



Artificial Intelligence: Medical Applications and the Future Impacts

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Abstract:

Artificial intelligence (AI) is currently being used to enable faster disease detection, enable better understanding of disease progression, enhance medication dosages, and discover pioneering treatments. We have only scratched the surface of AI, but under any circumstances, it would be impossible for AI to acquire the talent of creativity which is a unique human characteristic. AI poses real life and hypothetical risks. Many AI and robotics researchers have aired alarms about the way advances in AI, paired with autonomous systems, could create new and dangerous weapon systems that will menace global stability. AI might revolutionise areas like medicine and agriculture, but it also poses great risks to business and society as a whole. This paper is an attempt to evaluate the positive and negative impacts of AI. Improving the quality of life and prolonging life are responsibilities of the medical profession and any interference to this obligation, the caring profession has to take seriously.

Key words: artificial intelligence; medical applications; ethics; Techno-solutionism; creativity

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Introduction

Experts emphasize that artificial intelligence technology itself is neither good nor bad in a moral sense, but its uses can lead to both positive and negative outcomes. The medical applications of AI have unquestionable positive benefits. In the years to come, those beneficial effects could turn out to be negligible when compared to the potential negative impacts of AI in various aspects of human existence. Some experts point out that the perils of AI should be regarded as more of an urgent crisis than even climate change. If we were aware of the dangers of nuclear weapons before the Hiroshima, we could have stopped their manufacture. Once, the immense power of a war weapon becomes obvious, the enemies also want to possess them (Bousquet et al,2017). We should regulate the use of AI, before they are used to make weapons of war without giving a chance for the negatively motivated political leaders to grab them.

Since the discovery of nuclear weapons, technological advances have not posed as much risks as AI. With AI, we might get into the equivalent of a nuclear arms race

because of an inherent human fear that if one country does not build it, the other countries are sure going to build it and it will escalate. "Weaponization of AI" leading to extinction of humanity is a real concern (Bostrom,2002; Parkin,2015; Turchin,2018; Jacquin,2023; Roose,2023). Countries will want to go head-to-head in seeing how far they can push the AI technology, with theoretically horrible consequences. Sky is the limit once AI is linked with quantum computers which are very much in the early stages of development and commercialization. It is generally feared that the digital age will start cannibalising many flourishing industries. In spite of the disruption of Covid pandemic, AI is currently making headway into the industries because AI outcomes centre around cost reduction, value generation, and operational efficiency proving the magical effect of AI in the industries, but only to have a fatal outcome in the distant future. AI has a social dimension and AI systems could make social inequalities more durable (Kelly et al.,2018). If economy is the grounding substance of social classes, intelligence and a few other secondary factors are the craftsmen of the class system, and



such a view highlights the social importance of reproduced intelligence. It is too early to assess whether AI is a guide or a foe, or whether demerits would outnumber the merits.

Artificial Intelligence

Given that intelligence is defined as the ability to think, learn from experience, and solve problems by processing available information, reasoning, and planning, the term “artificial intelligence” (AI) may sound like a misnomer, as even the most advanced computer systems still cannot match human ability to comprehend complex ideas, think abstractly, and be creative. The concept of AI was first introduced by computer scientist John McCarthy in reference to “the science and engineering of making intelligent machines” (Russell et al., 2009), but its inception is still widely credited to Alan Turing (1950), who outlined the criteria machines need to fulfil to be deemed intelligent. While Turing Test is often quoted as the means of ascertaining if AI has been accomplished, most scientists concur that this will never be possible as machines lack creativity and cannot generate original ideas. This shortcoming arises from the fact that human creativity is influenced by a wide range of factors, including culture, emotions, and prior experiences. AI cannot learn to think outside the box. AI lacks intuitional guidance and inner motivations and that makes it unpredictable.

Yet, despite these drawbacks, AI has already found many useful applications, especially in areas that require rapid processing of large volumes of data or prolonged focus on a task, as it significantly reduces errors and increases accuracy and precision. In addition to facilitating automation of repetitive processes, AI is also posited to have the capacity to eliminate biases, even though biases can be implicit in the way the software was designed. Still, as the decisions taken by AI are guided by those made previously and the available information, by refining the algorithms, the potential for errors can be largely eliminated.

Owing to these benefits, many believe that AI can be used to create a better world as it can be harnessed to solve some of the

seemingly intractable problems. On the other hand, as with any technology, it can be employed for nefarious purposes. As the AI becomes more powerful, there is also a concern that it will lead to widespread unemployment, but it can also accelerate economic and scientific progress. If, however, AI surpasses human intelligence, the humanity will reach what Ray Kurzweil termed the Singularity, as it will no longer have the capacity to control the very technology it has created (Kurzweil, 2005). These costs and benefits should thus be carefully considered as the evolution of AI in the near future has the potential to determine human destiny.

Techno-solutionism of AI is the view that AI can be seen as a remedy for all technological problems and in fact it is only a tool. This itching to use AI as a remedy for all problems could only get worse in the years to come. With the rapid advancement of AI, the urge to apply AI decision-making to all societal problems rises. In this situation, we ought to bear in mind that technology often produces bigger problems in the process of solving smaller ones (Littman et al, 2021). In 1965, I.J. Good conceptualized an intelligent explosion by which he meant that a human made ultra-intelligent machine could design even better machines resulting in science fiction becoming a reality (Barret,2013). But, it is sometimes sensible to take science fiction seriously (Anderson,2014).

Medical Applications

At present, AI is used in almost all processes that require advanced computing, but its greatest benefits are evident in medicine, as AI algorithms are incorporated into diverse medical technologies to facilitate microscopic image analysis and tomographic image reconstruction (Mandal et al., 2018). Increasingly, however, AI is being trained in diagnosing different physical conditions based on large datasets and precise definitions of diagnostic criteria. On the other hand, its use in psychiatry is relatively limited, as mental healthcare requires a much more nuanced approach (Bi et al., 2019; Hosny et al., 2018; Miller and Brown, 2018). AI models have provided with a quantitative framework to study the relationship between network

characteristics and cancer, thereby leading to the identification of potential anticancer targets and the discovery of novel anticancer drugs (You *et al*, 2022).

This trend is likely to continue, as the main advantage of AI is its capacity for pattern recognition, which is the cornerstone of certain medical specialties such as ophthalmology, oncology, and radiology. In these fields, AI algorithms are already surpassing experienced clinicians in their ability to detect abnormalities or spot connections in large, dispersed datasets (Brinker *et al*, 2019; Hosny *et al*, 2018). For example, convolutional neural networks (CNNs) have been successfully used for automated detection of liver tumours on CT scans (Afifi & Nakaguchi, 2015), while machine learning has been applied for breast density segmentation on mammographs (Kallenberg *et al*, 2016).

In the near future, AI systems built on machine learning will be used to determine post-operative personalized pain management plans for some patients and in others to predict the likelihood that an individual will develop breast cancer. AI algorithms are employed in decisions concerning distributing organs, vaccines, and other elements of healthcare but, biases in these methodologies can have literal life-and-death risks (Littman *et al*, 2021). Therefore, going forward, AI adoption in the medical field is expected to increase, as it can facilitate faster and more accurate disease detection as well as enable better understanding of disease progression, allowing medication/treatment dosages to be tailored to the individual patient. It is also expected to lead to the discovery of innovative treatments (Fei *et al*, 2017). As AI is data science, its huge strength is swift pattern analysis/ rapid screening of large datasets. Areas of medicine which have till now been most successful in using AI for pattern recognition include ophthalmology, oncology, and radiology, where AI algorithms have performed at par or even better in some instances compared to experienced clinicians in evaluating images for abnormalities or acuity undetectable to the human eye (Brinker *et al*, 2019, Vidal-Alaball *et al*, 2019). AI

promoters are encouraging virtual hospital wards and a few pilot schemes are already functional (Best, 2022). Newer technological devices are introduced into the medical field so rapidly that the health professionals do not even get a breathing space to discern them.

Demerits of AI

As the AI advances, there is a risk that the reasoning behind its decisions will become increasingly opaque, making it difficult for humans to understand and control the outputs. As a result, some consider it a highly dangerous weapon, akin to nuclear or biological weapons. According to Jeffrey Hinton, considered the godfather of AI, these arguments are not unfounded, as AI could pose real existential threat to the humanity if its use is not carefully regulated (Cade, 2023). As information has already become the greatest commodity, many believe that it can be weaponised through the use of AI, especially once quantum computers become more readily available. The Centre for AI Safety based in San Francisco has already warned of the perils of unsupervised research with AI as it can lead to the development of more lethal war weapons than nuclear bombs.

Moreover, as we become more dependent on technological devices, it will be increasingly difficult to determine the veracity of the information we obtain or ascertain its sources, which will increase mistrust in the social systems. There is already widespread belief that AI is being used to manipulate elections and cause social unrest, and if the World Economic Forum predictions are true, by 2027, 83 million jobs would disappear globally due to the use of AI. Such precarious conditions would widen the already significant income disparities, increasing the potential for conflicts within and between nations.

Even if AI is used for beneficial purposes, it can lead to unanticipated results, as the algorithms are trained in specific domains and many not be generalisable to other areas (Kelly, 2019). For example, as previously noted, AI is successfully used in certain medical domains, but this cannot be used as evidence in support of its application in mental health, where diagnosis and

treatment relies on softer skills such as rapport building, forming relationships with patients, and observing their emotions and behaviour (Fakhoury, 2019). Other shortcomings should also be considered when attempting to use AI in any sector, including the cost of implementation, impact on the existing workforce, and the acceptance by the users/clients. AI will have an impact on morality, and it could be used to spread and promote the moral values of whoever produce it (MacAskill.2022). It would be extremely difficult to align superintelligence with the full breadth of substantial human values and constraints (Breuer,2003).

As was shown above, AI is "a double-edged sword" as it is already yielding many benefits, but also has the potential for significant harm (Wilkins,2020). Thus, its use needs to be carefully managed and any decisions to entrust AI with the decision-making processes should be carefully considered, especially if the adopted algorithms are allowed to improve their performance through unsupervised learning. In such cases, even the AI developers will not know how certain decisions have been reached by the AI and may not be able to mitigate the potential for bias.

One of the most obvious ways AI is shaping the future is through automation and many AI and robotics researchers have expressed concerns about the way advances in AI, incorporated with autonomous systems, could generate new and dangerous weapon systems that would pose real risk to international stability (editorial, 2023). AI is also expected to increase the risk of hacking and terrorism, as advanced algorithms are more capable than humans to spot and exploit any vulnerabilities in the data security systems. Moreover, as AI can be used for manipulation, with further advances in streaming technology, it will be increasingly difficult to discriminate between real and fake images and audio recordings. Accordingly, AI could be used to spread disinformation, defame individuals, or influence public opinion (Sedova et al., 2021).

As owing to their superior intelligence humans have long held the position of

supremacy on the planet, AI could also pose a threat to our sense of self. If we allow machines to take over every aspect of our lives, we risk the same subjugation that we have imposed on other creatures that share our environment. If machine brains surpass human brains in general intelligence, the new superintelligence would become the dominant life forms on earth replacing humans and these machineries could improve their own capabilities faster than human computer scientists, and the outcome could be an existential catastrophe for humans (Bostrom.2014).

Humans may be biochemical, electrical animals and quantum entities, but there are specific identifiable human experiences which render them spiritual beings, whereas AI is a mere quantum machine. In a physical sense, AI could be compared to elephants with many times more strength than humans. Without trained mahouts, they are violent and dangerous beings, as they can easily kill and cause destruction, but they are only electrical animals. In fact, a few of the AI generators are reportedly killed by the AI without verifiable evidence.

When given the choice between algorithms and humans, some think that algorithms will always be the less-biased choice. But in reality, automated decision-making can often serve to replicate, exacerbate, and even magnify the same bias that are attempted to solve. Indeed, far from being a cure-all, technology can actually create feedback loops that worsen discrimination (Hosanagar& Miller,2020; Jeffrey, Rachlinksiet al.2004). As biased users feed the algorithm biased information, it responds with more bias, which informs users' understandings and deepens their bias causing a spiralling of bias (Noble,2018). Because all technology is the product of a biased system, the flaws of techno-solutionism would run deep as a creation is limited by the limitations of its creator (Littman et al,2021).The rise of AI has created an uncertain future and people from all regions of life should come together to minimize the harms generated by new

technologies while sharing the benefits more broadly (Kelly et al.,2018). In the past with cars or rockets, safer forms have been manufactured due to repeated modifications, likewise it may be possible to make AI safer through incessant and reiterative refinement taking into consideration that AI as such will has no desire to take control (Cristian,2020).

Discussion

Although it is too early to determine whether the demerits of AI will outnumber its merits, it is certain that AI has already opened the Pandora's Box and might challenge aggressively many of the strongly held ethical principles in the near future. AI could also potentially generate its own digital religion, inspire new cults, and destroy all the established religions swallowing long cherished spiritual convictions, an area that needs further clarification and caution. It could confuse the Vedic philosophy of karma and retributive karma and might contribute to the long-feared reversal of faith as AI could steal Karmic opportunities. Thus, any use of this technology warrants much greater intellectual warning and honourable inspection. New ideas may be a disturbance to the tranquillity of mind, but that is not an excuse to shun away from such novel concepts.

Just as a knife can be used in the surgical theatre to save lives but can also be used to kill, AI can be beneficial as well as dangerous. Hence, we need to recognise that such an invention demands a high degree of moral and ethical scrutiny, prompting the question if humans are currently evolved to such high spiritual standards. As we have not yet achieved even scientific or artistic maturity, we are unlikely to possess the spiritual maturity needed to prudently use such a powerful tool. Therefore, it is hoped that AI will serve as an aid to human experts, especially in areas such as healthcare that require holistic person-centred approach. AI might help to prolong life span, but it could also cut short human life and other biological life forms. Even though the existence of extraterrestrials is not proven, in this juncture, we could hypothesise an alien civilization that has got highly progressed AI systems making

wider exploratory adventures in the space or an alien civilization that became extinct because of exceedingly advanced AI system. One wonders whether claims of the exaggerated usefulness of AI in medical fields is to quieten the critics so as to justify their further development and commercialization. If that is the case, medical professionals should specifically step into the discussions of AI before it becomes an unstoppable train.

Therefore, we are presently at crossroads, as we are already facing significant problems arising from climate change and growing socio-political division. If we do not employ AI to tackle these pressing issues, humanity will become increasingly vulnerable. AI is like a wild elephant, but even a tamed elephant poses a threat if not treated with caution. Only time will tell whether AI would turn out to be a fictional Frankenstein's monster evil. In my contention, if analysed closely, AI experiments have only proven that human intelligence is more a property of the neurocomputer constituted by the brain and the associated quantum part, but humans are more than that. Scientific community should figure out the forbidden precincts of scientific research, lest we might end up with technological devices that are more fatal than the hydrogen bombs. Technology is only the "occult" division of science, and we should not get carried away by technology as it might impair the growth of true science. Still, we are not powerless and can act now to ensure that technology continues to serve us in the quest for further beneficial advances.

AI may improve the physical quality of life, but it would cause immense psychological frustration leading to newer mental health issues and above all else, AI can cause loss of lives in large scales, all these factors make the medical professionals to be vigilant about these technological developments. In sum, if the present generation overlooks the potential dangers of AI, the next generation will have to face the real dangers and may not be willing to forgive us for our failure. Medical professionals are expected to have a footing in science, but acknowledging the limitations of science, they should place science under their feet and not over the head.

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