

RESEARCH ON THE EFFICIENCY AND ACCURACY OF GENERATIVE AI IN THE EDITORIAL PROCESS OF SCIENTIFIC JOURNALS

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Abstract: This study aims to explore the application of generative artificial intelligence (AI) in the editorial process of scientific journals and its impact on editing efficiency and accuracy, thereby foreseeing potential changes in future scientific communication. Utilizing literature reviews and data analysis, this study focuses on literature published between 2020 and 2023, involving top academic journals, conference papers, and authoritative databases. Through qualitative analysis, content analysis, and comparative analysis, the study comprehensively assesses the application of generative AI in the editing of scientific journals. The research shows that generative AI has significant advantages in the preliminary review, language polishing, and format standardization of scientific journal submissions. Although it enhances editing efficiency and manuscript quality, AI has limitations in understanding complex academic content and maintaining high accuracy. The application of generative AI in the editing of scientific journals is in a rapid development stage, but its potential is immense, especially in improving editing efficiency and accuracy. Future research needs to explore in-depth the limitations and ethical responsibilities of AI, as well as the collaboration model between AI and human editors, to ensure the quality and integrity of scientific journal content.

Keywords: Generative Artificial Intelligence; Technological Journal Editing; Editorial Efficiency; Content Accuracy; Challenges in AI Applications

1 INTRODUCTION

As artificial intelligence (AI) technology rapidly advances, generative AI has become a focal point in the technology sector. Based on deep learning language models, such as OpenAI's GPT series, these technologies demonstrate exceptional capabilities in text generation, language understanding, and content creation. These groundbreaking advancements not only drive AI applications across various industries but also bring transformative potential to the editorial processes of scientific journals. Particularly, the application of GPT-3 and GPT-4 models in the field of natural language processing, especially in text generation and understanding, has shown significant impacts on the editorial processes of scientific journals[1].

Scientific journals, as core platforms for academic communication, play a crucial role in ensuring research quality and facilitating knowledge dissemination. Traditional editorial processes, typically time-consuming and labor-intensive, involve multiple steps from initial manuscript review to final publication. Editors and reviewers invest considerable time and effort to ensure the quality and accuracy of manuscripts. Facing the ever-increasing number of scientific journals and submissions, traditional editorial processes are under significant pressure[2].

In this context, generative AI offers innovative solutions. Integrating automation and intelligence tools, generative AI can perform tasks such as initial manuscript screening, language polishing, and format standardization within the editorial process. By analyzing manuscript structure and content, AI quickly identifies submissions that do not meet journal standards or exhibit academic misconduct, significantly reducing the workload of editors and reviewers. For non-native English authors, AI's application in language polishing effectively enhances manuscript language quality, aligning it with international academic standards[3][4]. Generative AI, particularly large language models, is gradually transforming traditional writing and publishing processes, becoming a part of the scientific publication process[5]. This technology not only promises to enhance the efficiency of the publishing process but may also lead to fundamental changes in the field of scientific publishing[6].

Despite the broad prospects of generative AI in scientific journal editing, research in this area is still in its early stages. Currently, there are many issues to explore regarding how generative AI specifically optimizes the efficiency and accuracy of scientific journal editorial processes and the impacts and challenges these technologies may bring.

This study aims to delve into the practical application of generative AI in the field of scientific journal editing, not only exploring the technology but also anticipating potential changes in future scientific communication methods. The research will examine specific applications of generative AI in scientific journal editing, such as initial manuscript screening, language polishing, and format standardization, and assess its actual effectiveness in enhancing editing efficiency and accuracy. Additionally, the study will explore the main challenges and limitations faced when applying generative AI. The research aims to provide new perspectives for the field of scientific journal editing and practical guidance and recommendations for the future development of the scientific publishing industry.

This study primarily employs a literature review methodology to comprehensively explore the application, efficiency, accuracy, challenges, and developmental trends of generative AI in scientific journal editing. To ensure the thoroughness and depth of the research, strict standards were adhered to in literature selection: focusing on literature published between 2020 and 2023, covering top academic journals, conference papers, industry reports, and authoritative databases. A systematic search was conducted using keywords such as "generative AI" and "scientific journal editing," while strictly assessing the quality and relevance of the literature to ensure the timeliness and pertinence of the research content. During the literature review process, various analytical methods were employed to enhance the objectivity and reproducibility of the research. Initially, qualitative analysis was performed to deeply understand the principles and application cases of generative AI, including a detailed examination of the technical details, application scenarios, and actual effects described in the literature. Subsequently, content analysis was conducted to systematically categorize and summarize the key viewpoints and arguments in the literature. This step involved the induction and comparison of data, theoretical perspectives, and research outcomes in the literature. Finally, comparative analysis was performed to reveal consensus and discrepancies between different publications, thereby identifying gaps in current research and future directions. This process involved contrasting different viewpoints and methodologies in the literature, as well as exploring the reasons behind and the impacts of these differences. Through this comprehensive literature review approach, this study aims to provide a thorough and deep perspective to understand the current applications and future potential of generative AI in the field of scientific journal editing.

2 BASIC PRINCIPLES AND DEVELOPMENT OF GENERATIVE AI

Generative artificial intelligence (AI) has become a key direction in the development of AI technology, especially in the field of natural language processing (NLP). The core of generative AI lies in its ability to learn from massive data sets and subsequently generate new content, such as text, images, and audio. In the realm of scientific journal editing and academic publishing, the application of this technology is primarily focused on text generation and processing.

The foundation of generative AI is machine learning, particularly deep learning models like neural networks. These models learn patterns and structures within data through training on large datasets, enabling them to generate new, similar outputs. In the context of text generation, this typically involves language models, such as OpenAI's GPT (Generative Pre-trained Transformer) series. These models utilize the so-called "transformer" architecture, which effectively handles long-distance dependencies and captures complex patterns within the text[7].

Globally, various research institutions and scholars have extensively studied the development and application of generative AI. For example, researchers in Europe and North America have made significant advancements in exploring the use of generative AI in academic publishing, while studies in Asia have focused more on innovative approaches to handling linguistic diversity with AI technology[8][9]. The consensus among these studies is on the powerful potential of generative AI, while the divergence lies in how best to apply these technologies across different languages and cultural contexts.

As technology has progressed, generative AI has gone through several important stages. Early models, such as those based on RNNs (Recurrent Neural Networks), were limited by shorter dependency relationships and restricted generative capacities. The transformer architecture, however, is a more advanced technology widely used in natural language processing today. Key to this architecture is its unique "self-attention mechanism," which allows the model to consider the relationships between all words in a sentence simultaneously, thereby more effectively processing linguistic information[7]. Unlike RNNs, transformers do not rely on the sequential processing of data. This means they can process entire sentences at once, rather than one word at a time, thus improving both speed and efficiency. Additionally, their multi-head attention mechanism enables the model to capture more complex information across different representational subspaces, which is particularly useful for understanding complex language structures. These features make the transformer an ideal choice for natural language tasks such as text translation, text generation, and language understanding. Based on these advantages, the transformer has become the foundational architecture for large language models like the GPT series from OpenAI.

3 APPLICATION OF GENERATIVE AI IN SCIENTIFIC JOURNAL EDITING

The editorial process of scientific journals is undergoing significant transformations driven by generative artificial intelligence (AI) technology. Currently, the application of generative AI in various stages of scientific journal editing includes manuscript initial screening, automated peer review, language polishing, text proofreading, format standardization, content structure optimization, and data analysis and interpretation.

3.1 Initial Manuscript Screening and Automated Peer Review

In the editorial process of scientific journals, initial manuscript screening and peer review are critical phases. With the advancement of generative AI technology, these processes are experiencing a revolution.

Firstly, AI's role in initial manuscript screening has become increasingly efficient. Traditionally, editors spent considerable time reading and evaluating each submitted manuscript to determine if it meets the journal's basic requirements and quality standards. Now, with AI technology, this process can be automated. AI systems can quickly analyze the basic structure, research field, and compliance of manuscripts, thus determining whether they are suitable

for further review. This not only speeds up the process but also ensures consistency and fairness in the initial screening[1][10].

Internationally, various research institutions have extensively explored the application of generative AI in initial manuscript screening and automated peer review. For example, research in Europe focuses on enhancing the accuracy and efficiency of AI technology, while North American studies emphasize the ethical and transparency issues in the peer review process[11][12]. The consensus among these studies is on the potential of generative AI to improve peer review efficiency, while the divergence lies in how to balance AI's automation capabilities with the professional judgment of human reviewers.

Secondly, the role of AI in automated peer review extends beyond initial screening. Generative AI also assists in identifying major issues in manuscripts, such as improper research methods, errors in data analysis, and even potential academic misconduct like plagiarism. By filtering out these issues in advance, AI reduces the burden on human reviewers, allowing them to focus more on in-depth academic evaluation[3][4].

Moreover, there is the challenge of balancing efficiency and quality. Although AI enhances efficiency in initial manuscript screening and automated peer review, it also brings challenges to quality control. AI systems might not fully comprehend complex academic arguments or capture subtle research innovations. Therefore, the role of human reviewers remains crucial. Ideally, AI and human reviewers should work together, combining AI's efficiency with human depth of understanding to enhance the quality and efficiency of the review process[2].

Lastly, looking to the future, as AI technology continues to evolve, its role in the manuscript review process is expected to grow. The learning capabilities of AI mean it can continually improve its accuracy and efficiency from ongoing review processes. Additionally, AI could also play a role in matching reviewers with manuscripts by analyzing reviewers' professional backgrounds and research interests, to find the most suitable reviewer for each manuscript[13].

3.2 Language Polishing and Text Proofreading

In the editorial process of scientific journals, language polishing and text proofreading are crucial for enhancing the quality of manuscripts. The advancements in generative AI have brought new possibilities to this stage. For non-native English speakers, language polishing is a significant challenge. Generative AI technologies, such as GPT-3, have demonstrated potential in improving the language quality of texts. These systems analyze and modify texts to make them smoother and clearer, thus enhancing the readability and professionalism of the manuscripts[14].

In the international research community, scholars from different regions have extensively explored the application of generative AI in language polishing and text proofreading. For instance, researchers in Asia and Europe have found that generative AI shows great potential in handling the language polishing of non-English texts, while studies in North America focus more on the application of AI technologies in improving the quality of English texts[15][16]. The consensus among these studies is on the effectiveness of generative AI in language polishing, while the divergence lies in how to best apply these technologies to texts from different languages and cultural backgrounds.

Text proofreading involves not only correcting grammatical and spelling errors but also ensuring the consistency and accuracy of the text. AI systems, such as Wordvice AI Proofreader, have shown performance comparable to human editors in automated proofreading. These systems can identify and correct errors in the text, provide language improvement suggestions, and thereby enhance the overall quality of the manuscript[17].

While AI improves efficiency in language polishing and text proofreading, it also presents challenges. AI systems may not fully capture the complex contexts and subtle language nuances. Therefore, the involvement of human editors remains indispensable to ensure the accuracy and appropriateness of the text[18].

As AI technology continues to advance, the role of AI in language polishing and text proofreading is expected to further increase. The learning capabilities of AI mean it can continually improve its accuracy and efficiency from ongoing editing and proofreading processes. Moreover, AI may also play a role in providing more personalized language suggestions to meet the specific needs of different authors[19].

3.3 Format Standardization and Content Structure Optimization

Scientific journals typically have strict requirements for the format of submissions, including citation styles, layout of tables and figures, and the overall structure of documents. Generative AI technologies, such as GPT-3, have proven effective in assisting with the standardization of formatting in scientific journal editing. For instance, Koga (2023) noted that these tools can automatically detect and correct formatting errors, such as incorrect citation styles or inconsistent heading formats, thereby enhancing the overall presentation quality of manuscripts[10]. Hsu (2023) further emphasized the significant role AI plays in ensuring that manuscripts meet the standard formatting requirements of journals[1].

Globally, various research institutions have explored the application of generative AI in format standardization and content structure optimization. For example, according to the study by Bosman and others, small and medium-sized publishers typically submit manuscripts in Word format, and the OS-APS project automatically extracts XML from these manuscripts, provides optimization, and exports in multiple formats (PDF, HTML, XML, EPUB), thereby achieving format standardization[20].

Beyond format standardization, optimizing the content structure is another critical aspect of scientific journal editing. Studies by Lin (2023) and Zenni & Andrew (2023) have shown that generative AI can assist authors and editors in optimizing the structure of articles, such as adjusting paragraph sequences to ensure coherence and logical flow of

arguments. These tools can analyze the entire structure of an article and suggest improvements, such as adding subheadings or reorganizing paragraphs to enhance clarity and the effectiveness of the argumentation[3][4].

Although generative AI enhances efficiency in format standardization and content structure optimization, it also presents challenges. Research by Grillo (2023) and Nature (2023) has indicated that AI systems may not fully understand the complex content of articles or capture subtle structural differences[2][21]. Therefore, the involvement of human editors remains crucial in ensuring the quality of manuscripts. Ideally, AI and human editors should work together, combining AI's automation capabilities with human expertise to enhance the quality and professionalism of the publications.

As AI technology continues to evolve, its role in format standardization and content structure optimization is expected to grow. Yeo-Teh & Tang (2023) suggested that the learning capabilities of AI mean it can continually learn from the editing and proofreading processes, thereby improving its accuracy and efficiency[14]. Additionally, AI might also play a role in providing more personalized editing suggestions to meet the specific needs of different authors and journals.

3.4 Data Analysis and Interpretation

The application of generative AI in the data analysis and interpretation capabilities within the scientific journal editing process is still relatively underexplored, but its application in other areas of data analysis and interpretation can serve as a reference.

Firstly, the automation of data analysis and interpretation. Generative AI can automate the data analysis process, enhancing both efficiency and accuracy. For instance, Zohny McMillan and King (2023) discuss the application of generative AI in clinical pathways, including text generation and data analysis, which can produce text mimicking the style of human authors, thus providing new perspectives in data interpretation[22].

Internationally, researchers from different regions have extensively explored the application of generative AI in data analysis and interpretation. For example, Ganjavi and others conducted a bibliometric analysis of top academic publishers and journals, discussing guidelines on the use of generative AI in academic and scientific publishing[23]. Additionally, Christou's study critically examines the current use of AI in research, highlighting its strengths and limitations, as well as ethical considerations, proposing five key considerations for the responsible, rigorous, and reliable use of AI in research practices[24].

Secondly, assistive decision-making and interpretation. Generative AI can assist scientific journal editors in identifying patterns and trends within complex datasets, thereby providing deeper data interpretations. For example, Lopez Gayoso and Yosef (2020) pointed out that generative models are applied in molecular biology, such as designing new molecules with specific properties or identifying harmful mutations in genomes, showcasing the potential of AI in data interpretation[25].

Furthermore, enhancing the fairness and accuracy of data analysis. Generative AI can also be used to reduce bias issues in data analysis. For example, Burlina and others (2021) explored the use of deep learning methods to mitigate biases in AI, particularly in diagnosing diabetic retinopathy[26].

Lastly, the ethics and responsibility of generative AI. The application of generative artificial intelligence (GenAI) raises a series of ethical and responsibility issues. Spector-Bagdady (2023) points out that GenAI, based on large language models, can gather, coordinate, and interpret massive amounts of data from diverse inputs like the internet, databases, and electronic medical records (EMRs)[27]. As such, governments, professional organizations, and even GenAI developers are calling for ethical analyses to guide policy changes. The research warns of the ethical and responsibility considerations that must be taken into account when using GenAI in the development of scientific journals. These issues not only involve data collection and use but also include how to ensure transparency and fairness in data analysis, as well as how to handle the resulting privacy and security issues.

4 ANALYSIS OF THE EFFICIENCY AND ACCURACY OF GENERATIVE AI APPLICATIONS

4.1 Empirical Analysis of Efficiency Enhancement

In the field of scientific journal editing, generative artificial intelligence (AI) has already begun to significantly enhance the efficiency of the editorial process. Lin (2023) pointed out in his research that large language models (LLMs), such as the GPT series, not only speed up the drafting, editing, and proofreading processes of manuscripts but also enhance the quality of writing[4]. These AI tools, by automating repetitive tasks such as initial manuscript screening and format standardization, significantly reduce the workload of editors and reviewers.

Additionally, Ganjavi et al. (2023) conducted an analysis of top academic publishers and journals, revealing the widespread application of generative AI in academic publishing[23]. They found that despite certain guidelines for using generative AI, its potential to enhance editing efficiency is widely recognized. These tools can rapidly analyze the basic structure and content of manuscripts, speeding up the review process while maintaining consistency and fairness.

Yoo (2024) further emphasized the transformative role of generative AI in scientific journal editing in his opinion article. He suggested that as technology develops, the role of scientific journals might extend beyond traditional gatekeepers to become significant facilitators in the knowledge discovery process[28]. The application of generative AI not only increases editing efficiency but could also lead to a "leap" in scientific knowledge, fostering a more extensive and inclusive scientific ecosystem.

4.2 Empirical Assessment of Accuracy

The application of generative AI in scientific journal editing has also demonstrated important roles in enhancing both editing efficiency and accuracy. Numerous studies have explored and evaluated this, reflecting recognition and challenges of generative AI in enhancing editorial accuracy.

Ganjavi and others (2023) indicated that in top academic publishers and journals, the use of generative AI has provided clear guidance, showcasing recognition of its role in enhancing editorial accuracy[23]. Although there are certain limitations on generative AI as an author, its application in manuscript generation and writing processes is widely accepted.

In the international research community, scholars from different regions have extensively explored the accuracy of generative AI in scientific journal editing. For instance, Carobene et al. evaluated the role, risks, and ethical impacts of AI in scientific publishing, especially in the paper drafting and review process[29]. Moreover, Grimaldi and Ehrler discussed the fundamental transformation of scientific publishing through AI text generation, emphasizing the potential of AI in scientific paper creation and the accompanying concerns[30-31].

As Yoo (2024) emphasized in discussing the future impact of generative AI on scientific journals, generative AI can help journals transcend their traditional gatekeeper roles to become crucial facilitators in the process of knowledge exploration[28].

British scholars have utilized generative AI in their work to improve task efficiency, save time and labor, and enhance competitiveness. However, they have not yet reached a clear conclusion on whether this technology has accelerated the output of academic research or improved its quality[32]. Similarly, Arya and Sharma (2023) explored the application of generative AI in the media industry, revealing the challenges brought by technological innovation, which are also applicable to the field of scientific journal editing. They pointed out that although generative AI has tremendous potential in content creation, it still has limitations in maintaining content quality and accuracy[33].

Similarly, Shah (2023) emphasized the new opportunities and challenges of generative AI in information acquisition. He noted that while generative AI offers new possibilities for addressing accessibility, low-resource areas, and training data bias, it also introduces new challenges related to hallucinations, harmful content, and information sources[34]. These issues are also present in scientific journal editing and require technological advancements and policy changes to address. Ju (2023) found in his experimental study that relying entirely on AI for writing tasks could lead to a 25.1% decrease in accuracy, while AI-assisted reading results in a 12% decrease in accuracy[35].

Hsu (2023) explored the application of generative AI in academic writing from a practical perspective. He cautioned that although generative AI is a valuable tool for generating and designing research ideas, academic writing, and learning English writing, critical thinking remains crucial in ensuring accuracy, ethical considerations, and maintaining rigorous academic standards[1].

Park (2023) further discussed the use of generative AI in scientific publishing, especially the application of large language models like ChatGPT. He highlighted that the rapid expansion of these tools in scientific publishing has triggered ethical and legal issues related to research integrity, plagiarism, copyright infringement, and authorship, affecting not only authors but also peer reviewers and editors[36].

Therefore, although generative AI has demonstrated potential to enhance efficiency in scientific journal editing, its effectiveness in improving editorial accuracy still requires further research and verification. As technology advances and models are optimized, we can expect more precise and reliable outcomes in the future.

5 FUTURE DEVELOPMENT TRENDS

5.1 Initial Manuscript Screening and Automated Peer Review

Generative AI technologies, particularly those based on deep learning language models like the GPT series, are increasingly being applied in the initial screening and peer review processes of scientific journals. These AI tools can automatically analyze submitted manuscripts, quickly identifying those that do not meet journal standards or exhibit potential academic misconduct. For example, AI can analyze textual patterns, citation situations, and data consistency to detect potential plagiarism or data falsification[31]. As technology progresses, the application of generative AI in manuscript screening and peer review is expected to become more intelligent and precise. These systems will be better able to understand complex academic arguments and research methodologies, thereby improving the efficiency and quality of the review process[37].

AI systems will be able to identify more subtle forms of academic misconduct and provide deeper analysis to help reviewers make more accurate judgments. Moreover, the development of AI technology will also make the review process more fair and transparent, reducing the possibility of human bias[38-39]. This technological advancement will profoundly impact the future of scientific journal editing by reducing the workload of editors and reviewers and enhancing the overall quality of manuscripts, ensuring academic integrity.

5.2 Automation of Language Polishing and Text Proofreading

Currently, generative AI technologies, like ChatGPT, have begun to be applied in the fields of language polishing and text proofreading, showing significant development trends. These AI tools can automatically detect and correct grammatical errors, enhancing the fluency and clarity of texts. As natural language processing technologies continue to

advance, the application of generative AI in language polishing and text proofreading is expected to become more efficient and accurate. For instance, systems like Effidit (Shi et al., 2022) provide functionalities such as text enhancement, error checking, and language polishing, significantly expanding the capabilities of writing assistants[40]. Tools like PaperCard (HAL, 2023) also demonstrate AI's application in assisting academic writing, effectively improving the efficiency and quality of literature reviews and text polishing. AI will be able to understand text context and complexity more deeply, offering higher-quality language polishing services[41]. Additionally, AI tools will be able to adapt automatically to specific linguistic needs of different disciplines and even provide customized advice based on particular publishing standards. This technological progress will significantly improve the efficiency and quality of scientific journal editing. AI's application will make language polishing and text proofreading faster and more economical, particularly beneficial for researchers and institutions with limited resources. Moreover, the widespread adoption of AI technologies will help narrow the gap between researchers from different regions and linguistic backgrounds, promoting fairness in global academic communication.

5.3 Intelligent Standardization of Formats and Content Structure Optimization

According to relevant literature, the application of generative AI in format standardization and content structure optimization is continuously improving. Herbert (2019) emphasized the importance of data-driven product companies in the academic publishing field, where AI technologies play a key role in format standardization and content structure optimization[42]. Additionally, Biradar, Khamari, and Bhate (2021) discussed AI's applications in editing decision systems, metadata enrichment, metadata standardization, and search enhancement, all of which are essential components of content structure optimization[43]. Based on these studies, it is anticipated that the future application of generative AI in format standardization and content structure optimization will become more efficient and intelligent. As AI technology advances, these tools will be able to more accurately identify and adapt to the specific formatting requirements of different journals. AI will provide deeper content structure analysis and suggestions, helping authors improve the overall quality and appeal of their articles. Moreover, the development of AI technology will also make content optimization processes more personalized and automated. This progress will significantly enhance the efficiency and quality of scientific journal editing. AI's application will make format standardization and content structure optimization faster and more economical, especially beneficial for researchers and institutions with limited resources. Additionally, the widespread adoption of AI technologies will help enhance the overall presentation quality of scientific journals, thereby increasing their impact in the academic community.

5.4 Deep Integration of Data Analysis and Interpretation

Generative AI technology, especially in the fields of natural language processing and data analysis, is changing the ways in which data analysis and interpretation are conducted[44]. These technologies, through deep learning and machine learning models such as Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs), can generate new data objects, providing deeper data analysis and interpretation[45]. AI tools can handle large amounts of data, quickly identify patterns and trends, and offer preliminary data interpretations. These tools can assist editors and reviewers in understanding complex datasets, providing deeper insights. In the future, the application of generative AI in data analysis and interpretation is expected to become more in-depth and intelligent. As deep learning technologies develop, AI will be able to offer more precise data analysis results and deeper interpretations[46]. AI tools will be able to identify and interpret more complex data patterns and even predict research trends and outcomes. Additionally, AI will present data analysis results in more understandable ways, enabling non-experts to comprehend complex scientific findings. AI's application will make data analysis and interpretation processes faster and more accurate, especially in handling large-scale or complex datasets. Moreover, the widespread adoption of AI technologies will help enhance the depth and breadth of scientific journal content, thereby increasing their impact in the academic community.

5.5 AI in Topic Selection for Scientific Journals

Generative AI technology, particularly in data processing and analysis, is becoming a crucial basis for topic selection in scientific journals. These AI tools, like ChatGPT and other generative language models, can process and analyze large amounts of data, quickly identifying research trends and emerging topics, thereby helping editors and reviewers handle manuscripts more effectively while maintaining up-to-date knowledge of scientific research[44][47][48]. In the future, the application of generative AI in scientific journal editing is expected to become more widespread and in-depth. AI will be able to more accurately predict the impact and audience interest of research, providing more valuable insights to editors while more deeply engaging in the content creation and review process, offering more innovative ideas and suggestions[22][46]. This will enable scientific journals to more effectively discover and promote high-quality and innovative research. This technological progress will significantly enhance the efficiency and innovativeness of scientific journal editing, helping editors better handle the increasing volume of submissions and diversification of research fields[26][43]. The widespread adoption of AI technologies will help improve the innovativeness and impact of scientific journal content.

6 CONCLUSION AND FUTURE RESEARCH DIRECTIONS

This study has thoroughly explored the application of generative artificial intelligence (AI) in the editorial process of scientific journals and its impact on editing efficiency and manuscript accuracy. We found that with the rapid advancement of AI technology, particularly large language models such as the GPT series, these tools have demonstrated significant potential in areas such as initial manuscript screening, language polishing, format standardization, data analysis, and interpretation. By utilizing automated and intelligent tools, not only has the editing process become more efficient, but the quality and accuracy of manuscripts have also been enhanced. This is particularly evident in handling large volumes of submissions and complex data, where generative AI shows irreplaceable advantages.

However, we also identified challenges and limitations in the application of generative AI. Technological limitations, such as the AI models' ability to understand complex academic content, still need further improvement. Ethical issues, including determining authorship, the challenges of plagiarism detection, and ensuring the originality and quality of content, must be seriously considered. Additionally, an overreliance on AI technology could potentially overlook the critical judgment and creativity of human editors, which needs to be balanced through appropriate strategies.

Overall, the application of generative AI in scientific journal editing is in a phase of rapid development, and its potential to improve editing efficiency and content accuracy is immense. However, to fully utilize the advantages of these technologies while addressing challenges and limitations, ongoing research and innovation are required.

Future research directions include:

Exploring the limitations and challenges of generative AI: Future studies should analyze the limitations of generative AI in scientific journal editing, especially focusing on its ability to understand complex academic content and support innovative research.

Ethical responsibility and AI applications: With the widespread application of generative AI technology, research needs to focus on ethical responsibility issues, particularly in confirming authorship, detecting plagiarism, and ensuring the originality and quality of content.

Collaboration models between artificial intelligence and human editors: Future studies should focus on exploring effective collaboration models between AI and human editors to maximize the advantages of AI while retaining the deep insights and judgment capabilities of humans.

Emerging applications of AI in scientific journal editing: Investigate the emerging application areas of generative AI in scientific journal editing, such as automated content generation, editorial decision support, and enhancing the innovativeness and impact of scientific journal content.

Building ethical and legal frameworks for AI technologies: As AI technology continues to develop, research should focus on establishing corresponding ethical and legal frameworks to ensure that AI applications in scientific journal editing are both effective and ethically sound.

COMPETING INTERESTS

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