

## From the Editors-in-Chief

### ARTIFICIAL INTELLIGENCE FOR SCIENTIFIC RESEARCH – LARGE LANGUAGE MODELS IN MANUSCRIPT PREPARATION

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**Abstract:** *Artificial intelligence has the potential to revolutionize scientific work. At the same time, the availability of large language models, coupled with high publication pressure, often distorts the way AI tools are used. This study highlights not only the potential of selected contemporary tools, but also the traps and risks that come with using AI tools in the preparation of scientific papers. Wise use of AI techniques can improve the efficiency of work, but an unprofessional approach results in journal clogging and devaluation of the traditional form of sharing scientific achievements.*

**Keywords:** *manuscript preparation, artificial intelligence, large language models.*

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## INTRODUCTION

The development of generative artificial intelligence tools, especially publicly available large language models concealed in the form of conversational agents or chatbots, such as ChatGPT, is strongly revolutionizing the traditional system of scientific work. Increasingly large learning datasets and increasing number of parameters make it possible to perceptibly experience the growth of knowledge accumulated in large language models, but is there a proportional increase in awareness among users of how to practically and ethically use the achievements of modern technology?

It is important to realize that knowledge gain does not go hand in hand with knowledge structuring. Artificial intelligence models have historically been taught to return a corresponding output for a given vector of input features. Popular tools thus provide data on an action-reaction basis. Increasingly generative language models with broad knowledge are thus able to provide a broad set of general information that is able to satisfy those with little knowledge in a given area, but does not answer the concerns of inquisitive scientists. But aren't inquisitive scientists able to take advantage of modern technological advances?

The key to answering the above questions is probably inquisitiveness and reliability, as well as awareness of the limitations of the technology used. In the background of the development of the models themselves, quite a lot of attention is focused on the so-called prompt engineering, the idea of which is to conduct a dialogue with a language model in such a way that through inquisitiveness and the appropriate selection of phrases (prompts) the relevant knowledge is extracted from the model. A systemic offshoot of this process is so-called fine tuning, whose task is to automatically refine the context of questions and the expected style of answers. In the context of the latest large language models, one can hear about the so-called reflective thinking ("slow thinking") of chatbots, along the lines of human pondering, which, according to the creators' declarations, will make it possible to obtain a more plausible-looking answer or solution through self-reflection and self-correction of obvious imperfections.

Whether the ever-expanding language models will be smarter or just wiser remains to be seen, but it is already possible to explore their potential today. Among the works suggesting the use of chatbots for the preparation of scientific manuscripts, one can find such issues as literature review, data analysis, hypothesis formation, writing or proofreading of scientific texts. But can the tools be trusted in the scopes in question? Do they offer real support, or are they perhaps just wishful futurology that is not supported by existing research?

## CRITICAL ANALYSIS OF LLMS' USAGE

Scientific publications are one of the primary forms of knowledge sharing and dissemination of scientific achievements in research communities around the world. However, the dependence of scientific policies, including science funding, on scientometric indicators has substimulated an unnatural pressure to produce more and more momentous publications. Aside from the research itself, which is beyond the scope of this study, preparing a scientific text is undeniably a demanding and time-consuming process. The advent of AI tools to support the process of preparing scientific texts has strongly increased

the volume of articles being written and has clogged up the editorial offices of journals that are unable to process the supply of papers. To make matters worse, the quality of submitted manuscripts, often unethically supported by modern AI tools, raises the question of what to pay attention to when editing a scientific text. Each year more than 15 million hours are spent reviewing articles that are rejected (AJE, 2018).

The advent of specialized tools such as Consensus<sup>1</sup>, Semantic Scholar<sup>2</sup> seemingly makes it easier to find works related to the research topic. It is unfortunate that many authors stop at the descriptions generated by the tools, rather than studying the sources these tools suggest. Although any selection of sources is characterized by bias, the most valuable thing in a review is critical analysis, highlighting the inadequacies and shortcomings of earlier studies, rather than just unreflectively citing what is found in them. Thus, most automated literature reviews do not provide adequate background to the authors' contributions.

Peer review tools for scientific articles are also emerging, which can be thought of as a multi-criteria pre-evaluation of one's work (Kousha et al. 2024), but the reviewers themselves, if they limit their intellectual input to repeating the system's recommendations, will consciously give up the expert advantage provided by human brains and experience.

In the context of editing text, the notion of research productivity sometimes arises, which can be associated with the overproduction of articles. Research (Noy et al., 2023) shows that professional scientists facing the need to complete a motivating writing task may be more satisfied with their work when they can support themselves with generative tools. Another study (Campero et al., 2022) shows that inexperienced people supported by generative AI tools can write computer programs more effectively than programmers. Furthermore, it has been shown that the synergy of a human with an AI tool, is possible when the context of the activities is well defined. Either the scientist knows exactly what he or she wants to write, and only uses the tools as a word generator, styling the utterance - formulating sentences, or then because the formal requirements for the result of the work - the computer program code - are known.

The use of AI tools is different in the context of text translation or language correction. In this field, the proficiency of AI tools is unquestionable, but often it is necessary to refine the vocabulary to the nomenclature adopted in the field of research. Similarly, the unquestioned competence of tools appears in the field of data processing. After all, this is what humans develop computers for. However, it is worth noting that the automation of data processing and analysis deprives authors of vigilance regarding the correctness of the data themselves and the analysis performed. Paradoxically, the larger the data set, the more justified it seems to be to use tools to analyze it, and the less we can control the correctness of the analysis itself.

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<sup>1</sup> <https://consensus.app/>

<sup>2</sup> <https://www.semanticscholar.org/>

## CONCLUSIONS

Summarizing the development of large language models and the potential for their use in editing scientific texts, it can be assumed that they will be incorporated more and more often in various stages of editing, editing or proofreading scientific texts. Convenience of functioning and the desire to make one's work easier, will build an increasingly tight context, describing the multi-criteria conditions of scientific works. This, in turn, will lead to the dehumanization of the creative process of writing scientific documents, and the consequences of this change are difficult to predict.

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