

Understanding A.I.

Kajal Nanda

Computer Applications and Science

Abstract- This paper aims to provide an in-depth understanding of A.I., its historical development, and its transformative influence on modern civilisation. We will discuss significant concepts, evolving technologies under influence, technological advancements, and ethical and unethical A.I..

Index Terms- Expert systems, Natural language processing

I. INTRODUCTION

“Artificial intelligence(AI) is a set of technologies that allows computers to perform advanced functions, such as: seeing, understanding, Translating spoken and written languages, analysing data and making recommendations.” We all must have seen this definition somewhere in our lives but is this the real definition of AI? Or do we understand it wrong? Well, these are the features of AI so what is the purpose? So, the purpose is to LEARN. Learn making patterns, learn gathering information, learn making decisions on the basis of knowledge residing in the knowledge base(reinforcement learning) and many more.

We are going to explore AI with a different and open-approach in which we will see the underlying technologies, broader implications and the role and impact of AI on homo sapiens. The purpose is to address the questions regarding the current state of AI and its potential trajectory.

II. PROBING AI: WHAT, WHY, WHO, WHERE & HOW

Artificial Intelligence is being used everywhere, in a wide variety of applications, including engineering, technology, the military, opinion mining, sentiment analysis and many more. It is also popular in more advanced domains, such as Language processing- Natural language, machine learning, etcetera.

People are gradually becoming accustomed to its presence. It is utilised in systems that recognise both voices and faces. From technology advancements to e-commerce, it is familiar with the preferences. Its spectrum has been broadened with its quality to learn and make or imitate the decision just like humans do. Finding spam, preventing fraudulent decisions in criminal justice, developing antibiotics, which probably takes 6-7 years to develop one antibiotic body structure is developed by AI within days. The most cutting-edge technology currently on the market are virtual assistants like

Apple’s Siri, Amazon’s Alexa, Microsoft’s Cortana, and Google’s own Google Assistant. They are not just smart AI devices but attract customers and give a great hike to the tech-market.

AI has become very popular all over the world today. It imitates human intelligence in machines by programming them to do the same things people do. As a technology, AI is going to have a bigger impact on how people live their daily lives. Everyone wants to connect to Artificial Intelligence as a technology these days.

AI is the creation of systems that are capable of thinking and behaving in the same way as people do, in logical aspects. It has the ability to display human-like capabilities such as reasoning, learning, planning, and creativity.

The application of artificial intelligence do not all require the same kinds of AI. in general sense, one may say that AI can be categorised into the following levels:

- **Software level(Embodied AI)-** in software level, things like search engines, virtual assistants, speech and facial recognition systems, picture analysis, chatbots and GPTs(generative pre-training transformer) are seen.
- **Hardware level(Embedded AI)-** this level includes, robots, autonomous vehicles, drones, IoT, autonomous self-done machines and other technologies falls under this category.

Now, coming this far, we have seen a lot about the basics of artificial intelligence..but it is not ending anytime soon.. We have different types of AI approaches and types as well.

- **Artificial Narrow Intelligence(ANI):** it specialises in one area and solves one problem at a time(MACHINE LEARNING). It is also called Weak AI or Narrow AI. These systems act intelligent but they don’t have any awareness of what they are doing. For example, a chatbot.
- **Artificial General Intelligence(AGI):** it refers to a computer that is as smart as a human across the board(MACHINE INTELLIGENCE). They are also called Strong and Actual thinkers. They act like a smart

human and think like one with a conscious, subjective mind. Such a system was recently developed by the UK based Principle Research Scientist, David Silver, who developed Ai to defeat the world's best player at Complicated strategy game GO and he is currently working on more AGI systems.

- **Artificial Super Intelligence(ASI):** it works as an intellect that is much smarter than the best human brains in practically(MACHINE CONSCIOUSNESS). This category consists of systems which are highly smarter than the human brain. They are generally strong and rational. Such systems are recently launched by a tech company, EMBODIED, founded and controlled by Paolo Pirjanian- an american based Engineer and a former worker of Mars Rovers for NASA.

These systems are designed and developed to help the children develop and make them feel easy to open up in-depth, those who find it very difficult to open up with human beings.(Children suffering from psychological syndromes like Autism, Down Syndrome, etc). The expectation from the ASI system is to do more than the human can. This includes making rational decisions, emotional buildups, and relationships.

III. EVOLUTION AND BRIEF HISTORY OF ARTIFICIAL INTELLIGENCE

AI's ideas come from early research into how people learn and think. Also very old is the idea that a computer could act like a person

In the late 19th century and early th century, mathematicians and philosophers like GottLob Frege,Bertram Russel, ALfred North Whitehead, and Kur Godel built on Boole's first ideas about logic to make mathematical representations of logical problems. When electronic computers came along, it was a big step forward in how we could study intelligence.

In 1950, Alan Turing wrote a paper called "Computing machine and intelligence." This article gave a good overall picture of AI. This paper talked about a lot of things, one of which was how to solve problems by using heuristic as guides to look through the space of possible solutions. He used the game of chess to explain his ideas about how machines can think and work. He even said that the machine could change its own instructions so that machines could learn from what they do. 1997 was the year of the first official Robo-Cup soccer game. It was played on a tabletop with 40 teams of robots talking to each other.

As more and more people use the web, web crawlers and other AI-based programmes that pull information from it are becoming more and more important.

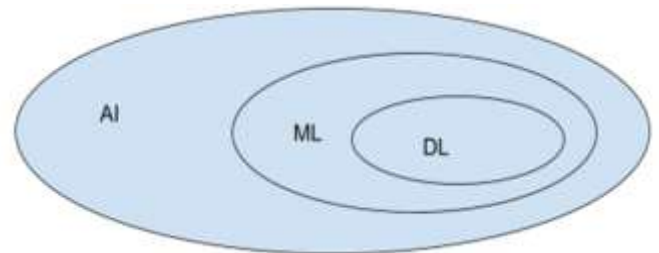
In 2000, the Nomad robot went to a remote part of Antarctica to look for meteorite samples. At the same time, space probes that are made of robots could work on their own to learn more about space. They keep an eye on what's going on around them, make decisions, and take action to get where they want to go. In April 2004, the first three-month missions of NASA's MARS rovers happened, in which the spirit rovers were looking at a group of hills on mars that took two months to reach.

That's how the AI reached the actual fields and came into action.

Featuring AI

Artificial intelligence is a big field that includes a lot of different ways of doing things, it works on approaches and that differentiates itself. Top-down Approach(knowledge representation) to bottom-up Approach(Machine learning(ML)).

These terms are very popular these days, Deep learning(DL), Machine learning(ML) and AI, from which, AI is the most general term and DL and ML are extended versions of it.



Proliferation of enhanced AI promotes core concepts of it, like, Neural networks, Natural language processing, Deep learning and Reinforced learning(usually seen in the AI Agents). Since, its been clear that Deep learning is the type of machine learning and machine learning is the type of AI and they are interconnected with each other in a chain manner.

Machine Learning shows a machine how to draw conclusions and make decisions based on what it has learned in the past. It looks for patterns and analyses past data to figure out what these patterns mean so that a possible conclusion can be reached without the need of human experience. Businesses save time and make better decisions by using automation to evaluate data and come to the conclusions. It explains one of the most important ideas in AI, which has to do learning through experience and not through being taught. This way of learning is made possible by applying machine learning to very large data sets. ML algorithms find patterns and learn how to make predictions and recommendations by using data and experiencing instead of explicit programming instructions. These algorithms get changed when they receive

new data sets and learn again from their experience. This makes them more effective over time.

Algorithms for ML are based on ways that people learn from their experiences. This means they are programmed to learn from what they do and get better at what they do. ML provides predictions and prescriptives which basically anticipate what will happen (inherently probabilistic) and provide recommendations on what to do to achieve goals.

Deep Learning is a subfield of machine learning that focuses on algorithms called “Artificial Neural Networks” that are based on how the brain is built and how it works. Deep learning is a type of machine learning that can handle a wider range of data sources, needs less pre-processing of data, and often gives more accurate results than traditional machine learning methods.

A Neural network is made up of layers of software-based calculators called “neurons” that are linked together. Neural networks can take huge amounts of data and process it through many layers. At each layer, the network can then decide what to do with new data.

Deep learning is a way of programming computers that uses the way neural networks work to teach computers to do things that humans do naturally. So, DL is a way to teach computer models to run classification algorithms based on an image, text, or sound. Once a neural network knows what an object looks like, it can spot that object in a new picture.

Such systems are developed and used in China in high schools and colleges, Subway Stations and remote areas for learning and instructing students where appointing teachers is difficult. Deep learning is becoming more popular because its models can get better results. It uses large sets of labelled data and neural network architectures to train the models.

Another core concept of AI Technology is NLP- Natural Language Processing.

NLP enables machines to comprehend, interpret, and respond to human languages, underpinning applications like chatbots, translation services, and sentiment analysis. These machines can be intelligent agents who can interact with humans or perform tasks like they do. NLP enabled machines are transformative which will be used in Artificial general intelligence machine testing and development.

AI didn't take over suddenly, it was being prepared and tested for years to show progress and develop not just the lifestyle of the population but also make people rely on the technology for trivial to big tasks. ChatGPT is the biggest example and solution for almost every problem these days. It is helping people write code, suggesting solutions to the mathematical and social science problems, writing CVs, teaching interview

tips and tricks and writing poetry and reviewing your stories in detail for you. So basically, we as a generation, rely on it. Even though, answers and solutions suggested by chatbots are not always right and true with the sources. These answers are sometimes manipulated, or self-made. It can answer any query. This problem is called AI Hallucination. Just like us, hallucination is a big problem with AI as well. Big AI assistant's like Google's or Bing's hallucinated and made defending and offensive answers in the beginning of their testing tenure. The companies are still expecting less made-up answers with a very good rate of accuracy, since it is still hard to say that this problem will be overcome by time or not, said Sundar pichai-CEO at Google in an interview with Scott paley on 60 minutes show.

AI raises a crucial question, and that is, “how do we measure if AI is making a machine to behave or act or perform like human beings or not?” Perhaps, in the future, we will reach a point where AI can behave like humans, but what guarantees do we have that this will continue? Is it possible to make a system that acts like a human to test the certainty of AI?

Maybe the answer is Yes. A machine enabled with ethical AI may imitate human behaviour, but it will never be able to become one. Taking a reference from an American Sci-fi thriller named, *Subservience*, in which a domestic android AI robot who has ability to take care of domestic chores and relations just like humans, becomes deadly and brings menace to family once they become aware. So here comes another question : if AI becomes like humans in the future, will it adapt to humanity or not ?! Sundar Pichai rephrased the quote “Don't fear technology, fear yourself” to “Don't fear technology, fear those behind” in an interview with 60 minutes show. AI entity's human-likeness is evaluated by different approaches like Turing test-the very first idea given by Alan Turing and test designed to check the ability of decisiveness of an AI enabled machine and some approaches like Approach of the Cognitive Modelling, Approach of the Law of Thought and Approach of the rational Agent.

IV. APPLICATION AREAS OF ARTIFICIAL INTELLIGENCE SYSTEMS

AI is the most Important factor in the transformation of the economies straight from the ground up, and it is contributing as an efficient alternative. It has a lot of potential to perform optimisations in any industry, whether it is smart cities or the health sector, education or any other specific prospective sector of relevance.

AI is functioning as the major source of competitive advantage in:

Healthcare: the application of AI in healthcare can help address issues of high barriers to access to healthcare facilities, particularly in rural areas that suffer from poor connectivity and limited supply of healthcare professionals. The deployment of use cases like AI-driven diagnostics, personalised treatment, early diagnosis of potential pandemics, and imaging diagnostics, amongst others, is one way to accomplish this goal. AI improved in various cancer diagnosis and treatments as well. Israeli-American professor of AI and Healthcare states that, developing a single Antibiotic for breast cancer through old practices could take up to the duration of PhD but now it is possible via AI to develop it within days. Similarly, human friendly AGI based robots are developed for promoting child development.

Smart Mobility(Transport and Logistics): A Chinese-American Businessman and Engineer, Kai Fu Lee, introduced AI image processing and analysis in local transport systems and subway stations. He also showed how AI image analysis can show the mood of the person in the picture recording his body posture, facial expressions and enthusiasm in voice. Autonomous fleets for ride sharing, semi-Autonomous features such as drive assistance, and predictive engine monitoring and maintenance are all possible use cases for smart mobility, which include transportation and logistics. Other areas where AI can have a positive impact include self-driving trucks and cars(TESLA) and delivery, as well as better traffic control. AI based image analysis traffic control cameras are installed in metropolitan cities in India to capture the vehicles violating the traffic rules and deliver the data to the control room to process their challan. This technology eases the job of Traffic Police, Drivers, and many more parties included.

Retail: The retail industry was one of the first to use AI solutions. For example, personalized suggestions, browsing based on user preferences, and image-based product search have all been used to improve the user experience. Other use cases include predicting what customers will want, keeping track of inventory better, and managing deliveries more efficiently.

Manufacturing: AI based solutions are expected to help the manufacturing industry the most. This will make possible the “Factory of the Future” by allowing flexible and adaptable technical systems to automate processes and machinery that can respond to new or unexpected situations by making smart decisions. Impact areas include engineering(AI for Research & Development), supply chain management(predicting demand), production(AI can cut cost and increase efficiency), maintenance(predictive maintenance and better use of assets), quality assurance(vision systems with machine learning algorithms to find flaws and differences in product features), and in-plant logistics and warehousing.

Education: AI bringing a lot in the Education and Skilling sector. Quality and access problems in the education sector might be fixed by the AI. Possible uses include adding to and improving the learning experience through personalized learning, automating and speeding up administrative tasks, and predicting when a student needs help to keep them from dropping out or to suggest vocational training. There are many AI tools in the market, already available to accelerate the education sector. Not only for students but to be used by the teachers as well.

Automatic Tools and Checkers for Plagiarism: AI Tools availability to check the content’s reliability and originality and removing anomalies helped the publications a lot. Even people can do it on their own without including any publishing company in it.

Recognizing Faces: This AI technology not just enhances the entertainment and gaming field but also be used for many purposes like crime and justice, biometric face recognition attendances, etc.

Autopilot AI: AI in autopilot mode is gathering attention these days. Autopilot modes in commercial transports and planes is a new trend. Robot cars and vehicles are not a dream anymore.

Smart AI Applications: AI applications like Uber, Ola, Swiggy, Zepto are all caught up with AI technology. From sharing rides to getting things delivered in a few minutes with real time details and reliable communication is an intelligent act of development. It shows, every field is growing in its own way with the common technology used.

Financial Sector: The financial industry also uses AI to help the fraud departments of banks to find and flag suspicious banking and finance activities like unusual debit card use and large account debits, Ai is also used to make trading easier and more efficient. This is done by making it easier to help figure out how many securities are being bought and sold and how much they cost.

Building Smart Cities and Infrastructure: Integrating AI into new built smart cities and infrastructure could also help meet the needs of a population that is moving to cities quickly and improve the quality of life for the people. Some possible use cases include controlling traffic to reduce traffic jams and managing crowds better to improve security.

Smart Personal Assistants and Prediction Apps: Smart Assistants like Siri, Alexa, Google Assistant are very much popular worldwide and configured very smartly are used for different types of fields. These are very reliable and bring ease of use. Smart Android applications like Google maps, Gemini are used by almost everyone and it accelerated the

trends in delivery based companies like Zomato, Amazon, etc. Google maps are one of the best AI examples which analyses the roads by sensing the strength of the signals of the cell phones.

Online Filters, features and Protection: There are various ways to use AI. It can be used in different industries and sectors, but the most interesting and relevant use of AI is protecting against and stopping frauds, restricting Email spams and many more. One of the very astonishing features are voice-to-text features, AI search suggestions and contents, creating AI voices and creative images, etc. AI is a boon if used wisely.

V. TOOLS OF ARTIFICIAL INTELLIGENCE

AI tools are softwares applications that use AI algorithms to perform specific tasks and solve problems. These can be used in a variety of ways from healthcare industries to business, finance, and sales market to AI image generators, video creation to education, content, and many more. AI has now become a big part of present and future generations. There's a list of AI tools trending worldwide:

1. ChatGPT

An Open AI introduces ChatGPT which uses NLP to create human-like language conversation. The most powerful version of ChatGPT is Enterprise Edition which offers you enterprise-grade security and privacy. It does not use personal data for training models. It is easily deployed with bulk member management, domain verification, and analysis dashboard.

2. DALL-E

An Open AI trained a neural network called DALL-E that creates images from human text. DALL-E is a transformer language model that receives text and images as a single stream of data containing up to 1280 tokens and is trained to generate all tokens one after another. It can create anthropomorphized versions of animals and objects and create plausible images for a great variety of sentences. This can create multiple objects simultaneously without mixing them up. It is free to use.

3. Midjourney

Midjourney is a small self-funded team with an independent research lab exploring new mediums. It uses Discord for prompt writing and creating images, a midjourney bot for one-on-one messages, and a user guide to learn more about versions, parameters, and more. It takes commands to work on different tasks. It can also create a private server for you to organise your work and notes. It has a pricing system based on the duration of time it is used.

4. Textio

Textio is a talent acquisition AI tool that gives high-quality feedback and provides bias-free, actionable, equitable performance reviews. It ensures equitable growth opportunities for every employee. It creates optimised job posts, source mailing, social posts, and more to the broadest audience and offered with fair and actionable feedback.

5. Slides AI

An AI-powered tool, Slides AI that helps to automatically transform text into visually appealing slides saving hours and effort. It summarises the slide content into easily digestible bits of information. It can automatically generate a sub-title by analysing the paragraph and create a presentation simply by a text or a topic prompting more than 100 languages.

6. Fliki AI

Fliki AI is the one of the best AI tools to provide text-to-speech and text-to-video service online. It helps transform your content using AI audio and video tools to create captivating videos with minimal time, effort, and money. It offers a simple and fastest editor for video creation which can create high-quality video at an affordable cost that does not require technical skills or any software installation.

There exists many more AI systems and tools like Github CoPilot, Chatbot, etc to solve bigger problems in units of time. AI tools have become the most widely used by companies. It decreased the paperwork and increased efficiently.

Businesses can increase more profit with minimal cost if they use the right AI tools and technology. AI tools are the future as they completely give accurate and unbiased solutions that humans can't even think of. They are very efficient and creative. This comes with many benefits like human insights turning into data and handling it with more volume and velocity. They are fast and give personalised, error free results.

VI. AI POLICIES AND GOVERNANCE MODELS

AI policies and models refer to a set of processes, guidelines, and frameworks designed to ensure the responsible development and deployment of Artificial Intelligence and its systems. However, AI can analyse large, complex set of data quickly and efficiently, so the governments can find opportunities to conserve energy and create more efficient public transit routes and accurately predict how demographic or population changes will impact demand for government services. There are many international efforts to regulate and govern the AI technology, such as,

- The European Commission's white paper on AI which outlines principles for Trust, Transparency, Reliability in AI systems.
- IEEE's Ethics in Action in Autonomous and intelligent systems emphasizes the importance of stakeholder collaboration in designing ethical frameworks.
- UNESCO's Recommendations on the ethics of AI provides a global standard for AI governance, addressing cultural diversity and inclusivity.

VII. ETHICAL AND UNETHICAL AI

Ethical and unethical distinguishes the difference between righteous and unfair practices of AI technologies. Ethical systems are designed with transparency, fairness, and accountability, prioritising human rights and societal values whereas unethical AI encompasses practices that disregard societal norms or harm users and stakeholders. Key principles of ethical AI includes:

- Fairness
- Safety
- Trustworthiness
- Privacy
- Reliability.

Key principles of unethical AI includes:

- Surveillance
- Manipulation
- Unaccountability
- Bias.

Modern AI technologies make a huge effort to mitigate unethical AI by regulating transparent processes.

Future of AI

The future of AI promises advancements in fields such as General AI, Quantum AI, and concepts like Machine learning and deep learning. Researchers and developers working very sophisticatedly to bring the anticipated AI versions to the public General AI was an impossible concept a century ago but now scientists have worked hard on the idea of general AI and now it has been launched through different systems. Developing and Exhibiting human-like cognitive systems in fields like gaming and entertainments, healthcare, criminal justice etc proved very useful and reliable.

Proliferation of human intervention through AI technologies is named as Human-in-the-loop(HITL) AI, is the process of combining human expertise with AI systems to improve accuracy, accountability, and ethical compliance. The importance of human interventions is to recognise the human patterns and act and identify the correct choices removing anomalies from the group. Human interventions are seen actively in fields like agriculture, optimising irrigation,

fertilisation, etc and in retail businesses. Other than that, job screening through models, education sector, etc are enabling human to do more work. The productivity of AI may boost our workplaces, which will benefit people in different ways. As the future of AI replaces tedious or dangerous tasks, the human workforce is liberated to focus on tasks for which they are more equipped, such as those requiring creativity and empathy. It is true that AI will replace very crucial jobs of society like jobs related to automobile, restaurants, engineering, etc but it will build more jobs and opportunities on different levels.

AI is evolving rapidly and it is expected to have a significant impact on society in the future. This revolution will cover many sectors, including healthcare, banking, economy, and transportation. Expectedly, improved automation, enhanced language models,

AI-powered medical diagnosis and decision making robots. AI will also have a major impact on the economy and the workforce. When Albert Einstein did so many inventions even though he did not have a calculator, what all inventions would he have made if he had this technology.

VIII. CONCLUSION

The evolution of AI underscores its profound impact on society, marked by advancements that redefine possibilities in technology and innovation. AI is going to replace humans and their jobs but if humans and AI work together, it will take the success of technology to another level. We should not fear the technology but those who are behind it.

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