Exploring the Development Path of Scientific Journals in the Artificial Intelligence Era: Post-print

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Abstract

【Purpose】 To promote the in-depth application of generative artificial intelligence in the field of intelligent publishing, particularly in the innovation and optimization of sci-tech journals. 【Method】 By rationally utilizing this advanced technology, address issues such as academic integrity, publishing ethics and norms, copyright and authorship, data privacy and security encountered in the current publishing process, while simultaneously enhancing publishing efficiency and quality to foster the high-quality development of sci-tech journals. 【Result】 The application of generative artificial intelligence in intelligent publishing, particularly in the innovation and optimization of sci-tech journals, has demonstrated tremendous potential and value, effectively resolving numerous challenges in the current publishing process while significantly improving publishing efficiency and quality, thereby driving the high-quality development of sci-tech journals. 【Conclusion】 We should actively embrace generative artificial intelligence, strengthen technological research and development as well as application practices, while emphasizing policy and normative guidance to lay a solid foundation for the future high-quality development of sci-tech journals.

Full Text

Preamble

Exploring the Development Path of Sci-Tech Journals in the Age of Artificial Intelligence

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Abstract

[**Purpose**] This study aims to promote the in-depth application of generative artificial intelligence in the field of intelligent publishing, particularly in the

innovation and optimization of sci-tech journals. [**Method**] By rationally utilizing this advanced technology, we address current challenges in the publishing process, including academic integrity, publishing ethics and norms, copyright and authorship rights, data privacy and security, while simultaneously enhancing publishing efficiency and quality to foster high-quality development of sci-tech journals. [**Result**] The application of generative artificial intelligence in intelligent publishing, especially in the innovation and optimization of sci-tech journals, demonstrates tremendous potential and value. It can not only effectively resolve numerous existing problems in the publishing process but also significantly improve publishing efficiency and quality, thereby driving the high-quality development of sci-tech journals. [**Conclusion**] We should actively embrace generative artificial intelligence, strengthen technology research and development and practical application, while emphasizing policy guidance and normative frameworks to lay a solid foundation for the future high-quality development of sci-tech journals.

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Since the 18th National Congress of the Communist Party of China, the Party Central Committee has elevated artificial intelligence development to a strategic priority, emphasizing that accelerating the development of new-generation AI is a strategic issue concerning China' s ability to seize opportunities in the new round of technological revolution and industrial transformation. AI development will provide crucial support for building China' s modern economic system and achieving high-quality development. The Party Central Committee and the State Council have also attached great importance to AI ethics governance [1]. The 2024 Government Work Report explicitly stated: "Deepen research and application of big data and artificial intelligence, launch the 'AI Plus' initiative," and "Improve the basic data system, vigorously promote data development, openness, and circulation."

1. Concept of Generative Artificial Intelligence

Generative Artificial Intelligence Generated Content (AIGC) refers to models and related technologies capable of generating text, images, audio, video, and other content [2]. At the end of 2022, ChatGPT launched by OpenAI marked significant progress in text generation technology. Subsequently, this technology rapidly evolved from single-language generation toward multimodal and embodied development. In language research, AIGC serves as a powerful tool for

processing and generating linguistic data, capable of mimicking the creativity and diversity of human language. Its applications broadly cover text generation, content creation, and machine translation. The technical core of AIGC in this field involves training large-scale language models to understand and generate texts that meet specific requirements, interacting with users in a natural and coherent manner. In this sense, AIGC has endowed language research with "digital" characteristics, and linguistic data is increasingly regarded as an "asset" with inherent "value." This transformation of linguistic data has facilitated paradigm shifts in linguistic knowledge production and major changes in productivity and production relations within the language services industry, thereby advancing theoretical and methodological innovations in the field. AIGC can largely replace human mental labor [3], presenting opportunities for the high-quality development of sci-tech journals while simultaneously posing unprecedented challenges. Therefore, leveraging AIGC to ensure the intelligent, high-quality, and sustainable development of sci-tech journals holds significant practical importance.

2. Applications of AIGC in Sci-Tech Journals

2.1 Topic Planning

AIGC can provide topic suggestions for sci-tech journals by analyzing current research trends, hot issues, and historical data, helping editors better grasp research directions and market demands. By analyzing extensive market data—including reader purchases, reading habits, and book sales—it can forecast future market demand trends. By examining competitors' topics, content quality, and market performance, AIGC generates topic strategies for specific competitive environments, enabling editors to stand out in fierce market competition and create publications with differentiated advantages. Beyond traditional market data and competitive analysis, social media has become an important window for understanding reader preferences. AIGC can analyze topics, trends, and discussion levels on social media platforms to generate topic suggestions aligned with reader interests, helping editors keep pace with trends and launch publications that meet reader demands.

2.2 Academic Writing

Based on AIGC, researchers can quickly generate paper drafts or partial content and then modify and improve upon them, thereby reducing writing burdens. For instance, researchers can use generative AI to produce introductions, abstracts, conclusions, or specific paragraphs and sentences. AIGC can also provide creative paper topics or research directions based on researchers' inputs or prompts, helping them break through mental sets and discover new research points and innovations. Furthermore, AIGC can polish and proofread paper language to improve linguistic quality and readability, helping researchers ensure clear, accurate, and fluent expression that meets academic standards and requirements.

2.3 Editing and Publishing

During the editing and publishing stage, AIGC can automatically format documents, generate tables of contents and indexes, thereby improving publishing efficiency. It can also check paper formats to ensure compliance with journal requirements. AIGC demonstrates powerful learning capabilities, quickly understanding user needs and efficiently completing publishing tasks, significantly enhancing editors' work efficiency. In editing and proofreading scenarios, AIGC can automatically identify and correct professional errors in textual expression and grammar while assisting editors in verifying academic paper references, serving as an efficient academic information retrieval assistant. Moreover, AIGC features content review functions, rapidly detecting political sensitivities, common sense errors, and other potential issues in manuscripts, providing valuable reference suggestions for editors.

As digital technology develops, AIGC application scenarios are extending from traditional editing and publishing to reader interactive experiences. In the new media era, publishing institutions increasingly emphasize interactive experiences with audiences. With its strong algorithmic advantages, AIGC injects new vitality into audience-demand-oriented editorial transformation. Specifically, interactivity represents a major highlight of generative AI, as it can accurately capture audience psychological needs and effectively fulfill interactive expectations. Through conversational interaction, AIGC can vividly interpret textual content, greatly enhancing audience reading experiences.

2.4 Academic Communication

AIGC can provide personalized literature recommendations to readers based on their reading habits and interests, promoting widespread dissemination of academic achievements. AIGC can quickly generate large volumes of content —including text, images, and video—that can be rapidly distributed through various channels, thereby improving the efficiency of academic information dissemination. AIGC can generate content in multiple forms that better align with modern audience reading habits, helping enhance the acceptance and influence of academic information. In international communication practice, AIGC can serve as big data analysis infrastructure to improve adaptability and precision in international communication, and through the combination of multimodal content generation and virtual reality technology, create a "third space" for cross-cultural integration that releases cultural flow based on empathetic experiences.

3. Challenges Posed by AIGC to High-Quality Development of Sci-Tech Journals

Analysis of papers submitted by users since 2009 using the Jianziyuan software reveals that a certain proportion of student papers have shown potential AI generation since 2019. By the end of 2023, this proportion had reached 31.2%,

as shown in Figure 1 [Figure 1: see original paper]. The development of AI-generated papers in China has not emerged suddenly but has undergone a gradual evolutionary process, with acceleration beginning in 2019. As the proportion of AI-generated papers rises rapidly, its impact on the academic publishing system becomes increasingly prominent. The challenges AIGC poses to high-quality development of sci-tech journals mainly manifest in four aspects: academic integrity, publishing ethics and norms, copyright and authorship rights, and data privacy and security.

3.1 Academic Integrity Issues

The widespread application of AIGC makes academic misconduct more concealed and complex, with problems such as plagiarism, honorary authorship, and false research findings potentially exacerbated by AIGC involvement. If researchers over-rely on AIGC during research output and writing processes without clearly declaring or annotating AIGC usage in their papers, academic integrity will be seriously compromised. Therefore, the academic integrity issue of AIGC is complex and significant, requiring joint efforts from government, academia, the technology sector, and society to address through clarifying legal positions, strengthening academic integrity education, improving accountability systems, enhancing detection technologies, and strengthening supervision and self-discipline.

3.2 Challenges in Publishing Ethics and Norms

As AIGC applications expand in publishing, they challenge authorship norms, citation standards, and detection technologies for sci-tech journals. Ensuring content authenticity and accuracy and preventing errors or misleading information caused by AIGC technology have become urgent issues. Addressing these challenges requires strengthening institutional development, improving technical detection capabilities, enhancing ethics education and training, and promoting technological innovation and upgrades.

3.3 Copyright and Authorship Issues

Copyright and authorship attribution for AIGC have long been focal points of discussion, involving complex characteristics with multiple overlapping issues. On one hand, whether AIGC infringes upon original work copyright holders' rights; on the other hand, whether the completed work enjoys independent or joint copyright. If AIGC holds copyright, how should it assume corresponding responsibility when content errors or infringements occur, and how should it be held accountable for article content? Therefore, when adopting AIGC, sci-tech journals must clarify copyright and authorship attribution and authorization issues to avoid potential disputes. Simultaneously, journals must also address potential risks of AIGC infringing upon others' copyrights and implement corresponding preventive measures.

3.4 Data Privacy and Security Issues

AIGC may involve extensive data collection, processing, and analysis, with users also transmitting data through interactive interfaces. This may leak sensitive information input by users, such as business secrets and personal privacy, thereby increasing the risk of information leakage for unpublished research findings. Additionally, when AIGC is applied in healthcare fields, excessive exposure of patients' personal data must be strictly avoided to protect patient privacy [4].

4. Opportunities AIGC Brings for High-Quality Development of Sci-Tech Journals

4.1 High-Quality Topic Selection Through Data Analysis and Trend Forecasting

AIGC can identify current and future hot topics, trends, and potential needs through in-depth analysis of collected data. Based on historical data and current trends, it can forecast future trends, enabling more precise grasp of market demands and changes to provide strong support for content creation. For instance, *The Washington Post* has established an AI editorial department that can obtain numerous high-quality topics related to current hotspots [5]. Additionally, by analyzing readers' frequency and time spent reading different content, AIGC can understand topics of interest and provide suitable topics for authors [6].

4.2 Assisting Editor-Author Communication to Improve Manuscript Solicitation Efficiency

AIGC can quickly generate reference materials related to manuscript solicitation themes based on big data and deep learning algorithms. Platforms such as Baidu' s Wenxin Yiyan and Tencent' s Hunyuan Assistant possess powerful text generation capabilities that can provide high-quality materials for editors. AIGC can also automatically generate preliminary manuscript frameworks or partial content according to editors' instructions and requirements, and preliminarily evaluate manuscript quality by identifying potential grammatical errors, logical issues, or unclear expressions with corresponding feedback and suggestions. This helps authors timely revise and improve manuscripts, reducing subsequent communication costs and time, alleviating authors' writing burdens, and accelerating manuscript solicitation progress. Authors can modify and improve upon this foundation, thereby enhancing writing efficiency.

4.3 Intelligent Screening and Identification to Improve Review Efficiency and Quality

First, AIGC can preliminarily screen manuscripts before the review process to exclude those with obvious serious errors, reducing the burden on reviewers and enabling them to focus on high-quality manuscripts. By combining author information, manuscript content, and reviewers' professional fields and inter-

ests, AIGC can intelligently recommend suitable reviewers, improving review relevance and efficiency. Through automated error checking and preliminary screening, the review cycle is shortened, allowing high-quality content to be published and disseminated more quickly. Second, AIGC possesses strong false information identification capabilities, efficiently detecting potential false information in manuscripts for marking and deletion [7]. Currently, multiple technology companies and media organizations have successfully applied AIGC to false information identification and removal. For example, Microsoft' s "Detox" system uses large AIGC models to identify and delete false information on social media, while Facebook's "Fact Check"project utilizes AIGC to help independent fact-checking organizations evaluate news article accuracy.

4.4 Personalized Content Recommendation and Customization to Meet User Needs

AIGC first needs to connect to big data collection systems for user reading habits, which can collect various behavioral data when users read academic journals, such as reading time, speed, click frequency, dwell time, bookmarking, sharing, and commenting. This data, after encryption and anonymization, provides rich material for AIGC while ensuring user privacy security. Then, using natural language processing (NLP), machine learning, and other technologies, AIGC conducts deep mining and analysis of the collected big data to understand each user' s reading preferences, interest areas, and habits by constructing user profiles [9-13]. Some platforms, such as SpringerLink and ResearchGate, have begun using AIGC technology to optimize content push by analyzing users' search history, download records, and citation relationships to deliver personalized academic papers and research findings to users, fully meeting user needs [8].

5. Path Exploration for AIGC to Promote High-Quality Development of Sci-Tech Journals

The impact of AIGC on editors and the entire publishing industry is inevitable. However, as an advanced technology, it brings innovation to sci-tech journals and can be applied in the following aspects.

5.1 Content Generation and Polishing

AIGC can assist authors in generating abstracts, introductions, and other sections of papers, improving writing efficiency and allowing authors to focus on core research components. It can optimize article grammar and vocabulary to enhance accuracy and fluency, ultimately achieving intelligent manuscript processing. Establishing intelligent editing systems can automatically detect format issues in manuscripts, summarize and integrate data and tables, and preliminarily evaluate academic quality. This can not only greatly improve editors' work efficiency but also reduce their workload, enabling them to devote more energy

to high-quality academic content review [14].

5.2 Efficient Editing and Review

Based on AIGC, grammatical and spelling errors in articles can be quickly identified and corrected to improve editing efficiency. During the review process, it can assist reviewers in quickly screening manuscripts that meet journal standards and provide preliminary review comments, reducing reviewers' workload. In terms of typesetting and format adjustment, it can automatically adjust article formats according to journal requirements, including fonts, font sizes, line spacing, etc., ensuring articles comply with journal publishing standards [15]. Although AIGC demonstrates enormous potential in sci-tech journal editing and review, human review remains an indispensable component. Editors should maintain in-depth analysis and judgment of manuscripts while fully utilizing AI tools to ensure the accuracy and reliability of review results.

5.3 Research Integrity Detection

AIGC detection refers to extracting features from paper texts and comparing them with known AI-generated text feature databases to determine whether paper content is AI-generated or suspected of being AI-generated. AIGC detection is widely applied in paper review and publishing processes [16], applicable to various text-based research outputs including journal papers, dissertations, and conference papers. Additionally, AIGC detection can be used in pre-review and re-review stages of research outcomes to ensure their authenticity and originality [17]. AIGC can also assist in detecting academic misconduct such as plagiarism in research papers, thereby improving research integrity levels [18]. By comparing vast amounts of literature and research findings in databases, it can quickly identify highly similar content, providing references for editors and reviewers that help combat academic misconduct and maintain research integrity and reputation in academia [19]. Furthermore, training and education for researchers should be strengthened to enhance their awareness of and commitment to research integrity.

5.4 Personalized Recommendation

AIGC can achieve personalized content recommendation, accurately delivering high-quality research findings to interested readers and researchers, aligning with user needs for precise production and distribution [20]. By analyzing readers' reading data and behavioral patterns, it can precisely push articles and research findings closely related to their research directions, thereby enhancing readers' reading experiences and satisfaction. Additionally, AIGC can provide decision-making support for editors by analyzing large volumes of user behavioral data and article data to timely adjust content strategies and promotion strategies for improved user satisfaction and loyalty. Authoritative platforms such as Alibaba Cloud Developer Community frequently publish articles on

AIGC applications across various fields, including user behavior analysis and personalized recommendations.

As AI technology development and application progress, the age of artificial intelligence has arrived and will inevitably impact sci-tech journal development. With its powerful learning and retrieval capabilities, AIGC drives the transformation and upgrading of the publishing industry while harboring numerous risks. As sci-tech journal professionals, we should understand, learn, and master AI technology, deeply analyze the opportunities and challenges AIGC brings to sci-tech journals, leverage the advantages of human-machine collaborative work, organically integrate AIGC with editing and publishing, and promote the high-quality development of China' s sci-tech journals.

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Note: Figure translations are in progress. See original paper for figures.