EDITORIAL

Applications, Implications, and Drawbacks of Artificial Intelligence in Medical Publications

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Applications

In the computer science sector in the 1950s, Artificial Intelligence (AI) was developed as a "copy" of the human mind. This was done to create machines that can process, methodize, and perform based on provided data, which proved especially useful with large volumes of data. Within the medical field, evidence-based medicine was coined from decision-making based on insights from past data. Statistical methods have approached this by characterizing patterns in the data as mathematical equations.[1] When we discuss the applications regarding medical publications, it opens the door for discussions on how AI might benefit data retrieval, as well as the time-consuming aspects of research that involve utilizing a large volume of data. To complete a systematic review, meta-analysis, and even implications, we must first comb through the data and determine the results and their meaning. Utilizing AI to analyze data, especially large volumes of said data, eliminates some of the lag time and allows for a potentially more accurate result, which might come with its own drawbacks. Having a system to feed data that potentially provides more accurate results makes for more efficient research and the ability to facilitate further research. AI is capable of extracting insights from unexpected sources and drawing connections that humans would not usually anticipate. New AI systems, such as explainable artificial intelligence (XAI), has been shown to improve the presentation of AI predictive modeling results and, thus, more effective communication between humans and AI systems. XAI explains the predictive outcomes and assists in the communication of internal decisions, behavior, and actions to healthcare professionals. XAI allows the AI systems to be trusted by clinicians. This includes both social and cognitive processes. The cognitive process provides an explanation for a certain event, while the social process, through interaction, transfers information and or knowledge between the explainer and explainee.[2]

Implications

The practical implications in this case can vary. The utilization of AI can be used widely in the medical field.

However, we must understand that it cannot replace those who have specialized roles. AI has been seen to increase the accuracy and efficiency of diagnoses, but what does this mean for the physician?[3] Medical AI studies use supervised learning to train AI systems that are compared against human experts. Using AI systems that work with humans instead of opposing has shown much more promise in improving the performance of both parties. AI allows the advancement of different systems used in research and by physicians, thereby retiring costly physical experiments.[4] AI and its systems, like Machine Learning (ML), have the potential to revolutionize medicine by performing tasks currently assigned to specialists to improve diagnostic accuracy, increase the efficiency of throughputs, improve clinical workflow, decrease human resource costs, and improve treatment choices.[5] These savings, however, do come at a cost. We must also consider the importance of defining correct AI application frameworks and ensuring vigorous quality control, including human supervision. This is to avoid driving patients on 'autopilot' towards unexpected, unwanted, and unhealthy outcomes, essential factors that need to be acknowledged.[6] AI tools that help authors improve the preparation and quality of their manuscripts and published articles are rapidly increasing in number and sophistication. These include those that help with grammar, writing, language, references, statistical analysis, and reporting standards. Editors and publishers also use AI-assisted tools to screen submissions for problems, check plagiarism, triage submissions, validate references, edit and code content for publication in different media, and facilitate post-publication search and discoverability.[7] Since modern ML algorithms perform complex mathematical transformations to input data, errors made by computational systems thus require extra vigilance for detection and interpretation. Regression models investigate and quantify the relationship between two variables, while machine learning and deep learning use

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algorithms to predict outcomes more accurately without human intervention. Deep learning (DL) deals with algorithms influenced by the structure and function of the human brain. DL uses artificial neural networks to create an intelligent model and solve critical problems. These artificial neural networks have even been found to predict post-operative rod curvature and fusion levels in scoliosis patients.[8] Machine learning (ML) is a technique that allows a computer to identify patterns, make more accurate predictions, and refine itself via experience without being precisely programmed to do so. When integrated with AI, the ML system can perform tasks faster and predict the decisions needed to solve complex problems, evaluate risks, and evaluate business performance.[9] [Figure 1]
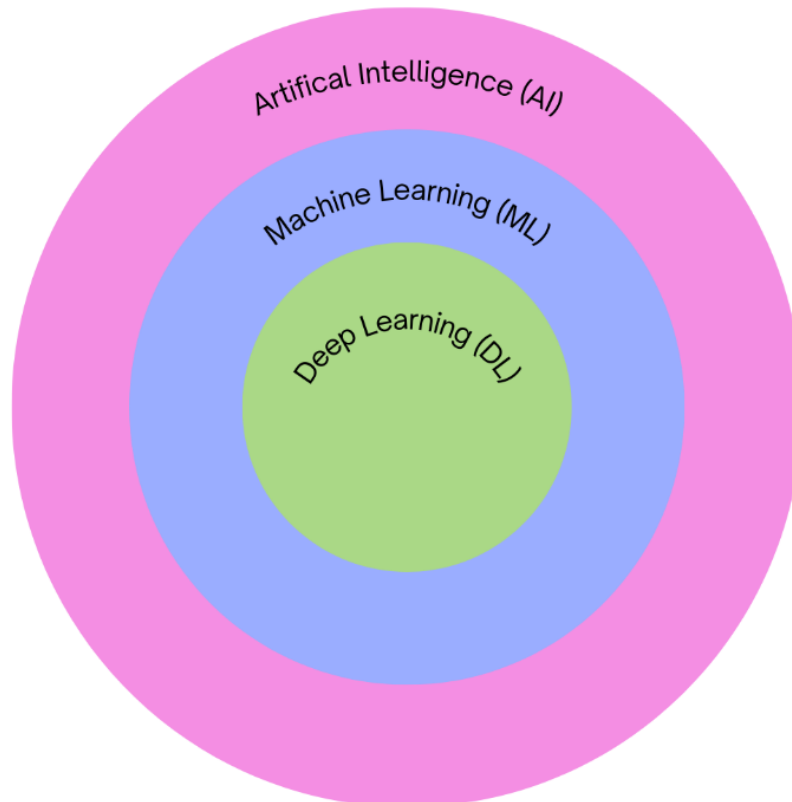

Figure1. Relationship between AI, ML, and DL

Drawbacks
 When it comes to AI, the drawbacks should be discussed, and in this case, this applies to the more controversial side of the conversation. AI, being a computer-generated system, must contain data somewhere. When dealing with sensitive data such as patient information, it can be extremely risky to house it in a generalized forum, especially AI, which can lead to patient privacy concerns.[10] Data bias and underrepresentation of minority information in data can make the system futile. Diversity and inclusion have been neglected in several AI systems, thus causing significant issues in the ability of the system to provide accurate results. AI systems rely on generated data; without diversified data, the system becomes erroneous.[11] AI is still a relatively new science and is not a guaranteed answer to any specific question. While it has shown to be helpful in many settings, some areas cannot afford to risk ambiguity. Most research that has previously been done on healthcare AI has been in non-clinical settings, making it challenging to generalize research results. Randomized controlled studies can also not display the benefits of healthcare AI.[12]

Conclusion
 In the Archives of Bone and Joint Surgery, we believe that a manuscript may benefit from implementing AI software and platforms for literature review, fluent writing, and grammar check, making medical writing more comprehensible. We are not restricting the use of AI to enhance medical writing and literature reviews. Still, we require the authors to be transparent and disclose the use of AI in the synthesis of each manuscript section.

ARTIFICIAL INTELLIGENCE IN MEDICAL PUBLICATIONS (EDITORIAL)

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