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SCOPE AND OBJECTIVE OF ARTIFICIAL INTELLIGENCE

AUTHORED BY - SUBASH S

ABSTRACT:

The scope of artificial intelligence (AI) encompasses developing computer systems that can mimic human cognitive abilities like learning, reasoning, problem-solving, and perception, allowing them to perform tasks that typically require human intelligence, while the primary objective is to create machines capable of analyzing data, identifying patterns, and making informed decisions without explicit programming, ultimately aiming to automate complex processes and enhance decision-making across various industries.

INTRODUCTION:

The transformative scope of Artificial Intelligence in daily life, industries, and future advancements, highlighting its impact on productivity and innovation. From my point of view in AI, I have seen technology go from a futuristic idea to a necessary daily necessity. These days, AI assists us with things like suggestions, reminders, and even customized experiences. It's fascinating to observe how once complicated AI is now making everyone's lives easier.

KEYWORDS:

Machines, Artificial intelligence, computers, robotics,

ARTIFICIAL INTELLIGENCE:

Artificial intelligence is one of humanity's most sophisticated and amazing creations to date. While this fact has been mentioned and reiterated countless times, it is difficult to acquire a full view on the potential influence of AI in the future. The reason for this is the revolutionary impact AI is having on society, especially at such a young stage in evolution. People have become anxious about the inevitability and proximity of an AI takeover due to AI's rapid expansion and tremendous powers. Furthermore, the revolution brought about by AI in various industries has led business executives and the general public to believe that

we are on the verge of reaching the pinnacle of AI research and realizing AI's full potential. Understanding the forms of AI that are possible and those that exist now, on the other hand, will provide a clearer sense of existing AI capabilities and the long road ahead for AI development.

Because AI research aims to make computers mimic human-like functioning, the degree to which an AI system can reproduce human capabilities is utilized as a criterion for classifying AI. Thus, AI can be classified as one of several categories of AI based on how a machine compares to humans in terms of variety and performance. In such a system, an AI that can execute more human-like functions with comparable levels of competency is deemed more advanced, whereas an AI with restricted functionality and performance is considered simpler and less evolved.¹

There are two general classifications of AI based on this criterion. One classification is based on AI and AI-enabled machines' resemblance to human minds and their ability to "think" and possibly "feel" like humans. Arend Hintze, an assistant professor of integrative biology and computer science and engineering at Michigan State University, divides AI in four categories, ranging from today's AI systems to sentient systems that do not yet exist⁸⁹. He classifies AI or AI-based systems into four categories: reactive machines, limited memory machines, theory of mind, and self-aware AI.

Reactive Machines:

These are the most primitive kind of AI systems, with extremely restricted capabilities. They mimic the human mind's ability to respond to various types of stimuli. Memory-based functionality is not available on these devices. This means that such robots cannot use previous experiences to inform their current behaviors, i.e., they lack the ability to "learn." These devices could only respond to a restricted set or combination of inputs automatically. They cannot be used to improve their operations by relying on memory. IBM's Deep Blue, which defeated chess Grandmaster Garry Kasparov in 1997, is a popular example of a reactive AI machine. Deep Blue can detect pieces on the chess board and make predictions, but it has no memory and cannot learn from past encounters. It analyses potential moves by itself and its opponent and selects the most strategic move. Deep Blue and Google's AlphaGo

¹ Ed Burns, "Artificial Intelligence", <https://www.techtarget.com/searchenterpriseai/definition/AI-Artificial-Intelligence>, March 2023

were created for specific goals and cannot be easily transferred to another circumstance.²

Limited Memory:

Limited memory machines are machines that, in addition to having the characteristics of fully reactive machines, can make decisions based on historical data. All modern AI systems, including those that use deep learning, are trained using vast amounts of training data that they store in memory to construct a reference model for addressing future problems. For example, an image recognition AI is taught to name items it scans by employing thousands of images and their labels.

When such an AI scans a picture, it uses the training photos as references to comprehend the contents of the image supplied to it, and it classifies fresh images with increasing accuracy based on its "learning experience." Almost all modern AI applications, from chatbots and virtual assistants to self-driving cars, are powered by AI with minimal memory. These AI systems can learn from past events to make better decisions in the future. Some decision-making functions in self-driving automobiles are created in this manner. Observations influence activities that will take place in the not-too-distant future, such as an automobile changing lanes. These observations are not saved indefinitely.

Theory of Mind:

While the first two forms of AI have been and continue to be abundant, the next two types of AI exist only as a concept or as a work in progress for the time being. The next level of AI systems that researchers are currently inventing is theory of mind AI. AI will be able to better grasp the entities it interacts with at the theory of mind level by discerning their wants, emotions, beliefs, and mental processes. While artificial emotional intelligence is now a burgeoning industry and a focus for prominent AI researchers, obtaining Theory of mind level AI would necessitate advancements in other areas of AI as well. This is because, in order to genuinely understand human wants, AI robots must recognize humans as individuals whose minds may be changed by a variety of conditions, hence "understanding" humans. This concept relates to the recognition that others have their own beliefs, wants, and intentions that influence their decisions. This type of AI does not yet exist.

² Mia Williams, "Artificial Intelligence", Larsen & Keller, 2020

Self-aware:

AI systems in this category have a feeling of self and consciousness. Machines with self-awareness are aware of their current condition and can utilize this knowledge to infer how others are feeling. This form of artificial intelligence does not yet exist. This is the final step of AI development, which currently exists only in theory. Self-aware AI is an AI that has evolved to be so similar to the human brain that it has gained self-awareness. Developing this form of AI, which is decades, if not centuries, away from becoming a reality, is and will always be the ultimate goal of all AI research. This sort of AI will not only understand and elicit emotions in individuals with whom it interacts, but will also have emotions, wants, beliefs, and maybe desires of its own. This is the type of AI that technology sceptics are concerned about. Although the emergence of self-awareness has the potential to accelerate our civilization's progress, it also has the potential to lead to disaster. This is because, once self-aware, the AI would be capable of possessing thoughts like self-preservation, which might either directly or indirectly mark the end of humanity, since such an entity could easily outmaneuver any human being's intellect and create sophisticated schemes to take over humanity. The alternative classification scheme which is commonly used in tech jargon, divides technology into Artificial Narrow Intelligence (ANI), Artificial Super Intelligence (ASI), and Artificial General Intelligence (AGI).

Artificial Narrow Intelligence (ANI):

This form of artificial intelligence encompasses all extant AI, including the most intricate and competent AI yet constructed. Artificial narrow intelligence refers to AI systems that can only do a single task autonomously while exhibiting human-like capabilities. These machines can only accomplish what they are designed to do, giving them a very limited or narrow range of capabilities. These systems relate to all reactive and limited memory AI, according to the aforementioned classification approach. Even the most sophisticated AI that employs machine learning and deep learning to teach itself is classified as ANI.

Artificial Super intelligence (ASI):

The development of Artificial Super intelligence (AGI) will most likely signal the apex of AI research, as AGI will be by far the most capable forms of intelligence on the planet. ASI, in addition to mimicking human intellect, will be significantly superior at everything they perform due to vastly increased memory, faster data processing and analysis, and decision-making skills. The advancement of AGI and ASI will result in a scenario known as the singularity.

While the prospect of having such powerful tools at our disposal appears tempting, these devices may endanger our existence or, at the very least, our way of life.

It is difficult to imagine the situation of the human world when more advanced varieties of AI emerge. However, it is apparent that there is still a long way to go because the current state of AI development in comparison to where it is anticipated to go is still in its infancy. For those who are pessimistic about the future of AI, this suggests that it is still too early to be concerned about the singularity, and there is still time to assure AI safety. And for those who are bullish about AI's future, the fact that we have only scratched the surface of AI development makes the future even more fascinating.

Artificial General Intelligence (AGI):

The ability of an AI age to learn, perceive, understand, and function totally like a human person is referred to as artificial general intelligence. These systems will be able to build numerous competences independently and form linkages and generalizations across domains, significantly reducing training time. By mimicking our multifunctional capacities, AI systems will be equally as capable as humans. Artificial general intelligence (AGI) is machine intelligence that can grasp or learn and intellectual work that a human can. It is a key goal of some AI research and a popular theme in science fiction and futuristic studies. Some academics define artificial general intelligence as "strong AI," "full AI," or a machine's ability to undertake "general intelligent action". Some sources distinguish between strong AI and "applied AI" (sometimes known as "narrow AI" or "weak AI"): the use of software to study or perform specialized problem solving or reasoning activities. Weak AI, as opposed to Strong AI, does not seek to replicate the entire range of human cognitive capacities.

REQUIREMENTS.

Various criteria for intelligence have been presented (most notably the Turing test), but no definition has yet to satisfy everyone. However, artificial intelligence experts generally agree that intelligence is required to achieve the following:

- Reason, employ strategy, solve puzzles, and make decisions in the face of uncertainty,
- Represent knowledge, especially common sense knowledge;
- Plan, Learn, and Communicate in Natural Language; and
- Integrate all of these skills towards common goals.

Other key talents include the ability to detect (e.g., see) and act (e.g., move and manipulate

objects) in a world where intelligent behavior can be seen. This would entail being able to detect and respond to hazards. Many interdisciplinary approaches to intelligence (for example, cognitive science, computational intelligence, and decision making) underline the need of considering extra attributes like imagination (defined as the ability to construct mental images and concepts that were not programmed in) and autonomy. Many of these qualities are available in computer-based systems (e.g., computational creativity, automated reasoning, decision support system, robot, evolutionary computation, intelligent agent), but not at human levels.

TESTS FOR CONFIRMING HUMAN-LEVEL AGI

THE TURING TEST:

A machine and a person chat sight unseen with a second human, who must determine which of the two is the machine. The machine passes the test if it can mislead the evaluator a large percentage of the time. Turing does not specify what constitutes intelligence, simply that understanding it is a machine does not disqualify it.

WOZNIAK'S COFFEE TEST:

A machine is required to enter a typical American home and figure out how to make coffee: locate the coffee machine, locate the coffee, locate the water, locate a mug, and brew the coffee by pressing the appropriate buttons.

THE ROBOT COLLEGE STUDENT TEST (GOERTZEL):

A machine enrolls in a university, takes and passes the same classes as humans, and earns a degree.³

SCOPE OF AI:

AI has a very wide scope.

1. Autonomous Planning and Scheduling
2. Autonomous Control
3. Diagnosis
4. Game Playing
5. Theorem Proving

³ K. Nitalaksheswara Rao, Dr. Satyanarayana, Mummana, CH V Murali Krishna, Alabazar Ramesh, “ Artificial Intelligence and Machine Learning – A Practitioner’s Approach”, Shanlax Publications, 2022, Page No 6.

6. Natural Language Processing
 - a) Natural Language Understanding
 - b) Natural Language Generation⁴
7. Robotics
8. Expert System (ES)⁵

OBJECTIVES OF AI

The main objectives of AI research are.

1. Understand Human Cognition.
2. Cost-effective automation can replace humans in intellectual activities.
3. Low-cost intelligent augmentations provide systems that assist humans think better, faster, and deeper.
4. Superhuman intelligence creates programmed that outperform human intelligence
5. General problem solving solves a wide range of difficulties. Mind-blowing systems
6. Natural language communication with coherent discourse. Conducts an intelligent discourse.
7. Autonomy is defined as intelligent systems operating on their own initiative. Must respond to the real world.
8. When learning the system, students should be able to acquire their own data and generalize, hypothesis, apply/learn heuristics, and reason by analogy.
9. Save information and know how to recover it.⁶

IMPORTANCE OF AI:

Many of today's largest and most successful organizations, like Alphabet, Apple, Microsoft, and Meta, use AI technologies to improve operations and outperform competition. AI is significant because of its potential to alter how humans live, work, and play. It has been successfully employed in business to automate functions previously performed by humans, such as customer service, lead creation, fraud detection, and quality control. AI can do tasks far better than humans in a variety of areas. When it comes to repetitive, detail-oriented

⁴ R.Vidya, "Introduction to Artificial Intelligence and Expert Systems", Pallavi Pathippagam S. India Pvt Ltd., 2008, Page no 25.

⁵ Er. Rajiv Chopra, "Artificial Intelligence, A Practical Approach", S.Chand & Company Ltd, Page No.4.

⁶ Rajendra Akerkar, "Introduction to Artificial Intelligence", Prentice Hall of India Private Limited, 2005, Page no, 13.

activities, such as analyzing huge quantities of legal papers to verify important fields are correctly filled in, AI systems frequently accomplish assignments swiftly and with few errors.

CONCLUSION:

The pursuit of AI's goals has given rise to groundbreaking advancements that are revolutionizing various industries and reshaping modern society. From problem-solving and decision-making to robotics and automation, AI's impact is both far-reaching and transformative. As we embrace the potential of AI, it is essential to navigate the ethical considerations and ensure responsible development to harness its full potential for the betterment of humanity.

