia is named as the good example of the AI in robotics.

4. Expert Systems: It is a domain of AI in which computer system learns as well as reciprocates with the ability of decision making of a human expert. It can use its logic notions in resolving the complex problems. Expert System domain of AI does not depend on the conventional programming system rather on more advanced programme. It is used in information management there seen to use in fraud deduction, virus deduction and also in managing medical and hospital records and so on.

5. Fuzzy Logic: It is a computing based approach where it works on the principle of degree of truth. Fuzzy Logic is the Boolean Logic. It has the utility in medical field in terms of resolving complex problems including decision making issues. Moreover, it is also useful in performing the task of automating the gas system in cars.

6. Natural Language Processing (NLP): It is a system of processing the natural language which is called as the science of drawing insights from the natural language of human being. NLP is used in order to communicate with machines and online businesses, and the examples of NLP are Twitter and Amazon. Twitter uses NLP to analyse the fake news and abusive languages, and to filter out the terroristic languages from the tweets whereas Amazon uses NLP to understand and analyse the customers' feedbacks and improves the users experience as well.

Indian Education System and Artificial intelligence (AI):

The Indian education system particularly in regard to AI has been devoid of reflecting any intention to accommodate and adapt AI till the New Education Policy (NEP-2020) got cabinet nod for

implementing at nationwide in July 2020. Academic discourses within the institutional boundaries are negligible except few that too in the discipline of computer science, engineering and management studies. We would say that AI in the common or general education system is at infancy stage where it has just started scrolling slowly as the Ministry of Education has put promising emphasis on introducing the Machine Language, AI and 3-D graphics in the education system of India so that the Indian education system can be at par to the global education system in which education is being imparted through AI of much advance level from years before. However, Central Board of Secondary Education (CBSE), New Delhi, India has decided to incorporate the AI in its school curriculum. As per an article only 15% teacher of government schools are trained in handling the computer. Whereas, only 3% of the government and private school teachers of the states like Bihar, Madhya Pradesh and Mizoram were reported trained in computer as compared to the states like Goa, Punjab and Maharashtra where more than 50% school teachers including government and private were found trained in the same (Sen, Nihalani & Radhakrishnan, As per the report of Ministry of Education- UDISE (2019-20) that only one forth teachers in India were reported trained to deal with the technology oriented teaching learning process where as 83.43% of the total schools of all management (government, government aided & private) had electricity supply, however only 80.16% schools were reported to have functional electricity connection. While, only 22.28% of all management schools in India had internet facility. Moreover, only 38.54% schools of all management of which only 30.03% of government, 62.97% government aided and 59.88% of private schools had computer facility. Similarly only 37.13% of the all management schools in India of which only 28.55% of the government, 61.84% of government aided and 58.48% of the private schools were found to have functional computer facility. In spite of National Policy on ICT in school education (2012) through which ICT enabled teaching leaning process and enhancement of ICT literacy and competency was given top priority, the reality of facts and figures mentioned in UDISE-2019-20, realising the conceptualisation of AI in general

education system of Indian including schools and universities is not like a bed of roses rather hard nut to crack as even in 21st century the significant proportion of teachers are untrained in technologies, limited schools have functional electricity supply, internet connections and computer facilities which have been recognised as inevitable to go with the potential, effective and promising uses of AI in the different realms of education system. In this connection, a revolutionary and insightful efforts like National Literacy Mission (1988) and Operation Blackboard (1987) is needed to launch at nationwide to revamp and establish the essential infrastructures required for AI, it would be better to have a National Policy on AI including Code Language and 3-D graphics in school and university education similar to the National Policy on ICT (2012).

Benefits of AI in Education in India :

There are several benefits of AI in education in India:

- 1. Personalized Learning:** AI can analyze the learning patterns and preferences of individual students, allowing for the creation of personalized learning experiences. This helps in catering to the specific needs and strengths of each student, improving their overall educational outcomes.
- 2. Intelligent Tutoring:** AI can act as intelligent tutors, providing instant feedback and guidance to students as they complete exercises and assignments. This personalized support helps in the improvement of their understanding and retention of knowledge.
- 3. Virtual Classrooms:** AI can enable the creation of virtual classrooms and online learning platforms. This allows students to access educational resources, study materials, and lectures from anywhere and at any time, leading to increased accessibility and flexibility in education.

4. Data Analytics: AI can process and analyze large amounts of data to identify trends and patterns in student performance. This information can be used by educators to develop effective teaching strategies and interventions to address specific student needs.

5. Automation of Administrative Tasks: AI can automate administrative tasks such as grading, scheduling, and record-keeping. This reduces the workload of educators, allowing them to focus more on teaching and providing individualized attention to students.

6. Enhanced Collaboration: AI can facilitate collaborative learning by connecting students from different locations and backgrounds. This encourages the exchange of ideas and knowledge, promoting a more inclusive and diverse learning environment.

7. Adaptive Assessments: AI can provide adaptive assessments that adjust the difficulty level and content based on the student's performance. This ensures that students are appropriately challenged and allows educators to evaluate their progress accurately.

Overall, the integration of AI in education in India has the potential to improve educational outcomes, increase access to quality education, and enhance the learning experience for students.

Challenge of AI in Education:

1. Privacy and Ethical Concerns: The use of AI in education involves collecting and analyzing large amounts of data about students. This raises concerns about privacy and the ethical use of student data.

2. Lack of Expertise: Implementing AI in education requires specialized knowledge and skills. Many educational institutions may lack the expertise and resources necessary to effectively integrate AI into their teaching practices.

3. Initial Investment and Infrastructure: Integrating AI into education requires significant investment in infrastructure and technology. Many educational institutions, especially in developing countries like India, may struggle to afford the initial costs associated with AI implementation.

4. Teacher Resistance and Acceptance: Some teachers may be resistant to the use of AI in education, fearing that it may replace their roles or reduce their importance. Ensuring teacher acceptance and providing them with the necessary training and support is crucial for successful AI integration.

5. Bias and Lack of Diversity: AI algorithms can be susceptible to bias and lack of diversity, leading to inequitable outcomes for certain student populations. Care must be taken to ensure that AI systems are fair, unbiased, and inclusive.

Conclusion : AI plays a significant role in revolutionizing education by providing personalized learning experiences, automating administrative tasks, and improving overall efficiency. Its benefits include improved learning outcomes, increased access to education, enhanced efficiency, personalized support, and data-driven decision making. However, there are challenges related to privacy and ethical concerns, lack of expertise, initial investment, teacher resistance, and biases. Despite these challenges, the potential of AI in education is immense, and with careful implementation and addressing these challenges, AI can positively transform the education system, benefiting both students and educators.

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