Short Communication

The Yin and Yang of Artificial Intelligence

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Abstract

Artificial Intelligence holds the ability to transform medical education by improving the efficiency of training programs, enabling personalized learning, and providing new tools for evaluation and assessment. However, with any new technology, there are also potential risks and concerns that must be acknowledged. The use of AI in medical education raises concerns about privacy, ethical dilemmas, and the possibility of biased algorithms. It is vital to be aware of these potential threats and work to reduce them to ensure that AI is used in an ethical and responsible manner. By doing so, the potential benefits of AI in medical education can be enhanced while minimizing its drawbacks.

Keywords: Artificial Intelligence, Medical Education, Yin and Yang

Introduction

Artificial Intelligence (AI) is a rapidly growing field that involves the maturing of computer systems and algorithms that can perform tasks that generally require human intelligence. It has the capability to revolutionize many aspects of our lives, from healthcare and education to transportation and finance and many other fields. By using machine learning algorithms and large amounts of data, AI systems can learn from experiences and make predictions, decisions, and recommendations based on that knowledge. This has led to development of intelligent systems that can perform tasks such as image recognition, natural language processing and even autonomous driving. A recent study by Jungwirth D in 2023, explains how AI can be used to forsee student performance, identify knowledge gaps, and personalize learning experiences.[1] Literature shows that combining AI capabilities with IT strategy is important for digital transformation in recent times, when innovative and routine AI techniques are used together, they work better than when used independently. Despite the benefits of AI, there are also concerns about the potential negative impact of AI on society, including job displacement, privacy, and ethical considerations. As AI continues to evolve and become more widespread, it is very important to consider these issues and work to ensure that AI is used in a responsible and ethical manner.

AI can be used to revitalize education by offering personalized and individualized instructions, automated grading and feedback, improved student assessment, and increased engagement through interactive learning. Mentioned below are some of the potential benefits of AI.

Potential benefits of AI

AI has the ability to automate repetitive tasks, resulting in timE and resource savings for various industries, including education, healthcare, finance and manufacturing. This can increase efficiency and productivity. For example, AI can simplify patient data management and minimize the workload of medical personnel in healthcare, allowing them to focus on providing better care. AI can also transform the healthcare industry for example in radiology, as it can improve disease diagnosis, develop personalized treatment plans, and advance drug discovery. In a study by Dileep and Gyani (2022),[2] the significance of AI was emphasized by highlighting a system that can detect breast cancer up to five years earlier than mammogram, potentially saving lives through early intervention.

Medical students learn more smartly and actively by analyzing their learning patterns and adapting to their individual needs. For example, AI-powered platform called Osmosis, uses algorithms to personalize learning content and assessments based on the individual's learning pace and preferences.[3] It can significantly help commitees to make informed decisions by analyzing large amounts of data in real time and to highlight insights and patterns that may not be apparent through traditional methods, leading to better decision-making.

AI can be used to provide personalized learning experiences, tailoring the curriculum to individual needs and abilities of each student which can definitely lead to improved student engagement and better learning outcomes. The implementation of AI can offer better accessibility in learning and identification, specifically for students with disabilities. For example, AI-led technologies can be used to provide real time captions or audio descriptions for students who are deaf or visually impaired. A study published in the Journal of Educational Computing Research in 2022, discussed the use of AI-powered speech recognition software for providing real-time captioning for deaf students in a classroom.[4] The study mentioned that use of AI-powered captioning software improved the students' participation

and engagement in class discussions.[3,4]

By implementing AI technology, grading and providing feedback to students can be automated. This can help teachers save time and effort, freeing them up to concentrate on other responsibilities. A study on "Automated Feedback in Online Courseware" explores the impact of automated feedback on student learning outcomes and provides examples of how AI algorithms can be used to provide one to one feedback to students, which help them identify areas for improvement and enhance their learning experience.[5] A study published in the Journal of Computing in Higher Education examined the use of an AI system called an e-rater for scoring essays. The study found that the e-rater system produced scores that were comparable to human scorers and provided more reliable and consistent feedback.[6]

Utilizing AI can facilitate the immersive and captivating learning opportunities that motivate, sustain students' attention and drive their enthusiasm. For example, virtual tutors can provide support and personalized feedback to students, making the learning experience more enjoyable and interactive.[7]

Moreover, AI can enable educators to gain data-based insights into students' learning, empowering them to make well-informed choices regarding their teaching approaches.8 This can help teachers improve their skills and provide better learning experiences for students.

Risks of AI

AI has the potential to greatly benefit society, but it also presents significant threats that need to be addressed. Some of the main threats include loss of jobs and privacy concerns. Automation through AI has the ability to displace many jobs, particularly in industries such as manufacturing and retail. This could lead to unemployment at a vast scale, and it is important for organizations and governments to consider and address this potential impact.[8]

AI systems can perpetuate and amplify existing biases in society, leading to unfair treatment of certain groups. AI systems are only as unbiased as the data they are trained on, and if that data reflects societal biases, AI systems can perpetuate and magnify those biases. This can result in unfair treatment of certain groups, such as racial or gender discrimination. A study by Gebru highlights how facial recognition algorithms can be biased and inaccurate, particularly when it comes to classifying people of different genders and races. It shows that these biases can have real-world implications, such as the potential for misidentification by law enforcement agencies.[9] It's important for industries and organizations to consider and address these potential assumptions in their AI systems to ensure they are not causing harm.

AI systems often use and collect large amounts of personal data, which raises privacy and security concerns. This data can be vulnerable to breaches, misuse, or exploitation, and individuals may not be fully aware of how their data is being used and in which setting. It's important for all organizations to ensure they are transparent in data collection practices and are protecting the privacy of individuals by issuing guidelines and policies.[9]

Darker side of AI

It can be difficult to determine who is responsible when AI systems cause harm, leading to a lack of obligation. In 2018, it was identified that data analytics firm Cambridge Analytica had harvested data from millions of Facebook without consent of users, using the data to influence political campaigns around the globe.[9] Despite the notable harm caused by the company's actions, no one has been held criminally responsible for the data breach or the misuse of personal data in this case. It's important for governing bodies to consider and address this possible lack of accountability as AI systems become vaster.

Overreliance on AI systems in medical education can reduce students' critical thinking, problem-solving, and creative skills. Students may also become passive learners and rely on AI systems to make decisions for them, which can lead to reduced self-reliance and decreased motivation to learn.[10]

AI systems used in medical education brings up some difficult ethical and legal questions, such as accountability for mistakes and malfunctions, ownership of information, and rights to intellectual property. Buja tackled the ethical issues that develop in the domain of medical education research, he talked about the potential risks to patient privacy and the need for transparency in the use of AI and other technologies in medical education.[11] There are also many ethical issues about the use of AI systems for delicate and important tasks, such as diagnosis, medical care, and surgery, which might have great impact on patients.[11]

The acceptance and adoption of AI in medical education may be met with resistance from educators, students, and healthcare professionals who are used to traditional teaching methods and may be unsure of the potential benefits of AI. To overcome, this resistance can be a significant challenge and may need effective training and communication of the advantages of AI.

Conclusion

It is essential to tackle these risks actively, through regulation, education, and the development of ethical AI practices. Addressing the threats posed by AI proactively is important to ensure that AI is developed and used in a way that benefits society and minimizes problems. This can be achieved through regulation, guidance, and the development of rigorous ethical AI practices. Regulations can help to ensure that AI systems are transparent, accountable, and secure.

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