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Advantages and Risks of AI Technologies

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ABSTRACT

In recent years, members of the information system research community have been paying a greater amount of attention to artificial intelligence (AI). Artificial intelligence is a broad discipline that encompasses a variety of subfields and aims to automate activities that traditionally need the intelligence of humans. The term "artificial intelligence" (AI) refers to a technology that, despite the general public's lack of acquaintance with it, is revolutionising every facet of existence. This article's goals are to educate non-specialists about artificial intelligence (AI) and encourage them to use AI as a tool in a variety of fields to rethink the way we integrate data, analyse it, and make decisions. The gathering of sufficient data, along with its processing and analysis, in order to gain important insights, has evolved into the central pillar of decision-making in virtually all modern enterprises. However, the volume and variety of data produced by humans and sensors cannot be managed at scale by humans alone. The process of human thought, according to data scientists, can be described as the mechanical manipulation of symbols, which eventually led to the development of AI. These data have been the seeds of current artificial intelligence. Alongside this topic came the subsequent discussion on the benefits and drawbacks of Artificial Intelligence (AI).

Keywords: Artificial intelligence (AI), machine learning, review, deep learning.

INTRODUCTION

Artificial intelligence, sometimes known as AI, is a solution that was developed in response to issues with data and numbers. This important discovery has resulted in a number of important technological advances in practically all areas of study and practise, including engineering, architecture, education, accounting, business, medicine, and many more. Both machine learning and deep learning, which are key subcategories of artificial intelligence, have emerged as powerful and useful technologies for understanding and analysing data in a variety of business settings. These include retail, healthcare, and financial services. There are various benefits and drawbacks associated with artificial intelligence that need to be weighed in the context of a more comprehensive analysis. In this essay, we will go through the fundamentals of AI, including its concepts, stages of development, advantages and disadvantages, application cases, and the outlook for its future. In order to get a head start and create a solid foundation in Data Science, which will help us better grasp AI and the applications it has, we need learn more about the Data Science courses that are offered in India [1].

The pharmaceutical industry has not been left behind as AI has revolutionised the healthcare industry, making it more effective and efficient. In the pharmaceutical industry, artificial intelligence is collaborating with researchers to help the decision-making processes for existing pharmaceuticals and expanding therapies for additional ailments. Additionally, AI is aiming to expedite the process of clinical trials by selecting the appropriate patients from a variety of data sources.

"The science and engineering of making intelligent machines," as John McCarthy, the "father of artificial intelligence," defined it, is what artificial intelligence is.

AI is the ability of computer-enabled robotics systems to process information and creates outcomes in a manner comparable to the thinking process of human learning, decision making, and problem solving. This ability is referred to as "artificial intelligence [2]."

A world of future where,

- AI is able to develop new pharmaceuticals;
- It can find new drug combinations;
- It can deliver clinical trials within minutes;
- pharmaceuticals are not tested on actual humans or animals before being released; rather, they are tested on virtual models that are engineered to simulate the physiology of organs.
- Both in the production and the delivery of medicines, robots are becoming increasingly important.
- Your neighbourhood druggist can 3D print personalised medications in any form and at the dosage you want.

The categorization of AI

There are two categories that can be applied to artificial intelligence [3].
• According to the publication Calibre,
• According to the evidence that was present

The following is a classification of AI systems determined by their Calibre:
Artificial narrow intelligence (ANI), also referred to as weak intelligence: This system has been developed and is being trained to carry out a specific function, such as recognising faces, operating a vehicle, competing in chess, or managing traffic signals. Examples include Apple's virtual personal assistant Siri and the tagging feature found in social media.

Strong artificial intelligence, often known as artificial general intelligence (AGI): It is sometimes referred to as Human-Level AI. It has the potential to simplify the intellectual capacities of humans. Because of this, even when presented with an unusual challenge, it is able to figure out how to complete it. The AGI is capable of doing all that humans can.

ASI stands for "artificial superintelligence." It is a form of brainpower that is more active than smart humans in sketching, mathematics, space, and other areas; it excels in every discipline, from art to science. It can be as little as the computer being less intelligent than a human to as much as a trillion times more intelligent than humans.
AI researchers categorised the AI technology depending on whether or not it was currently present or not yet available. The following are some of them:

The first category of AI system is known as a reactive machine, and it falls under this category. For example, the chess programme Deep Blue developed by IBM defeated the reigning world champion, Garry Kasparov, in the 1990s. It is able to recognise the pieces that are moving across the chessboard and it can make predictions, but it does not have the memory to draw on its previous experiences. Its use is limited, and it is not applicable to any other circumstances due to the design of the product.

The second kind of artificial intelligence system is known as a limited memory system. This technology is able to draw on previous experiences to solve both current and upcoming issues. Only this method may be used to develop some decision-making functions in autonomous vehicles, such as cruise control and lane departure warning systems. The recorded observations are utilised to keep track of the actions that are going to take place in the future, such as switching lanes in an automobile. The recollections of the observations do not remain permanently in the mind.

"Theory of mind" is the name given to the third type of artificial intelligence system. It indicates that every human being has their own unique thinking, objectives, and desires, all of which have an effect on the choices they make. This is an artificial intelligence that does not exist [4].

TOOLS OF AI

In order to achieve the goals outlined above, research into AI makes use of a wide range of different technologies [5].

The processes of searching and optimising
The intelligent exploration of a wide variety of potential solutions is one of the numerous ways that AI may solve issues. In the field of artificial intelligence, there are two very distinct types of search: state space search and local search.

State space search
The objective of a state space search is to navigate through a hierarchy of potential states and arrive at a desired state.[56] For instance, in order to perform a process known as means-ends analysis, planning algorithms traverse hierarchical goal and subgoal trees in an effort to locate a route leading to the ultimate objective. Simple searches that are thorough are insufficient to solve the vast majority of problems that arise in the real world because the search space, or the number of locations to look, soon expands to enormous levels. The end result is a search that either takes an excessive amount of time or never finishes. The use of "heuristics" or "rules of thumb" can be helpful in prioritising decisions that will lead to a greater likelihood of achieving a goal. In computer programmes that play games like chess or go, the adversarial search algorithm is utilised. In order to find a winning position, it works its way through a tree containing all of the possible moves and countermoves.

Local Search
A swarm of particles that is looking for the local minimum Mathematical optimisation is used in local search in order to come up with a numerical answer to a problem. It begins with an educated guess of some kind and then gradually improves upon that guess until there are no further improvements that can be made. These algorithms can be thought of

as a form of blind hill climbing: we begin the search at a random location on the landscape, and then, by jumping or taking steps, we keep moving our guess uphill, until we reach the top of the hill. Stochastic gradient descent is the term that describes this process. A variation on the search for optimal solutions is utilised by evolutionary computation. For instance, they might start with a population of organisms (the guesses), then let the organisms mutate and recombine while allowing only the healthiest individuals to pass on their genes from generation to generation (refining the guesses).

Swarm intelligence techniques can allow for distributed search processes to cooperate effectively. Particle swarm optimisation and ant colony optimisation are two common swarm algorithms that are employed in search. Both of these algorithms take their inspiration from bird flocking and ant trails, respectively. Local search is also used by neural networks and statistical classifiers, both of which will be covered in more detail below. In this type of search, the "landscape" that has to be searched is produced through learning [6].

Logic

Reasoning and the representation of knowledge are two applications of formal logic. The most common types of formal logic are propositional logic (which relies on statements to determine whether they are true or false and makes use of logical connectives like "and", "or", "not", and "implies") and deductive logic.[65] and predicate logic, which utilises quantifiers such as "Every X is a Y" and "There are some Xs that are Ys" and also operates on objects, predicates, and relations.

The method of proving a new statement (the conclusion) through logical inference (also known as deduction) is the process of demonstrating a new statement (the premises) from existing statements that are already known to be true. In addition to inference, questions and assertions can be handled by a logical knowledge base as a subset of the latter. An inference rule specifies the criteria for what constitutes a legitimate step in a proof. Resolution is the most general form of the inference rule. The process of drawing inferences from given premises and evidence can be summed up as a search for a route that connects the two, with each stage consisting of the execution of a specific inference rule. When carried out in this manner, inference is impossible, with the exception of brief proofs in constrained domains. There is currently no known approach that is simultaneously effective, potent, and general. The "degree of truth" that is assigned in fuzzy logic ranges from 0 to 1, and it is used to manage uncertain and probabilistic scenarios. The ability to handle default reasoning is a primary focus of non-monotonic logics. There have been produced numerous other specialised forms of logic that are used to describe a variety of complex areas.

Probabilistic methods for uncertain reasoning

The grouping of the data from Old Faithful's eruptions begins with a guess at random, but it eventually manages to converge on a correct clustering of the two physically distinct modes of eruption.
In order to solve many problems in artificial intelligence (including those involving thinking, planning, learning, vision, and robotics), the agent must be able to work with unclear or partial knowledge. Researchers working in the field of artificial intelligence have developed a variety of tools to handle these issues by applying strategies drawn from the fields of probability theory and economics.

Bayesian networks are a fairly general tool that may be used for a variety of problems, including reasoning (using the Bayesian inference algorithm), learning (using the expectation-maximization algorithm), planning (using decision networks), and perception (using dynamic Bayesian networks). Bayesian networks can be utilised for all of these difficulties. Probabilistic algorithms can also be used for filtering, prediction, smoothing, and finding explanations for streams of data. This assists perception systems in analysing processes that occur over the course of time.

Utilising decision theory, decision analysis, and information value theory, precise mathematical tools have been built that analyse how an agent might make decisions and plans. These tools are extremely accurate. Models such as Markov decision processes, dynamic decision networks, game theory, and mechanism design are included in these tools [7].

Classifiers and statistical methods of learning

The most basic uses of artificial intelligence can be broken down into two categories: classifiers, on the one hand, and controllers, on the other hand (for example, "if diamond then pick up"). Classifiers are functions that determine the closest possible match by comparing a pattern to the pattern being compared. Using supervised learning, it is possible to fine-tune them based on specific instances that have been chosen. Each pattern, which is sometimes referred to as a "observation," is assigned a certain class that has been predefined. A data set is the collection of observations along with the labels they were given for their categories. When a new observation is obtained, that observation is categorised based on the experience that has been gained in the past.

There are a wide variety of classifiers that can be used. The decision tree is the symbolic machine learning algorithm that is both the easiest to understand and the one that is employed the most frequently. Kernel approaches such as the

support vector machine (SVM) superseded the k-nearest neighbour algorithm in the 1990s. Until the middle of the 1990s, the k-nearest neighbour algorithm was the most extensively used form of analogical artificial intelligence. According to reports, the naive Bayes classifier is Google's "most widely used learner." This is apparently in part owing to the scalability of the model. Classification is another application for neural networks.

Artificial neural networks

A neural network is a group of nodes that are connected to one another. It is analogous to the extensive network of neurons that is seen in the human brain. The architecture of the human brain served as an inspiration for the development of artificial neural networks. A simple "neuron" N accepts input from other neurons, and when these other neurons are active (also known as "fired"), they individually cast a weighted "vote" for or against whether neuron N should itself activate. In actuality, the "neurons" are represented by a list of numbers, the "weights" are matrices, and learning is carried out by performing linear algebra operations on the vectors and matrices. When trained, neural networks are able to carry out a specific kind of mathematical optimisation known as stochastic gradient descent on a multi-dimensional topology. This topology is produced as a result of the neural network's training [8].

Neural networks are able to discover patterns in data and learn to model complicated interactions between inputs and outputs as a result of their training. In principle, a neural network should be able to master any function. The back propagation algorithm is the training method that is used the most frequently. Hebbian learning, sometimes known as "fire together, wire together," was one of the earliest methods of learning utilised by neural networks.

The signal is only allowed to travel in a single direction in feed forward neural networks. The output signal is fed back into the input of recurrent neural networks, which enables the network to have short-term memories of events that were input in the past. Deep learning utilises many layers of neurons, in contrast to perceptrons which only use a single layer. This is especially crucial in image processing, because a local collection of neurons must recognise a "edge" before the network can identify an item. Convolutional neural networks increase the connection between neurons that are "close" to each other.

Deep Learning

Deep learning involves representing images on multiple levels of abstraction simultaneously. Using a number of different levels of abstraction to represent pictures in deep learning. When doing deep learning, numerous layers of neurons are interposed between the inputs and outputs of the network. The raw input can be processed by the various layers, which can then gradually extract higher-level information. When it comes to image processing, for instance, lower layers might be able to recognise edges, whereas higher layers might be able to recognise concepts that are significant to humans, such as numerals, letters, or faces.

Deep learning has been shown to significantly increase the performance of programmes in a variety of essential facets of artificial intelligence, such as computer vision, speech recognition, image classification, and many more.

Hardware and software designed specifically for the job. Programming languages for artificial intelligence and hardware designed specifically for artificial intelligence. At the end of the 2010s, graphics processing units (GPUs), which were increasingly designed with AI-specific enhancements and used with specialised TensorFlow software, had replaced the previously utilised central processing units (CPUs) as the predominant means for large-scale (commercial and academic) machine learning models' training.

Throughout the course of history, specialised languages such as Lisp, Prologue, and a few others were utilised [9].

ADVANTAGES OF AI:

Reduction in Human Error:

Because people make mistakes from time to time, The concept of "human error" was first articulated. Computers, on the other hand, are incapable of making such mistakes provided that they have been appropriately programmed. The decisions that are made by artificial intelligence are influenced by the data and algorithms it has accumulated in the past. As a direct consequence of this, the number of errors committed is cut down, and the likelihood of achieving more precision and accuracy is boosted [10].

Instead of humans, it volunteers to take risks:

This is without a doubt one of the most important benefits that come from utilising artificial intelligence. We will be able to surpass many of humanity's risky boundaries if we build an AI robot that is capable of performing the perilous activities on our behalf. It is possible to make effective use of it in every form of natural or man-made disaster, whether the goal is to fly to Mars, defuse a bomb, explore the deepest sections of the ocean, or mine for coal and oil. It is applicable to all of these endeavours.

Availability All Time
Without taking any rest, the typical working day for a human is between four and six hours. Humans are designed to be able to take breaks to refresh themselves and get ready for a new day of work. In addition, humans have weekly days off so that they can keep their personal and professional life distinct. However, unlike humans, we can apply AI to have robots work nonstop for seven days a week, twenty-four hours a day, without taking any breaks, and they will not become bored.

Help Provided through Technology
Some of the most cutting-edge businesses have begun engaging with customers through the use of digital assistants, which has resulted in a reduction in the need for human workers. There are now several websites that make use of digital assistants to deliver things that customers are looking for. We are able to talk to them about the things we are looking for. It can be challenging to determine if we are having a conversation with a person or a machine while using certain chatbots because they are programmed to appear human [11].

RISKS AND DISADVANTAGES

- Theoretical physicist and professor Stephen Hawking has stated that attempts by humans to create machines that are capable of thinking like humans pose a significant danger to the survival of the human race, and that the current competition to produce a fully human artificial intelligence may one day result in the extinction of the human species [12].
- A very high price tag since artificial intelligence programmes are incredibly complicated machines that require a lot of work to develop.
- Unemployment - AI has the potential to generate unemployment because things will be automated in this system, which means there will be less demand for human labour.
- No match for the intelligence of the human brain.
- No improvement with experience.
- No original innovation.
- No original inventiveness.

ARTIFICIAL INTELLIGENCE AND ITS APPLICATIONS

AI and machine learning technology is used in the majority of the essential applications of the 2020s, including the following: search engines (such as Google Search), targeting online advertisements, recommendation systems (offered by Netflix, YouTube, or Amazon), driving internet traffic, targeted advertising (AdSense, Facebook), virtual assistants (such as Siri or Alexa), autonomous vehicles (including drones, ADAS, and self-driving cars), and automatic language translation (Microsoft Translator).

There are also thousands more effective AI apps that are used to solve specific challenges for certain businesses or institutions. These applications can be found all over the world. In a poll conducted in 2017, one in every five businesses stated that they had used "AI" in some aspect of their products or procedures. Some examples include the storage of energy, the diagnosis of medical conditions, the logistics of the military, applications that forecast the outcome of judicial decisions, foreign policy, or supply chain management, and so on.

Since the 1950s, the most cutting-edge methods of artificial intelligence have been demonstrated and tested using game-playing programmes. On May 11, 1997, Deep Blue made history by being the first computer chess-playing system to defeat a reigning world chess champion. That champion was Garry Kasparov. IBM's Watson, a question answering system, competed against the two greatest Jeopardy! champions, Brad Rutter and Ken Jennings, in an exhibition match for the Jeopardy! quiz programme in 2011. Watson came out on top and won by a substantial margin. In March of 2016, AlphaGo defeated the reigning world Go champion Lee Sedol by a score of four games to one, becoming the first computer Go-playing system to defeat a professional Go player without using any advantages or disadvantages. Other computer programmes deal with games with faulty knowledge, such as Pluribus and Cepheus, which play poker at a level beyond that of a human. In the 2010s, DeepMind produced what it calls a "generalised artificial intelligence" that was capable of learning a variety of different Atari games on its own.

At the beginning of the year 2020, generative AI began to garner broad attention. 14% of individuals in the United States have tried out ChatGPT, which is based on GPT-3 in addition to other major language models. The growing realism of AI-based text-to-image generators. A hoax of an attack on the Pentagon, a fictional arrest of Donald Trump, and a phoney shot of Pope Francis wearing a white puffer coat have all garnered widespread notice, not to mention their use in professional creative arts. AlphaFold 2 (2020), exhibited the capacity to approximate the three-dimensional structure of a protein in a protein in a matter of hours rather than months [13].

CONCLUSION

There is a huge amount of potential for artificial intelligence to make the world a better place to live in. The primary concern should be to limit the amount of reliance placed on artificial intelligence. The impact that artificial intelligence is having on businesses throughout the world cannot be ignored, despite the fact that it has both positive and negative aspects.

One can study the different types of work that can be done with artificial intelligence (AI) and get promoted according to their level of knowledge if they enrol in an AI course. Training, learning, and development opportunities are offered in both management and technology through the use of the various courses that are available. In a word, everything is going to move very quickly, which will result in significant changes and progress. Therefore, it is possible to acquire the necessary skill sets in order to effectively cooperate with AI in business settings.

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