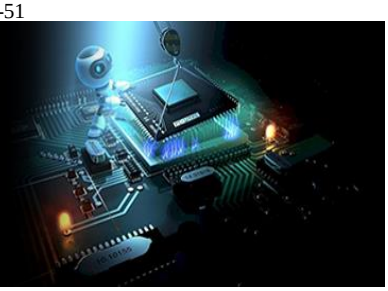
International Journal of Engineering in Computer Science



E-ISSN: 2663-3590
P-ISSN: 2663-3582
www.computersciencejournals.com/ijecs
IJECS 2025;7(1): 48-51
Received: 05-01-2025
Accepted:15-01-2025

Dr. Bimal Marandi
Faculty of BCA, S.P. College, Dumka, Jharkhand, India

Corresponding Author:
Dr. Bimal Marandi
Faculty of BCA, S.P. College, Dumka, Jharkhand, India

A study on artificial intelligence & its applications

Bimal Marandi

DOI: https://doi.org/10.33545/26633582.2025.v7.i1a.157

Abstract
It is the discipline of developing intelligent machines, particularly sophisticated computer algorithms. It pertains to the analogous endeavour of using computers to comprehend human intellect; nevertheless, AI is not obligated to restrict itself to physiologically observable methodologies. Although a universally accepted definition of Artificial Intelligence (AI) is lacking, it is often defined as the examination of algorithms that facilitate perception, reasoning, and action. Currently, the volume of data created by people and robots significantly exceeds humans' capacity to assimilate, analyse, and make intricate judgments based on that data. Artificial intelligence underpins all computational learning and represents the future of intricate decision-making processes. This study analyses the characteristics of artificial intelligence, including its inception, definitions, historical context, applications, growth, and accomplishments.

Keywords: Computer algorithms. artificial intelligence, decision making, data, applications

1. Introduction
Artificial intelligence (AI) is described as the capacity of an artificial organism to independently resolve complex issues with its own cognitive abilities. Artificial Intelligence integrates computer science with physiology. Intelligence is the cognitive ability to achieve objectives in the actual world. Intelligence is described as the ability to think, visualize, retain information, understand, see patterns, make judgments, adapt to change, and acquire knowledge from experience. Artificial intelligence aims to enable computers to emulate human behaviour in a fraction of the time required by a human. Consequently, it is referred to as Artificial Intelligence. Artificial intelligence focuses on advancing practical computer science towards systems that are adaptive, flexible, and capable of independently generating analyses and solutions by applying general knowledge to particular contexts.

2. Overview of AI
Artificial intelligence refers to machine or software intelligence. Perception + Analysis + Reaction equals Intelligence. Artificial intelligence is a domain of computer science that is rapidly gaining prominence due to its enhancement of human life in several ways. Over the last two decades, artificial intelligence has significantly improved the efficiency of production and service systems. Expert systems are a rapidly developing technology that originates from AI research. Intelligent computers will replace or enhance human talents across several domains in the future.

3. Working of artificial intelligence
AI is sometimes erroneously associated with an island inhabited by robots and autonomous vehicles, according to common perception. This strategy, however, neglects a crucial practical application of artificial intelligence: the analysis of the vast quantities of data generated daily. AI may facilitate insight gathering and work automation at unprecedented speed and scale when applied meticulously to specific tasks. AI systems perform intricate searches throughout vast datasets produced by individuals, interpreting both text and images to identify patterns within complex information and then acting upon their conclusions. Computer systems capable of comprehending human language, acquiring knowledge via experience, and making predictions, facilitated by advanced technology. The below list delineates many subfields of artificial intelligence.

A. Machine Learning | Acquiring knowledge from experience

Machine learning (ML) is an application of artificial intelligence that enables computers to autonomously learn and evolve from their experiences without explicit programming. The objective of machine learning is to develop algorithms capable of analysing data and producing predictions. Machine learning is used in the healthcare, pharmaceutical, and life sciences industries to enhance disease diagnosis, medical image analysis, and drug development, as well as to anticipate preferred Netflix films.

B. Deep Learning | Autonomous Learning Systems

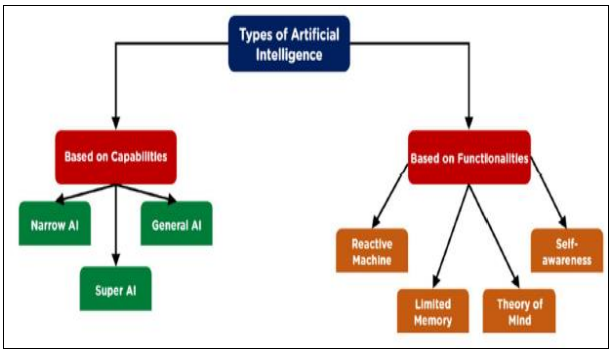
Deep learning, a subtype of machine learning, employs artificial neural networks that acquire knowledge via data analysis. Artificial neural networks are structured to resemble biological neural networks in the brain. Multiple layers of artificial neural networks function in conjunction to generate a singular output from many inputs, such as identifying a face image from a mosaic of tiles. The machines acquire knowledge via positive and negative reinforcement for their activities, requiring continuous processing and reinforcement for progression.

C. Cognitive Computing | Deriving conclusions from context

Cognitive computing is a vital element of artificial intelligence. Its objective is to replicate and enhance the connection between people and machines. Cognitive computing aims to replicate the human cognitive process inside a computational framework, namely via comprehending human language and interpreting the significance of visuals. Cognitive computing & artificial intelligence aim to equip robots with human-like behaviours and data processing capabilities. Another kind of deep learning is speech recognition, which allows voice assistants on phones to comprehend inquiries such as, “Hey Siri, how does artificial intelligence function?”

Computer vision is a technique for analysing visual content, including graphs, tables, and images in PDF documents, together with other textual and video data, using deep learning and pattern recognition.

4. Types of AI



i. AI type-1: Based on Capabilities

a. **Narrow AI:** Narrow AI refers to a kind of artificial intelligence that is proficient at executing a certain job with intelligence. Narrow AI is the most prevalent and readily available kind of artificial intelligence. Narrow AI is specifically trained for a certain task, rendering it incapable of functioning outside its designated domain. Consequently, it is often referred to as "weak AI." When limited AI encounters its limitations, it may malfunction in unforeseen ways. Apple Siri exemplifies Narrow AI, although it executes a limited range of functions. Chess playing, e-commerce shopping recommendations, autonomous vehicles, voice recognition, and image recognition are all instances of narrow AI.

b. **General AI:** General AI refers to an intelligence that can do any cognitive task equivalent to that of a human. The objective of general AI is to develop a system capable of autonomous learning and reasoning akin to human cognition. No system currently exists that can be categorized as general AI capable of doing tasks as proficiently as a human. Researchers across are now focusing their efforts on developing robots capable of performing broad AI tasks. Due to ongoing research on generic AI systems, their development will need substantial effort and time.

c. **Super AI:** Super AI refers to a level of system intelligence where robots may surpass human capabilities and do tasks more effectively than humans, exhibiting cognitive attributes. It is a consequence of artificial intelligence in general. Key attributes of advanced AI include the ability to comprehend, reason, solve problems, make decisions, strategize, learn, and communicate autonomously. Super AI remains a concept of future Artificial Intelligence. The development of such systems in the real world remains a transformative endeavour.

ii. AI Type-2 According to Functionality

a. **Reactive Machines:** The most fundamental types of Artificial Intelligence are purely reactive robots. Such AI systems do not retain memories or prior experiences to inform future judgments. These robots just assess present conditions and react in the most effective manner possible. Reactive machines, shown by IBM's Deep Blue system, serve as a notable instance. AlphaGo, created by Google, exemplifies reactive machines.

b. **Limited Memory:** This kind of AI, akin to Reactive Machines, has memory functions that enable it to use historical facts and experiences to enhance future decision-making. This category includes the bulk of frequently used applications in our everyday routines. These AI systems may be trained with a substantial volume of training data retained in a reference model inside their memory. Numerous autonomous vehicles include limited memory technologies. They collect data like as GPS coordinates, adjacent vehicle velocities, the dimensions and characteristics of obstacles, and several other data kinds to operate like a human driver.

c. **Limited Memory:** Although the first two categories of AI are prevalent and ongoing, the subsequent two kinds now exist only as concepts or works in progress. Researchers are currently developing the next generation of AI systems known as theory of mind AI. An AI with a philosophy of mind will be capable of recognizing the needs, emotions, beliefs, and cognitive processes of the entities it interacts with. Although artificial emotional intelligence is now an emerging industry and a focal point for leading AI researchers, achieving Theory of Mind AI requires progress in other

AI domains. AI systems must see people as distinct individuals whose cognitive processes may be influenced by many factors to really comprehend human needs.

d. Self-Awareness: This is the last stage of AI development, currently existing only in theory. Self-aware AI is an artificial intelligence that has evolved to a level of sophistication comparable to the human brain, resulting in the acquisition of self-awareness. The paramount objective of all AI research is to develop this kind of AI, which remains decades, if not centuries, from realization. This kind of AI will possess the capability to identify and produce emotions in its interactions, while also potentially having its own emotions, desires, beliefs, and maybe objectives. This is the kind of AI that technology skeptics are apprehensive about.

The advancement of self-awareness may expedite our development as a society; however, it also carries the risk of resulting in catastrophe.

The emergence of self-aware AI may instil ideas such as self-preservation, perhaps leading to the demise of humankind, since such an entity may adeptly outsmart human intellect and devise intricate strategies to dominate mankind. The classification of technology into Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI), and Artificial Superintelligence (ASI) is a prevalent terminology within the tech lexicon.

5. Applications of AI

Artificial Intelligence has several uses in contemporary culture. It is increasingly vital in contemporary society since it effectively addresses complicated issues across several sectors, including healthcare, entertainment, finance, and education. Artificial intelligence is enhancing our everyday lives by increasing convenience and efficiency.

The following industries use Artificial Intelligence:

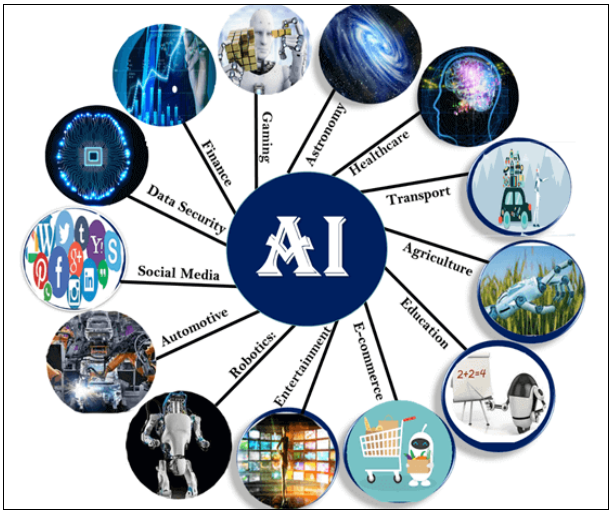
a. AI in Astronomy: Artificial Intelligence is very beneficial for addressing intricate issues inside the cosmos. AI technology may aid in comprehending the cosmos, including its mechanisms and origins.

b. AI in Healthcare: In the last five to ten years, AI has become more beneficial for the healthcare sector and is poised to have a substantial influence on this business. •The healthcare industry is using AI to get more efficient and rapid diagnoses than those performed by humans. Artificial intelligence may assist physicians in making diagnosis and also alert them when patients deteriorate, enabling timely medical intervention prior to admission.

c. AI in Gaming: AI may be used for gaming purposes. The AI systems may engage in strategic games such as chess, requiring the machine to consider several potential moves.

d. Artificial Intelligence in financial: The integration of artificial intelligence with the financial sector is very synergistic. The finance sector is integrating automation, chatbots, adaptive intelligence, algorithmic trading, and machine learning into its financial operations.

e. AI in Data Security: The protection of data is essential for all enterprises, and cyber-attacks are escalating fast in the digital realm. Artificial intelligence may enhance the safety and security of your data. Examples such as AEG bot and AI2 Platform are used to more effectively identify software bugs and cyber-attacks.



f. AI in Social Media: Social media platforms like Twitter, Snapchat, and Facebook have billions of user profiles that need efficient storage and management. Artificial Intelligence can systematically arrange and oversee vast volumes of data. AI can examine extensive data to discern current trends, hashtags, and user requirements.

g. AI in Travel and Transport: AI is becoming essential for the travel industry. AI is proficient at doing several travel-related tasks, including arranging trips, recommending hotels, airlines, and optimal routes for consumers. The travel industry use AI-powered chatbots to provide human-like interactions with consumers, ensuring prompt and efficient responses.

h. AI in the Automotive Industry: Certain automotive companies are using AI to provide virtual assistants to enhance user performance. Tesla has unveiled TeslaBot, an advanced virtual assistant.

Numerous industries are now engaged in the development of autonomous vehicles that may enhance the safety and security of your travel.

i. AI in Robotics: Artificial Intelligence plays a significant role in Robotics. Typically, conventional robots are programmed to do repetitive activities; however, with the integration of AI, we may develop intelligent robots capable of performing tasks based on their own experiences rather of relying on pre-programming.

j. AI in Agriculture: Agriculture needs diverse resources, labour, capital, and time to achieve optimal outcomes. Contemporary agriculture is increasingly adopting digital technologies, with artificial intelligence gaining prominence in this sector. Agriculture is using AI for robots, soil and crop monitoring, and predictive analysis. Artificial intelligence in agriculture may significantly assist farmers.

k. AI in E-commerce: AI is granting a competitive advantage to the e-commerce sector, and its demands within the industry are increasing. Artificial intelligence assists consumers in identifying related goods based on

suggested size, colour, or brand.

l. **AI in education:** AI may streamline the grading process, allowing educators to allocate more time to instruction. An AI chatbot may interact with pupils in the capacity of a teaching assistant.

6. Future of AI

Considering its attributes and extensive applicability, we may certainly adhere to artificial intelligence. Given the advancement of AI, is the future world becoming artificial? Biological intelligence is static, since it represents an established, mature paradigm, while the emerging paradigm of non-biological computing and intelligence is expanding rapidly. The memory capacity of the human brain is estimated to be around 10 billion binary digits.

However, the majority of information is likely used for recalling visual impressions and other somewhat inefficient methods. Consequently, it may be said that due to the limitations and volatility of natural intellect, the world may increasingly rely on computers for efficient operation.

7. Conclusion

Artificial intelligence (AI) is a groundbreaking achievement in computer science, poised to become an integral element of all contemporary software in the next years and decades. This poses both a risk and a potential advantage. Artificial intelligence will be used to enhance both defensive and offensive cyber operations. Furthermore, new methods of cyber-attack will be developed to exploit the specific vulnerabilities of AI technology. The significance of data will be heightened by AI's need for extensive training datasets, necessitating a re-evaluation of our approach to data security. Prudent global governance is required to guarantee that this transformative technology fosters widespread safety and prosperity.

8. References

1. Alam A. Should robots replace teachers? Mobilization of AI and learning analytics in education. In: 2021 International Conference on Advances in Computing, Communication, and Control (ICAC3); 2021 Jan; Mumbai, India. New York: IEEE; 2021. p. 1-12.
2. Jiya T. Ethical implications of predictive risk intelligence. ORBIT J. 2019;2(2):51.
3. Devedic V. Web intelligence and artificial intelligence in education. Educ Technol Soc. 2004;7(4):29-39.
4. Rowe JP, Shores LR, Mott BW, Lester JC. Integrating learning problem solving and engagement in narrative-centered learning environments. Int J Artif Intell Educ. 2011;21(1-2):115-133.
5. Timms MJ. Letting artificial intelligence in education out of the box: Educational cobots and smart classrooms. Int J Artif Intell Edu. 2016;26(2):701-712.
6. Chassignol M, Khoroshavin A, Klimova A, Bilyatdinova A. Artificial intelligence trends in education: A narrative overview. Procedia Comput Sci. 2018;136:16-24.
7. Sharma RC, Kawachi P, Bozkurt A. The landscape of artificial intelligence in open online and distance education: Promises and concerns. Asian J Distance Educ. 2019;14(2):1-2.
8. Murphy RF. Artificial intelligence applications to support K-12 teachers and teaching. Tech Rep PE135. 2019.
9. Ryan M, Antoniou J, Brooks L, *et al*. Research and practice of AI ethics: A case study approach juxtaposing academic discourse with organizational reality. Sci Eng Ethics. 2021;27(1):16. DOI:10.1007/s11948-021-00293-x.
10. Pokrivcakova S. Preparing teachers for the application of AI-powered technologies in foreign language education. J Lang Cultural Edu. 2019;7(3):135-153.