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LLM4SR: A Survey on Large Language Models for Scientific Research

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Abstract

LLMs are transforming scientific research across hypothesis discovery, experiment planning, writing, and reviewing, offering new methodologies and benchmarks while highlighting challenges for future research.

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In recent years, the rapid advancement of [Large Language Models \(LLMs\)](#) has transformed the landscape of scientific research, offering unprecedented support across various stages of the research cycle. This paper presents the first systematic survey dedicated to exploring how [LLMs](#) are revolutionizing the scientific research process. We analyze the unique roles [LLMs](#) play across four critical stages of research: [hypothesis discovery](#), [experiment planning and implementation](#), [scientific writing](#), and [peer reviewing](#). Our review comprehensively showcases the task-specific methodologies and evaluation benchmarks. By identifying current challenges and proposing future research directions, this survey not only highlights the transformative potential of [LLMs](#) but also aims to inspire and guide researchers and practitioners in leveraging [LLMs](#) to advance scientific inquiry. Resources are available at the following repository: <https://github.com/du-nlp-lab/LLM4SR>


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A comprehensive survey on how LLMs can assist the scientific research. The covered tasks include scientific hypothesis discovery, experiment planning & implementation, paper writing, and paper reviewing.

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