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HIST2211 The World After 1945

Robots and Artificial Intelligence - How Artificial Intelligence Could Change the World

Executive Summary

Artificial intelligence refers to the intelligence of machines, in relation to their ability to think and act like humans, learn from experience, and evolve. Machines can learn from enormous amounts of data to make appropriate decisions and produce results that fit in with the trend of the data, often processing information faster than humans. Today, models of artificial intelligence are commonplace and omnipresent, from virtual assistants like Alexa to self-driving vehicles. As the industry is rapidly growing, individuals should concern themselves with knowing how to use AI tools to prepare for a future dominated by AI technology.

What is Artificial Intelligence?

Artificial intelligence systems are organized into 4 distinct categories: reactive machines, limited memory, theory of mind, and self-awareness. Reactive machines are the most basic form of AI. They are task-specific and rely on preprogrammed rules to perform actions. As such, they are unable to learn with new data and have no memory to record past activity. Most modern AI is grouped as limited memory; these kinds of machines show growth from being given new data that they then remember and use to improve. Theory of mind AI mimics human decision-making skills and can recognize emotion and react in social situations. Self-aware AI are one step ahead of theory of mind as they have a sense of identity and are conscious of their own existence. More importantly, self-aware AI has the emotional capabilities of a human, which would allow it to make more sophisticated decisions and deeper connections when interacting with humans. Out of the four, self-aware AI is the closest to human experience. Both theory of mind and self-aware AI currently do not exist, but there is active research being made for theory of mind AI.

More broadly, artificial intelligence is also categorized by the number of actions the machines are capable of completing. Machines are labelled as narrow intelligence when they can only perform actions based on given data and its programming. Guided by a fixed objective, they are unable to execute tasks outside of the one they were programmed to complete, and therefore can only be exclusively used for that single purpose. One such example is Deep Blue, a computer program that was designed to play chess. Although Deep Blue is exceptional at playing chess, if asked to play a game of solitaire or generate an image, it would be at a loss. Artificial general intelligence (AGI) refers to a machine's ability to learn to accomplish any task that a human being is capable of, using actions or decisions that reflect human-like characteristics. AGI can adapt to unfamiliar situations, meaning it evolves with experience. Even higher in the spectrum

of competence is artificial superintelligence (ASI). Artificial intelligence is described as an ASI when it has qualities and capabilities superior to a human. So far, all artificial intelligence systems and machines fall under the realm of narrow intelligence.

Brief History of Artificial Intelligence

Prior to 1949, computers lacked the key prerequisite for intelligence: they could only execute commands but could not store them. In other words, computers could perform an action but would be unable to retrieve data of that action even a few minutes later because there was no feature to hold memory.

Explorations in artificial intelligence began with Alan Turing in 1950, when he questioned “Can machines think?” He then designed the Turing Test, which essentially tests to see if a machine can exhibit intelligent behavior that is indistinguishable from a human. For a machine to pass the Turing Test, a human interrogator should have difficulty differentiating between a machine’s response and a human’s response to various prompts.

Years later, with the development of the Logic Theorist—a computer program deliberately designed to mimic human problem-solving skills—people started to believe that artificial intelligence was possible. Many considered this to be the “first artificial intelligence program,” as well as the catalyst for the artificial intelligence research that followed in the next few decades.

AI has proven to have the capacity to master games and strategy; there are many instances of AI technology besting top-level players in matches. In 1997, Deep Blue defeated international grandmaster Garry Kasparov in a chess match—the first time a computer won against a reigning world chess champion. AlphaGo, a computer program that plays the board game Go, beat multiple Go champions, such as Lee Sedol and Ke Jie, during the late 2010s. AlphaGo’s victory was a milestone in artificial intelligence research. Compared to chess, Go is more complicated due to the exponential number of possible positions to play per move, so researchers did not expect artificial intelligence to be sufficiently advanced to successfully play Go.

Now, AI can be found in many aspects of daily life, through self-driving cars and large language models, such as ChatGPT.

Why Artificial Intelligence is a Gamechanger

Especially during the past few decades, artificial intelligence has proved to be the initiator of notable change—often change for the better. Artificial intelligence reconstructs the status quo in ways that are beneficial on both individual and societal levels.

Artificial Intelligence and Robots in Everyday Life

The utilization of AI and robots increases standard of living and makes tasks more convenient for the individual. Even the simple action of unlocking a phone is made easier with artificial intelligence; face ID uses algorithms to compare the current image of your face to the data it has stored. If the data matches, then the algorithm determines that the person trying to open the phone is undoubtedly you. Digital voice assistants, such as Siri or Google Home, recognize versatile voice commands and can respond with answers or actions. Furthermore, travel apps use AI to monitor real-life traffic conditions and to recommend to you alternate, quicker routes. Artificial intelligence is also able to keep track of our preferences. An artificial intelligence system called the recommender system determines what is shown in your social media feed, what products are shown to you while you browse an online shop, and what videos you get recommended on YouTube. Vacuum cleaning robots like Roomba facilitate chores and save time. They are programmed to clean your floors and with a certain navigation route throughout the area, even when you are out of the house or busy with other work. What is amazing is how accessible these features are; with just the touch of your fingers or the sound of your voice, artificial intelligence can answer daily inquiries and perform the desired actions.

Similarly, the possibilities of AI in transportation are optimistic. Autonomous cars are already being manufactured by well-known companies like Tesla or Google. San Francisco is actively using driverless vehicles as taxis; Waymo, an autonomous car company owned by Alphabet, counted 250 of its self-driving cars being used in the San Francisco streets. These cars respond to their environment based on data they receive from sensors in real-time, which is then remembered and used to improve their performance in the future. Even so, the technology is not perfect: between June 2022 and June 2023, self-driving vehicles were involved in more than 600 incidents in San Francisco.

Artificial Intelligence in Education

Artificial intelligence is a growing presence in education, especially through the use of ChatGPT. ChatGPT is presently one of the most widely used AI tools; it has grown exponentially in popularity since its release in 2022. It is a free-to-use language model that provides detailed response to user textual input, as if in a conversation with a human. Its repertoire of knowledge and skills are seemingly endless, ranging from creative idea generation to code debugging. With so much freedom, some educators view ChatGPT as a threat to academic integrity. There is fear that students will form a dependent bond to the tool and use the chatbot to write homework or essays. However, when used correctly and appropriately, ChatGPT is a valuable tool for advancing education. AI chatbots have thorough answers for quick questions and help students understand difficult concepts with clear explanations in plain language. By acting as individualized tutors, AI enables students to learn more effectively and at their own pace, leading to greater chances of academic success.

Artificial Intelligence in Labor and Industry

By eliminating the need for humans to perform repetitive tasks, human efforts can be redirected to more impactful or important problems. Experts acknowledge that robots may displace some manual jobs, but humans are flexible and innovative, and will create new jobs and industries. There will still be a need for people to build the tools to support AI, and new work opportunities may arise in the form of more human-robot collaboration. Continuing, AI reduces human error and is not only fast, but accurate, which will make us more productive. Restaurants are starting to implement robot waiters as part of their staff to lighten the workload for human employees and offer more efficient service. In Asia, robot servers are commonly used; across South Korea, restaurants use about 5,000 robot waiters. In the healthcare sector, AI has a variety of helpful usages as a doctor's assistant. It can help doctors diagnose diseases with a higher degree of accuracy and reduce the costs of developing new treatments.

Concerns Regarding Artificial Intelligence

Although positively transformative in many aspects of society, AI can be likened to a double-edged sword; due to the recentness of its development, there are just as many concerns and risks as there are praises.

"Hallucinations" and Spread of Misinformation

Vectara, a start-up founded by former Google employees, has researched, and discovered that chatbots invent information, or "hallucinate," at least 3% of the time and even up to 27%. Knowing that there is the risk of an AI system hallucinating is crucial, especially when people use the technology for important, sensitive information, such as court documents or medical records.

Is AI-generated Art "Real" Art?

There are still a few regulations over AI and the ones that are currently in place are obscure and ambiguous, especially when it involves the creative process. In the art industry, a critical question needs to be addressed: Does AI-generated art still count as real art, knowing that it was not produced by a human? At the Colorado Art Fair in 2022, an AI-generated work won first prize, angering artists, and sparking this debate over how AI should be regulated concerning creative expression. Similarly, actors are afraid that the use of deepfake technology will eliminate the need for real, human actors.

Artificial Intelligence in Warfare

Artificial intelligence is transforming the boundaries of war. Autonomous killer drones are being used in battle. However, people are concerned about the ethics of using these robots that have the capability to make decisions themselves, without the input of a human. AI weapons will sometimes process information incorrectly and are likely to make mistakes identifying targets. One mistaken decision or malfunction could turn fatal, especially when human lives are involved. Proposals are being suggested at the United Nations to create restrictions on the use of lethal autonomous weapons; however, division persists between members over the urgency of such international laws, slowing down the process of implementing limits.

The Future of Artificial Intelligence

Research is currently being conducted towards the development of AGI. Earlier this year, AI researchers published an academic paper in which they claimed that GPT-4 has shown traces of AGI tendencies. GPT-4 is a large multimodal model created by OpenAI, and its abilities to solve a broad range of problems at human-level performance are why researchers are calling it an incomplete model of AGI. Although the future seems endless with possibilities, the appropriate precautions must be taken to ensure that the technologies we create will have a positive impact. As AI can learn from patterns in data, it adapts and reorients its actions based on how people use it. It is impossible to fully eliminate unintended behavior, but much can be done to reduce the likelihood of it occurring. Experts and researchers will need to focus on “alignment,” a field of AI safety research that studies how to ensure AI systems exhibit desired behavior that aligns with human values.

A pattern emerges regarding the utilization of artificial intelligence: it has proven itself to be useful in various aspects of life, but more research is needed in existing AI to minimize the risks associated with using AI-dependent machines. Beyond the efforts of experts, the average citizen should contribute to the journey towards AI safety. In an increasingly technological-oriented world in which AI has already come to be normalized, it can be confidently said that AI will play a key role in the future. People, especially the younger generation that will grow up along with AI, should have an individual interest and concern about the development of AI.

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