

EDITORIAL

Limitations in the use of AI in research disciplines

Research in any field is an investigation that follows a series of methodical disciplines. These include reviewing existing knowledge and identifying knowledge gaps, designing or structuring the research to address the selected gap, collecting data using appropriate methodologies and adhering to ethical standards where applicable, analyzing the data with suitable tools, and interpreting the results by evaluating relevant arguments and assumptions. This set of methodical disciplines constitutes the first phase of research.

The key outcome of this initial phase should be the generation of new knowledge. As the final step, this knowledge must be published in a standard and structured manner. Even if the initial steps are correctly followed and result in new insights, an investigation is not considered as standard research until it is reported or published in a clear, logical, and standardized way, ensuring that others can examine and verify the findings if necessary.

The standard peer review process is the initial and the most critical step in the standard publication procedure for research. In this step, it is thoroughly checked whether all the required disciplines have been correctly followed and whether the process has led to the generation of new knowledge. In research, the peer review process is critical and essential for two reasons. Firstly, expertise does not make someone immune to errors. Even experts are prone to mistakes due to factors such as miscalculations, misinterpretations, or lapses in attention. Secondly, recognizing a mistake made by someone else—regardless

of one's own errors—is a complex human behavior influenced by various factors, including cognitive biases. These two reasons form the foundation of the peer review process.

Artificial Intelligence (AI) is a new and emerging tool that is increasingly used in scholarly work, including research. It is important to examine how extensively AI can be applied within various research disciplines. Although it is not advisable to rely on AI entirely, it can provide significant support in pursuing these primary areas of research, as well as in language checking. The peer review process can also be made significantly easier, as reviewers can use AI to assess the quality and relevance of the same set of research disciplines discussed above.

However, there are certain aspects of the peer review process that AI cannot handle. In addition to considerations of ethics and conflicts of interest, evaluating novelty and assessing significance are critical components of any peer review, which AI cannot adequately perform—because AI relies on pre-existing information. While some AI models can generate novel outputs by recombining, reasoning with, or optimizing existing data in useful ways, the validity of such outputs must still be assessed by humans. For example, in the evaluation process, novelty or originality is expected not only in scientific works but also in creative works, such as the lyrics of a new song. Only humans can truly judge whether the novelty of a given work aligns with scientific standards or creative expectations.

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