

The Impact of Artificial Intelligence on Society

*D. Revathy, V. Bindhu Priya

Er. Perumal Manimekalai College of Engineering, Hosur, TamilNadu, India. *Corresponding Author Email: <u>reva0520@gmail.com</u>

Abstract: This branch of computer science is concerned with making computers behave like humans. Artificial intelligence includes game playing, expert systems, neural networks, natural language, and robotics. Currently, no computers exhibit full artificial intelligence (that is, are able to simulate human behavior). The greatest advances have occurred in the field of games playing. The best computer chess programs are now capable of beating humans. Today, the hottest area of artificial intelligence is neural networks, which are proving successful in a number of disciplines such as voice recognition and naturallanguage processing. There are several programming languages that are known as AI languages because they are used almost exclusively for AI applications. The two most common are LISP and Prolog. Artificial intelligence is working a lot in decreasing human effort but with less growth.

1. INTRODUCTION

Artificial Intelligence (AI) is the branch of computer science which deals with intelligence of machines where an intelligent agent is a system that takes actions which maximize its chances of success. It is the study of ideas which enable computers to do the things that make people seem intelligent. The central principles of AI include such as reasoning, knowledge, planning, learning, communication, perception and the ability to move and manipulate objects. It is the science and engineering of making intelligent machines, especially intelligent computer programs.

2. OVERVIEW OF AI

Machine or software intelligence is referred to as artificial intelligence. Perceive + Analyze + React = Intelligence e. Artificial intelligence is a subject of computer science that is rapidly gaining popularity since it has improved h uman existence in a variety of ways. Artificial intelligence has substantially enhanced the performance of manuf acturing and service systems during the previous two decades. Expert systems are a fast emerging technology tha t originated from artificial intelligence research. Intelligent machines will replace or augment human capabilities in many sectors in the future

3. WORKING OF AI

AI is frequently misplaced on an island with robots and self-driving cars, according to popular belief. This metho d, however, overlooks one of artificial intelligence's most important practical applications: analyzing the massive volumes of data created every day. Insight gathering and job automation may be done at a previously inconceiva ble velocity and scale by carefully applying AI to particular activities. AI systems execute sophisticated searches through the mountains of data generated by people, deciphering both text and pictures to detect patterns in compl icated data and then acting on their findings. Computer systems that can grasp the meaning of human language, l earn from experience, and make predictions, thanks to cutting-edge technologies. Following are a few subfields o f AI.





3.1. *Machine Learning / Learning from experience:* Machine learning, or ML, is an AI application that allows c omputers to automatically learn and grow from their experiences without having to be explicitly programmed. T he goal of machine learning is to create algorithms that can analyze data and generate predictions. Machine learn ing is being utilized in the healthcare, pharma, and life sciences sectors to improve illness detection, medical pict ure interpretation, and medication acceleration, in addition to predicting what Netflix movies you would like.



FIGURE 2. Machine learning

3.2. Deep Learning / Self-educating machines: Artificial neural networks that learn by analyzing data are used i n deep learning, which is a subset of machine learning. Artificial neural networks are designed to look like organ ic neural networks in the brain. Several layers of artificial neural networks collaborate to produce a single output from a large number of inputs, such as detecting a facial picture from a mosaic of tiles. The machines learn by re ceiving positive and negative reinforcement for the tasks they perform, which necessitates ongoing processing an d reinforcement in order for them to advance.

3.3. Cognitive Computing / Making inferences from context: Cognitive computing is another essential compone nt of AI. Its purpose is to imitate and improve interaction between humans and machines. Cognitive computing s eeks to recreate the human thought process in a computer model, in this case, by understanding human language and the meaning of images. Together, cognitive computing and artificial intelligence strive to endow machines w ith human-like behaviors and information processing abilities. Another form of deep learning is speech recogniti on, which enables the voice assistant in phones to understand questions like, "Hey Siri, how does artificial intelligence work?"





3.4. Computer Vision / Understanding images: Computer vision is a method of interpreting image material, suc h as graphs, tables, and photographs within PDF documents, as well as other text and video, using deep learning and pattern recognition. Computer vision is a branch of artificial intelligence that allows computers to recognize, analyze, and interpret visual input. This technology's applications have already begun to transform areas such as r esearch and development and healthcare. Computer Vision and machine learning are being used to analyze patie nts' x-ray images in order to diagnose patients faster.

4. TYPES OF AI



FIGURE 4. Types of AI

5. AI TYPE-1: BASED ON CAPABILITIES

5.1. Narrow AI: Narrow AI is a sort of AI that is capable of doing a certain task intelligently. In the area of artificial intelligence, narrow AI is the most frequent and currently accessible AI. Because narrow AI is exclusively educated for one single activity, it cannot perform outside its field or boundaries. As a result, it's also known as "weak AI."

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When narrow AI reaches its boundaries, it might fail in unexpected ways. Apple Siri is an excellent example of Narrow AI, yet it only performs a restricted set of duties. Playing chess, purchasing suggestions on an e-commerce site, self-driving automobiles, speech recognition, and picture identification are all examples of narrow AI

5.2. General AI: General AI is a sort of intelligence that is capable of doing any intellectual work as well as a human. The goal of general AI is to create a system that can learn and reason like a person on its own. Currently, no system exists that can be classified as general AI and execute any work as well as a person. Researchers from all across the world are now concentrating their efforts on creating robots that can do general AI tasks. Because generic AI systems are still being researched, developing such systems will take a lot of work and time.

5.3. Super AI: Super AI is a degree of system intelligence at which machines may outsmart humans and execute any task better than humans with cognitive qualities. It's a result of AI in general. Some fundamental properties of powerful AI are the capacity to understand, reason, solves puzzles, make judgements, plan, learn, and communicate independently. Super AI is still a futuristic Artificial Intelligence idea. The creation of such systems in the actual world is still a world changing effort.

6. AI type-2 Based on Functionality

6.1. Reactive Machines: The most basic kinds of Artificial Intelligence are pure reactive robots. Such AI systems do not keep track of memories or previous experiences in order to make decisions in the future. These robots just consider current circumstances and respond in the best way feasible. Reactive machines, such as IBM's Deep Blue system, are one example. AlphaGo, developed by Google, is another example of reactive machines.

6.2. Limited Memory: This sort of AI, like Reactive Machines, has memory capabilities, allowing it to leverage prior data and experience to make better judgments in the future. This category encompasses the majority of the commonly used apps in our daily lives. These AI applications may be taught using a huge amount of training data stored in a reference model in their memory. Example: Many self-driving automobiles have limited memory technology. They save data like as GPS position, neighboring automobile speeds, the size/nature of barriers, and a hundred other types of data in order to drive like a person.

6.3. Limited Memory: While the first two categories of AI have been and continue to be abundant, the next two types of AI exist only as an idea or a work in progress for the time being. The next level of AI systems that researchers are actively working on is theory of mind AI. A theory of mind level AI will be able to identify the needs, emotions, beliefs, and mental processes of the creatures with whom it interacts. While artificial emotional intelligence is now a burgeoning business and a focus for prominent AI researchers, reaching the level of Theory of Mind AI would need advancements in other AI areas as well. Because AI computers will have to view humans as individuals whose brains may be changed by a variety of elements in order to genuinely grasp human needs, they will have to "understand" humans.

6.4.Self-Awareness: This is the last step of AI development, which exists only in theory at the moment. Self-aware AI is an AI that has matured to the point where it is so similar to the human brain that it has gained self-awareness. The ultimate goal of all AI research is and will always be to create this form of AI, which is decades, if not centuries, away from becoming a reality. This form of AI will not only be able to recognize and generate emotions in individuals with whom it interacts, but will also have its own emotions, wants, beliefs, and maybe goals. And this is the kind of AI that sceptics of the technology are concerned about. Although the growth of self-awareness has the potential to accelerate our progress as a civilization, it also has the potential to lead to disaster. This is because, once self-aware, AI may have ideals like self-preservation, which could either directly or indirectly mark the end of mankind, since such an entity could easily outmaneuver any human brain or create sophisticated schemes to take over humanity. The categorization of technology into Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI), and Artificial Super intelligence (ASI) is an alternative method of classification that is more commonly used in tech jargon (ASI).

7. AI SYSTEM ARCHITECTURE

7.1. Automation & Robotics: The purpose of Automation is to get the monotonous and repetitive tasks done by machines which also improve productivity and in receiving cost-effective and more efficient results. Many organizations use machine learning, neural networks, and graphs in automation. Such automation can prevent fraud issues while financial transactions online by using CAPTCHA technology. Robotic process automation is programmed to perform high volume repetitive tasks which can adapt to the change in different circumstances.



FIGURE 5. Ai System Architecture

7.2. *Knowledge-Based Systems(KBS)*: A KBS can be defined as a computer system capable of giving advice in a particular domain, utilizing knowledge provided by a human expert. A distinguishing feature of KBS lies in the separation behind the knowledge, which can be represented in a number of ways such as rules, frames, or cases, and the inference engine or algorithm which uses the knowledge base to arrive at a conclusion.

7.3. *Neural Networks:* NNs are biologically inspired systems consisting of a massively connected network of computational "neurons," organized in layers. By adjusting the weights of the network, NNs can be "trained" to approximate virtually any nonlinear function to a required degree of accuracy. NNs typically are provided with a set of input and output exemplars. A learning algorithm (such as back propagation) would then be used to adjust the weights in the network so that the network would give the desired output, in a type of learning commonly called supervised learning.

7.4. Applications of AI: Artificial Intelligence has various applications in today's society. It is becoming essential for today's time because it can solve complex problems with an efficient way in multiple industries, such as Healthcare, entertainment, finance, education, etc. AI is making our daily life more comfortable and fast. Following are some sectors which have the application of Artificial Intelligence:



FIGURE 6. Artificial Intelligence

7.5. AI in Astronomy: Artificial Intelligence can be very useful to solve complex universe problems. AI technology can be helpful for understanding the universe such as how it works, origin, etc.

7.6. AI in Healthcare: In the last, five to ten years, AI becoming more advantageous for the healthcare industry and going to have a significant impact on this industry. Healthcare Industries are applying AI to make a better and faster diagnosis than humans. AI can help doctors with diagnoses and can inform when patients are worsening so that medical help can reach to the patient before hospitalization.

7.7. *AI in Gaming:* AI can be used for gaming purpose. The AI machines can play strategic games like chess, where the machine needs to think of a large number of possible places.

7.8. *AI* in *Finance*: AI and finance industries are the best matches for each other. The finance industry is implementing automation, Chatbot, adaptive intelligence, algorithm trading, and machine learning into financial processes.

7.9. *AI* in *Data Security:* The security of data is crucial for every company and cyber-attacks are growing very rapidly in the digital world. AI can be used to make your data more safe and secure. Some examples such as AEG bot, AI2 Platform, are used to determine software bug and cyber-attacks in a better way.

7.10. AI in Social Media: Social Media sites such as Facebook, Twitter, and Snapchat contain billions of user profiles, which need to be stored and managed in a very efficient way. AI can organize and manage massive amounts of data. AI can analyze lots of data to identify the latest trends, hashtag, and requirement of different users.

7.11. AI in Travel & Transport: AI is becoming highly demanding for travel industries. AI is capable of doing various travel related works such as from making travel arrangement to suggesting the hotels, flights, and best routes to the customers. Travel industries are using AI-powered catboats which can make human-like interaction with customers for better and fast response.

7.12. AI in Automotive Industry: Some Automotive industries are using AI to provide virtual assistant to their user for better performance. Such as Tesla has introduced TeslaBot, an intelligent virtual assistant. Various Industries are currently working for developing self-driven cars which can make your journey more safe and secure.

7.13. AI in Robotics: Artificial Intelligence has a remarkable role in Robotics. Usually, general robots are programmed such that they can perform some repetitive task, but with the help of AI, we can create intelligent robots which can perform tasks with their own experiences without pre-programmed. Humanoid Robots are best examples for AI in robotics, recently the intelligent Humanoid robot named as Erica and Sophia has been developed which can talk and behave like humans.

7.14. AI in Agriculture: Agriculture is an area which requires various resources, labor, money, and time for best result. Now a day's agriculture is becoming digital, and AI is emerging in this field. Agriculture is applying AI as agriculture robotics, solid and crop monitoring, predictive analysis. AI in agriculture can be very helpful for farmers.

7.15. AI in E-commerce: AI is providing a competitive edge to the e-commerce industry, and it is becoming more demanding in the e-commerce business. AI is helping shoppers to discover associated products with recommended size, color, or even brand.

7.16. AI in education: AI can automate grading so that the tutor can have more time to teach. AI chatbot can communicate with students as a teaching assistant.AI in the future can be work as a personal virtual tutor for students, which will be accessible easily at any time and any place.

8. TRENDS IN AI

8.1. Creative or generative AI: Generative AI refers to the sub-field of machine learning generating new data or content using an existing data set. Its goal is to produce something close to the original, real-world input data. This AI type uses deep learning algorithms to learn patterns and features in that data set, which may consist of code, text, images, audio, video, or other data types. Generative AI already has a wide range of applications. Here are three in-demand examples, all produced by the San Francisco-based AI research firm OpenAI, which will continue to shine in the coming year:

8.2. Generative Pre-trained Transformer 3 (GPT-3):

Developed in 2020, GPT-3 is a language prediction model which "autocompletes" text after studying millions of web pages and scientific papers on the Internet. GPT-3 has 175 billion machine learning parameters. This generative AI product runs current copywriting tools, which generate human-like written content after you feed it with contexts, such as topics, descriptions, or introductory sentences. You can use this tool to develop outlines, summaries, essays, op-eds, and more.

However, GPT can contain bias because its output comes from previously published content, which can also have racial, religious, or gender bias.

8.3. ChatGPT:

ChatGPT is a bot version of GPT-3 that made its debut in November 2022. It's a large language model which can answer questions and perform instructions after receiving "training" from human conversations and internet content written by humans. By studying human feedback sources such as Reddit, this AI "learned" what humans expect when others ask them a question—the "human style" of responding. OpenAI designed ChatGPT to mimic conversational dialogues with humans. Because the bot can create and organize lists and human-sounding letters, industries foresee its wider use as an office assistant and customer service support. Some of the concerns related to ChatGPT are its possible use for composing essays and academic papers. However, its generated content may include nonsensical sentences or even wrong information. Auditing ChatGPT's performance may be necessary to prevent misinformation in customer care settings.

8.4. DALL-E:

DALL-E became the most popular of the three Open AI creations in 2022 due to its graphic-creation features. The product's name comes from Spanish surrealist Salvador Dali and the robot in the 2008 Pixar animated film WALL-E. You can create art by keying in a description, and DALL-E generates several versions. Or you can create a new image from an existing one by using text prompts. Users can do "in-painting" or delete parts of an image and replace it with something else. Or they can do "out-painting," in which DALL-E can add more to an original photo (main subject or scenery). These capabilities make DALL-E a handy tool for the branding and creative marketing sectors.

8.5. *Greater AI-human collaboration:* The extent of AI's support for various human functions has reached and will soar to new heights, earning them the name cobots or collaborative robots. Market insiders foresee more companies deploying machines with built-in AI to implement repeated and physically strenuous tasks. Doing so will allow human staff to perform more specialized duties. AI features can also enable teams to swiftly detect and respond to defects or failures,, improving safety and lowering costs for repairs or injury. Cobots will be more widespread in these fields:

8.5. *Automotive manufacturing*: car assembly, spray painting, surface polishing, systems checking, and the retrofitting or reconstructing car production lines to accommodate electric models. Companies with palletizing and welding activities expect to adopt more cobots with higher payloads and a longer reach.

8.6. *Agriculture*: drones for seed planting, fertilizer and pesticide application, trespasser and invasive species tracking, and LED lighting and hydroponics for indoor farms

8.7. *Healthcare and hospitality*: sample collection, hospital supplies restocking, surgery, injury recovery, health worker support in residential and nursing care homes for the elderly or disabled

8.8. Food and beverage: warehousing, food packaging

Electronics: quality inspection for phone chips, phone chip processors, and printed circuit boards

8.9. *Emerging technologies*: torque sensors, proximity detection sensors, end-effectors (end-of-the-arm tooling such as vacuum, mechanical, pneumatic, and magnetic grippers

8.10 Defense: clearing roads of explosive devices, sensors to detect explosives

Companies can also turn to these machines to ease labor shortages and issues in the supply chain. In particular, the healthcare, construction, and defense industries may replace traditional training methods with VR and AR-based learning for safety and reduced spending.

9. ETHICS AND REGULATION

Amid generative AI's many benefits, people fear its misuse, such as the production of deep fake videos. Cybercriminals can use these tools to commit fraud, slander, blackmail, revenge, coercion, or extortion. Questions also arise regarding the boundaries of original and proprietary content. The AI sector expects users and customers to demand transparency, safety, and responsible practices. The New York City Department of Consumer and Worker Protection has already passed an AI Law (New York City Local Law 144) that requires employers to meet bias audit requirements before using automated tools for evaluating job applicants. Moreover, hiring teams should inform candidates about their use of these tools for recruitment and job advertisements. As early as 2021, the European Council has already submitted a proposal to regulate AI. The proposed legislation classifies AI applications and systems into prohibited, high-risk, and low-risk categories.

When approved, the AI Act will serve as the AI counterpart of the General Data Protection Regulation

9.1. Democratization: low-code, no-code AI: The low-code, no-code trend in website and app development will carry over to AI, allowing organizations to customize these intelligent systems through pre-built templates and drag-and-drop methods. This way, AI's integration into existing workflows will happen more quickly. AI usage will also scale faster within their corporate setup. Besides using low-code, no-code AI for automating repeated

tasks such as invoicing, form filling, and contact validation, businesses can program AI tools—like Sway AI and Akkio for data analysis of current processes and visualization of future performance.AI market insiders also expect more cloud service providers to integrate AI into their offers due to its foreseen adoption in the long run. Because IT modernization using low-code, no-code tools costs 70% cheaper and gets completed faster (as short as three days) than traditional methods, 66% of developers already use (39%) or plan to do so (27%) in 2023. Meanwhile, Gartner forecasted that by 2026, "citizen developers"— or those who did not take formal coding courses—will make up 80% of low-code tool development users.

9.2. Sophisticated cyber security: Another sad aspect of AI is that hackers can use it and its features to shorten the end-to-end lifecycle of their attacks from a few weeks to just days or hours, according to a McKinsey report. As more industries adopt AI resources, critical infrastructure—including national civil infrastructure that supplies homes with power and water—may come under threat of hacking activities. At the same time, smaller, less protected organizations will continue to be vulnerable. Career opportunities in information security will grow due to these new risks. Specialists can deploy and oversee security AI for: *Data handling*, including classification, cataloging, integration, and quality control *Vulnerability management* by surveying network traffic and identifying patterns suggesting criminal behavior *Threat detection* through predictive AI, which can project which of the thousands of alerts has the highest risks and deal with them first IBM reported in 2022 that businesses with cyber risk management structures and policies saved an average of <u>USD3 million</u> and reduced breach lifecycles by 74 days due to quick detection and response. Growing cyber threats may also push the insurance market to adopt new technologies and strategies to assess and manage cyber risks. Insurers may also introduce risk-based pricing and exemption clauses for ransomware and cyberattacks.

9.3 Digital twinning: A digital twin is a digital replica of an object or process in the physical world. Through AI, industries create virtual models for simulations, allowing them to predict how a product or system will perform. The Omniverse platform of leading GPU manufacturer NVIDIA is an example of digital twin technology.

9.4AI for personalization: eCommerce: While 62% of consumers expressed concern about AI bias, 69% of respondents to a Sales force poll said that they're open to its use by brands if it will improve their shopping experience. This trend will continue, given that 91% of consumers already interact with chatbots, the majority of which are AI-powered bots. AI marketing tools help brands analyze customer interactions to personalize product searches, recommendations, and messages.

9.5 Entertainment: AI reliance may also grow in filmmaking, where movie companies are already turning to audience analysis tools for finding the best stories for their next movies. Screen vision Media introduced its proprietary Cinelytics to its advertisers in 2022 while Warner Bros. adopted a similar technology earlier to predict ticket sales. As early as 2018, 20th Century Fox co-developed Merlin Video with Google's Advanced Solutions Lab to forecast their moviegoers' interest based on the AI's study of movie trailers. Also, Netflix uses its subscribers' watch history to suggest what to watch next.

9.6. *Workplace*: Worries about AI bias also exist among employers. However, market insiders say AI tools will continue to be an option for improving engagement through team communication software (such as Glint and Leena.AI) and workplace learning (using platforms like Hone and EdApp). According to PwC, 54% of executives at companies already using AI see improvements in employee productivity, while 80% believe automation will be helpful in any business decision.

9.7. AI in voice technology:1. Voice biometrics: More businesses will explore using biometrics or voice authentication for identity protection in place of passwords or PINs. Voice assistants will make a "voiceprint" from your recorded sample and will use that to compare any new voice it receives whenever you unlock your device through speech. A growing number of banks are using voice recognition, allowing clients to access their accounts through speech authentication

9.8. Voice cloning: AI can use a person's voice sample to generate new audio. The technology will hasten the recording of voice-overs for a project and voice content for films, video games, and others. VoCapsule has a "voice bank" platform called My Legacy Voice. Members can access their voice data if they start having speech difficulties. Designated "primary recipients" can also access the data when the original member passes away.

Companies can also use voice cloning for localizing content, enabling people to hear promotions or instructions in their native language. Meanwhile, filmmakers can use this technology to manipulate an actor's voice to speak different languages. They will transfer extracted elements from the artist's original recording to a secondary track containing an interpreter or a voice talent's speech. The process retains the accent and vocal performance of the secondary translation voice.

9.9. AI in motoring: The automotive industry foresees greater adoption of AI-based driver monitoring systems that can alert human drivers or activate autonomous driving if they detect drowsiness or illness. Adaptive cruise controls can send forward collision warnings and automatically adjust vehicle speed. Also, manufacturers see automation—not electrification—as the future of driving. Renub Research forecasts that the autonomous vehicle market will skyrocket to \$186.4 billion by 2030 from \$4 billion in 2021.Autonomous vehicle features continue to advance, from the presence of sensors and radars for object detection to convolutional neural networks. These

networks recognize and classify terrain, paving the way for path planning, route optimization, and ultimately "training" self-driving cars to drive safely. Moreover, vehicle connectivity solutions are emerging that allow autonomous cars to "communicate" and avoid crashing into each other, pedestrians, and other objects.

10. AI IN MEDICINE

10.1. *Precision medicine*: As AI optimizes electronic health records, medical professionals can deliver targeted diagnostics, develop patient-specific drugs, and customize treatment plans. AI-enhanced diagnostics can reduce the harm <u>one in four patients</u> experience annually due to hospital negligence or oversight.

10.2. Virtual exams and decentralized clinical trials: Telehealth will stretch its powers to include remote physical exams with the help of smartphone solutions and wearables. Research and pharmaceutical entities can use the same devices in conducting clinical trials so that participants don't need to travel to a trial site to answer surveys and assessments.

10.3. *Emotional AI technology*: AI with emotion recognition and generation capabilities will engage autistic children, depressed patients, and others with degenerative ailments like dementia.

11. FUTURE OF AI

Artificial intelligence (AI) is truly a revolutionary feat of computer science, set to become a core component of all modern software over the coming years and decades. This presents a threat but also an opportunity. AI will be deployed to augment both defensive and offensive cyber operations. Additionally, new means of cyber attack will be invented to take advantage of the particular weaknesses of AI technology. Finally, the importance of data will be amplified by AI's appetite for large amounts of training data, redefining how we must think about data protection. Prudent governance at the global level will be essential to ensure that this era-defining technology will bring about broadly shared safety and prosperity. *Net App and artificial intelligence:* Net App AI solutions are based on the following key building blocks: ONTAP software enables AI and deep learning both on premises and in the hybrid cloud. AFF all-flash systems accelerate AI and deep learning workloads and remove performance bottlenecks. ONTAP Select software enables efficient data collection at the edge, using IoT devices and aggregations points. Cloud Volumes can be used to rapidly prototype new projects and provide the ability to move AI data to and from the cloud.

12. CONCLUSION

Till now we have discussed in brief about Artificial Intelligence. We have discussed some of its principles, its applications, its achievements etc. The ultimate goal of institutions and scientists working on AI is to solve majority of the problems or to achieve the tasks which we humans directly can't accomplish. It is for sure that development in this field of computer science will change the complete scenario of the world Now it is the responsibility of creamy layer of engineers to develop this field.

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