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Embracing the Transformative Power of AI

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Abstract

Artificial Intelligence (AI) is transforming healthcare, transportation, and communication. This article traces the evolution and categorization of AI, while exploring ethical concerns such as bias and privacy. Emphasizing AI literacy and cross-sector collaboration, we argue for a responsible and inclusive approach to AI development that protects human values and enhances societal well-being.

Introduction

In an era defined by relentless technological advancement, artificial intelligence (AI) emerges as a transformative force, its influence permeating every facet of society and changing how the world lives and interacts from healthcare, where it assisted in the COVID-19 pandemic through molecular research and drug development, amongst many others (Huang et al., 2021), to autonomous transportation, all driven by complex algorithms and neural networks. However, amidst its remarkable capabilities, its widespread use raises important ethical questions about privacy, societal impact, and biases in its algorithms. Though these challenges remain difficult, there are exciting possibilities and potential dangers to AI, highlighting its significant impact on the future of humanity.

Therefore, this correspondence offers an introductory overview of AI, covering its definition, developments over time, and the categorization of AI. It also aims to enhance AI literacy and promote informed engagement with AI's societal impacts. The focus is on fostering responsible utilization of AI technologies.

The Evolution of Artificial Intelligence

AI stands as one of humanity's most ambitious endeavors, reflecting a timeless fascination with the notion of creating intelligent machines. Since antiquity, thinkers like Descartes, Leibniz, and Condillac have contemplated mechanical assistants, laying the groundwork for centuries of philosophical musings and speculative fiction on the subject (Buchanan, 2005). Isaac Asimov, who introduced the ‘Three Laws of Robotics’ in his ‘Runaround’ short story, is a key figure who

inspired others into the fields of AI, robotics, and computer science (Haenlein & Kaplan, 2019; Harguess & Ward, 2022).

In the post-World War II era, the seeds of AI began to sprout with the emergence of modern computers, including Alan Turing's *The Bombe* that deciphered the Enigma code, the coinage of the term 'artificial intelligence' by John McCarthy during the Dartmouth Summer Research Project on Artificial Intelligence (DSRPAI), and ELIZA, the first computer program to attempt the Turing Test (Haenlein & Kaplan, 2019).

The *AI Winter* shortly followed, characterized by increased criticism, especially from James Lighthill, asserting that AI would yield limited results, leading to a lack of funding for AI researchers and waning interests (Haenlein & Kaplan, 2019; Harguess & Ward, 2022). However, a resurgence of attention returned once Lighthill's statement was proven wrong by IBM's Deep Blue chess playing program beating the world champion Gary Kasparov (Buchanan, 2005; Haenlein & Kaplan, 2019; Harguess & Ward, 2022). The growth of AI and robotics skyrocketed from here, leading to the creation of Artificial Neural Networks (ANN) and Deep Learning (DL) that brought us AlphaGo, a board game program by Google capable of beating Go's world champion (Haenlein & Kaplan, 2019), virtual assistants such as Siri (Apple) and Cortana (Microsoft), and generative AIs such as ChatGPT (OpenAI), Gemini (Google) and Bing (Microsoft).

Due to its rich history, there is no widely accepted definition of AI; however, John McCarthy in 1956 defined AI as "the science and engineering of making intelligent machines", while Wang (2019) expanded this, highlighting AI's cognitive capabilities, notably learning and problem-solving (Ng et al., 2021). Haenlein and Kaplan (2019) defined it as a system's capability to process external data, learn from it, and apply these insights to achieve specific goals through adaptable methods.

Categorization of AI and Its Impacts

With the above-mentioned growth of AI, it may be summarized as a technological machine capable of controlling the surrounding environment and data while emulating the human brain and

mental processes. In other words, a computer that can think may be classified into several categories, including Machine Learning (ML), Computer Vision (CV), Fuzzy Logic (FL), and Natural Language Processing (NPL) (Bellini et al., 2022). These AIs replicate human behaviors and ideas through various processes. For instance, Machine Learning (ML), as its name suggests, functions as a computer that requires data feeding; the more data, the better. Once the machine receives data in the database for training, it organizes and compartmentalizes the data collection. When prompted, it responds or provides the assigned data (Guérin, Aydin, & Mahdavi-amiri, 2020). This subgroup perceives deep learning (DL) as a sophisticated machine that not only provides information or data, but also learns to reason, analyze, and draw conclusions in a manner similar to human reasoning (Guérin et al., 2020).

Next, CV may be likened to human vision and the capacity to explain and comprehend the world based on the information obtained from it. Large datasets of photos or videos enable the machine to recognize or identify objects and generate narratives for input images or videos, a feat that would be challenging for a human to visualize. Applications such as facial recognition systems, medical imaging, and self-driving cars have utilized this type of technology (Bellini et al., 2022).

Furthermore, FL is a matrix that deviates from a binary nature and deals with a scenario in the actual world that is neither clear-cut nor ambitious. It is difficult to have an absolute truth; thus, FL, using the data it has learned, may provide various truths and solutions to a problem in addition to a simple yes or no answer (Thakkar et al., 2023). An auto-focus system, for example, allows a camera to adjust to various types of terrain and locations.

Last but not least, NPL may learn to read, write, talk, and listen to humans by studying and analyzing human linguistics or training data to recognize language patterns. The machine can assess the parts of speech, the relationships between words and phrases, and use this foundation to generate a response in the form of content or a chatbot. For example, AI can translate or help generate text (Egger & Gokce, 2022).

Alternatively, AI might be classified into three primary branches: artificial narrow intelligence (ANI), artificial general intelligence (AGI), and artificial superintelligence (ASI)

(Kelly, Kaye, & Oviedo-Trespalacios, 2023). ANI can be referred to as a weak AI or a sort of AI capable of only performing restricted functions. It is not capable of completing any additional activities. For example, consider a Google search that solely searches for information. The second type of AI is AGI, which is deemed powerful since it can do human-like tasks and processes. They can perform more activities and communicate bidirectionally with humans and finally, while there is no proof of ASI's existence at this time, it is thought to be superior to human capability, thinking process, and reasoning (Abonamah, Tariq, & Shilbayeh, 2021).

As AI advances and plays an increasingly important part in our lives, it is critical to evaluate the ethical and societal implications of the machines. It is crucial to note that the purpose of this article is not to provide an in-depth explanation of the impact but rather to provide a concise summary of the implications. To begin, the issue may be about data privacy and autonomy, which are critical components for AI machines to train on. Information mismanagement, personal data theft, and abuse have raised concerns (Slimi & Carballido, 2023). Furthermore, the data could potentially lead to discrimination and prejudice, as advanced countries and firms undeniably hold more power and access to such advanced technologies than poor nations. Additionally, the developer might overlook or be unaware of an AI black box, which could potentially influence the algorithms and provide the user with sensitive or inaccurate information (Qian, Siau, & Nah, 2024). Humans, particularly developers, are also essential aspects that, to some extent, are overlooked and ignored in terms of social dynamics (Qian et al., 2024). As a result, collaboration and varied participation in data gathering, AI development, and reaction should be prioritized.

The Road Ahead: Responsible AI

From an STS perspective, AI should be viewed not just as a technological breakthrough, but as a sociotechnical system shaped by political, economic, and cultural forces. Ethical AI development must consider who designs it, who benefits, and who might be marginalized.

As the world chart the road ahead surrounded by AI, it becomes imperative to foster responsible AI. This entails not only advancing the technological frontiers but also ensuring that AI systems are developed and deployed with ethical considerations and the integration of fairness, transparency, and accountability into their systems, addressing issues such as bias, privacy, and the

potential displacement of jobs. For this reason, AI literacy is crucial; knowing how to use AI applications like ChatGPT is just the beginning (Ng et al., 2021). Understanding AI concepts is essential for individuals' careers and helps combat the ethical concerns above, fostering a culture of responsible AI. Additionally, collaboration across governments, industries, and communities is vital to establish robust guidelines and regulations that safeguard human interests. Ultimately, steering the future of AI towards societal benefit hinges on our collective ability to imbue these systems with values that reflect our diverse and dynamic human fabric.

It also calls for the proactive education of the public, empowering individuals through knowledge to understand and engage with AI technologies effectively. Additionally, it requires collaboration across governments, industries, and communities to establish robust guidelines and regulations that safeguard human interests. Ultimately, steering the future of AI towards societal benefit hinges on our collective ability to imbue these systems with values that reflect our diverse and dynamic human fabric.

Conclusion

Artificial intelligence (AI) is a technological machine that can interact with or alter its environment and data while simulating the human brain and mental processes. We can divide it into four categories: machine learning (ML), computer vision (CV), fuzzy logic (FL), and natural language processing (NPL). These AIs reproduce human behaviours and ideas via a variety of approaches. There is little doubt that artificial intelligence is and will be a transformational force in the future. The machine may have both advantages and disadvantages. What is disturbing is that, even if humans are aware of the possible consequences, there has yet to be a consistent approach to AI. When used appropriately, AI may be beneficial since it has already had an impact on different parts of society, such as healthcare, medication research, and autonomous vehicles. However, questions about ethics, privacy, societal effects, and algorithmic biases remain. As a result, it is critical to approach AI development and use in a responsible manner. Ethical factors, including the integration of justice, openness, and accountability, should be taken into account. AI literacy is critical for people's careers and addressing ethical problems. An interdisciplinary

approach and collaboration between governments, industry, and communities are required to build strong standards and legislation that protect human interests.

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