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Editorial

The era of artificial intelligence-powered research and scientific writing: Treading with care

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The rapid advancement of artificial intelligence (AI) has permeated various aspects of modern life and healthcare and its transformative impact is now extending into the realm of research and scientific writing. AI-powered tools are revolutionising the way scientists conduct research, analyse data and communicate their findings, leading to a paradigm shift in the entire scientific process. As we stand at the intersection of technology and academia, it is imperative to recognise this profound impact of AI on research and scientific writing. This editorial delves into some of the ways that AI can reshape the research and scientific writing landscape, highlighting its potential benefits and limitations.

Generation of research questions: Many AI-driven platforms can assist researchers in scouring through published literature and identifying gaps in existing knowledge. This ability to uncover hidden insights can lead to the formulation of novel hypotheses and the design of more effective experiments.

Literature review and information retrieval: Conducting a comprehensive literature review is a cornerstone of any research endeavour. AI-driven tools can enhance the efficiency of literature reviews and information retrieval processes. They can quickly scan through an extensive array of papers, extract relevant information based on keywords, concepts, and methodologies, and summarise key findings. This not only expedites the research process but also reduces the risk of oversight, ensuring a more comprehensive literature review.

Data analysis: One of the primary contributions of AI in research is its ability to analyse vast datasets at unprecedented speeds. Machine learning algorithms can help to identify patterns, correlations, and outliers in the data. This not only saves time but also provides insights into data that could be overlooked humanely and using traditional analytical methods.

Structured-outline generation: AI tools can be helpful for generating structured outlines that guide the flow of scientific writing.[1]

Manuscript writing: AI can facilitate the manuscript writing process itself. AI-powered writing assistants can transform scientific writing by structuring manuscripts, refining the language, ensuring clarity and conciseness, articulating ideas more effectively, ensuring adherence to journal guidelines, and identifying potential grammatical errors or inconsistencies. By providing raw information, these can also assist in composing the methodology, justifying sample size, and describing data analysis techniques. They are extremely effective for the proofreading and editing process, rewriting more clearly, and even summarising to compose a suitable abstract.[2] This not only accelerates the entire writing process but also enhances the overall quality of the publications. These tools can also provide feedback on the clarity and coherence of the writing, helping researchers communicate their findings more effectively.

Table and figure creation: AI can aid in developing tables and figures by offering suggestions on formatting, data visualisation techniques, and labelling.[1]

Citation and reference management: AI can assist in accurately citing and referencing by generating the required citation format and suggesting related articles to cite.

Translation and dissemination: The impact of AI extends beyond the individual researcher, revolutionising the way scientific knowledge is disseminated and consumed. AI-powered translation tools can break down language barriers, making research accessible to a wider global audience. In addition, AI-driven tools can condense complex scientific findings into easily comprehensible summaries, enabling a broader public understanding of the content.

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Collaborative writing and peer review: AI-powered tools can facilitate collaboration by serving as intermediates for brainstorming, sharing ideas, and reviewing drafts.[1]

It may be difficult to recognise whether AI or a human being writes a paper and requires thorough critical reading. However, a few characteristics might reveal that a paper was written by an AI tool, such as lack of nuance and originality, writing traits, word choices, total absence of structural and grammatical errors, an element of vagueness that would not be present in a human-written paper, etc.[2] Not surprisingly, AI software is available that can help to detect AI and human-generated content!

While the benefits of AI in research and writing are substantial, it is crucial to acknowledge and address its potential limitations and concerns: [3]

Lack of context: AI tools may lack the ability to fully understand the context and nuances of the writing, often resulting in non-relevant and inappropriate suggestions.

Inaccurate or biased information: AI tools may introduce inaccurate or selective information and lack fairness and inclusivity depending on the data they were trained on.

Over-dependence: Over-reliance on AI tools can lead to a reduction in human creativity, critical thinking, and the ability to make independent judgments. There is a risk of perpetuating or amplifying existing biases and inaccuracies in data, providing unfair results.

Technical limitations: AI tools may not be able to understand all complex scientific concepts and technical terminologies depending on their training data, which can limit their usefulness.

Cost: Some AI tools may require subscriptions, which may be a barrier for some researchers. Free versions of the tools may have their limitations in the accessibility of functions.

Plagiarism: AI cannot generate new ideas, but it organises and develops these from the data which has been fed to create them, thereby often presenting the work of others without referencing or inaccurately referencing the original authors.[2]

Effect on career development: Incredible use of AI can lead to a significant increase in publications from some researchers, but not necessarily accompanied by a corresponding increase in their knowledge and experience. Problems can, therefore, arise when weightage for career development is given to the number of publications rather than to their quality and the individual's ability.

While the ethical implications and potential biases associated with AI warrant careful consideration, the benefits it brings to the scientific community are undeniable. As AI continues to evolve, its impact on research and scientific writing will only grow more profound. To ensure the responsible and ethical use of AI in research, it is essential to establish clear guidelines and standards. Researchers should be transparent about their use of AI tools, ensuring that their contributions are original and the role of AI is appropriately acknowledged. The International Committee of Medical Journal Editors (ICMJE) recommends that authors disclose and describe any use of AI-assisted technologies in assisting research and manuscript preparation.[4] AI should not be listed as one of the authors as it fails to meet the ICMJE authorship criteria. The authors must carefully evaluate the accuracy and reliability of AI-generated outputs, ensuring that the work is accurate, unbiased, and grounded on sound scientific principles. AI algorithms should be rigorously tested, validated, and regularly updated to minimise the risk of errors and biases. Researchers must be vigilant in the use of AI, and all AI tools must be used to assist and augment human expertise and not replace human critical thinking and judgment.

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