Postprint: Optimization of Journal Resource Integration and Dissemination Models from the Perspective of Media Convergence

Authors: Wu Jiao

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Abstract

[Purpose] The integration of artificial intelligence and journal publishing represents an inevitable choice for the development of information technology and culture. From the perspective of media convergence, journal media face challenges such as difficulties in resource integration and insufficient communication awareness. This paper proposes optimization strategies for AI-enabled journal resource integration and communication models. [Methods] First, an intelligent communication data system for journal media based on the data middle platform concept is constructed, which performs cleaning, transformation, and loading integration of various types of journal media data to build a journal communication data warehouse. Then, multi-source tagging is employed for user profiling and personalized recommendation of journal users, providing effective support for precise communication of journal media. Finally, large language model-based assisted content generation and editorial optimization are implemented to accomplish tasks such as overview generation, editing and proofreading, intelligent interaction, and communication effect analysis, offering references for journal improvement. [Results] The optimization of journal communication models through artificial intelligence can help journals better adapt to the trend of media convergence and enhance their communication effectiveness and influence. [Conclusion] As the process of journal media convergence advances rapidly, the intelligent journal communication system has ushered the development of the journal industry from theoretical exploration to a new stage of practical innovation. AI-related technologies can effectively facilitate the revolution and optimization of journal communication.

Full Text

Preamble

Title: Optimization of Journal Resource Integration and Communication Models from the Perspective of Media Convergence

Author: Wu Jiao (Journal Press, Hebei University, Baoding, Hebei 071002)

Abstract

[**Objective**] The integration of artificial intelligence and journal publishing represents an inevitable trend in information technology and cultural development. Under the perspective of media convergence, journal media face challenges such as difficulties in resource integration and weak communication awareness. This paper proposes optimization strategies for AI-enabled journal resource integration and communication models. [**Methods**] First, an intelligent communication data system for journal media based on the data middle platform concept is constructed, which performs cleaning, transformation, and integration of various types of journal media data to build a journal communication data warehouse. Second, multi-source tagging is employed for user profiling and personalized recommendation, providing effective support for precision communication in journal media. Finally, large language model-assisted content generation and editing optimization are implemented to accomplish tasks such as overview generation, editing and proofreading, intelligent interaction, and communication effect analysis, offering references for journal improvement. [**Results**] AI optimization of journal communication models can help journals better adapt to media convergence trends and enhance their communication effectiveness and influence. [**Conclusion**] As the journal media convergence process accelerates rapidly, intelligent journal communication systems have ushered the journal industry into a new stage of practical innovation beyond theoretical exploration. AI-related technologies can effectively promote the innovation and optimization of journal communication.

Keywords: media convergence; journal publishing; artificial intelligence; scientific journals; communication model

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1. Current State of Journal Resources and Communication Under Media Convergence

In March 2016, the computer program "AlphaGo" defeated world Go champion Lee Sedol, marking a new stage in the development of Artificial Intelligence (AI). In July 2017, the State Council promulgated the "New Generation Artificial Intelligence Development Plan," and AI began to enter the journal publishing industry and develop rapidly. In August 2019, four departments including the China Association for Science and Technology jointly issued the "Opinions on Deepening Reform and Cultivating World-Class Scientific Journals," emphasizing the importance of deepening scientific journal reform and improving journal quality and international influence. The document called for seizing the major opportunities of digitalization and intelligence to promote transformation in journal publishing, innovating communication mechanisms, and driving the digital transformation and upgrading of scientific journals. In June 2021, three ministries including the Publicity Department of the CPC Central Committee jointly issued the "Opinions on Promoting the Prosperous Development of Academic Journals," emphasizing the need to adapt to media convergence development trends, adhere to integrated development, achieve full-chain digital transformation and upgrading through process optimization and platform reconstruction, guide academic journals to adapt to mobile and intelligent development directions, and promote the construction of integrated development platforms. The integration of AI and journal publishing has become an inevitable choice and trend in information technology and cultural development [1].

Since 2017, domestic academia has conducted preliminary explorations of AI applications in academic journals. Existing research has mainly focused on three aspects: the impact of AI on journal development, problems and challenges, and changes in communication modes. First, the impact of AI on journal development represents the mainstream research direction, with most scholars examining AI applications from the perspective of the journal field. Xu et al. [2] argue that technology is the catalyst and key force for industry transformation, and that cutting-edge technologies such as AI and blockchain, when applied in the publishing industry, bring new possibilities and directions for journal publishing. An Qi [3] believes that breakthroughs in big data technology and AI make it possible to intelligently analyze hot topics and development trends in various disciplines, and to discover outstanding author resources in these areas. Lü et al. [4] propose that Chinese scientific journal publishers can enhance the international visibility of Chinese scientific journals by leveraging AI, developing parallel corpora, and reprocessing Chinese content to improve the accuracy of online translation systems. Liu et al. [5] suggest that AI can not only improve the efficiency and accuracy of topic planning but also enhance the matching degree of invited contributions.

Second, some scholars have noted that AI may bring new problems and challenges to journal development. Dai et al. [6] argue that while AI accelerates

the speed of scientific publishing, it may cause scientific literature flooding, lose the filtering function of scientific publishing, and make it difficult to guarantee the quality of published papers. Pan et al. [7] believe that intelligent publishing faces many practical dilemmas, including conflicts between urgent demands and scarce technical resources, conflicts between creative communication and copyright risks, and conflicts between precise push and algorithmic discrimination. Liu and Zhu [8] contend that scientific journal editors face challenges such as the reconstruction of digital platforms, editorial and publishing work content, information terminal systems, and journal presentation forms. They argue that editors must reshape their core competencies, including professional academic literacy, new technology application literacy, organizational management ability, service awareness, and technology ethics literacy, to comprehensively improve their ability to cope with intelligent media development.

Third, a few scholars have focused on the important impact of AI on journal communication. Zheng [9] argues that under media convergence, efforts should be made to explore ways to improve the precise communication ability of scientific journals by expanding academic search paths, building personalized precision push platforms and diversified communication modes, and providing targeted services to users. Huang et al. [10] discuss the application and prospects of mainstream AI technologies, including natural language processing, data mining, intelligent recommendation, machine learning, and AI writing, in journal communication.

Due to factors such as weak communication awareness, slow updating of publishing technology, and lack of media literacy among practitioners, AI technology has not yet been truly integrated into domestic academic journal publishing. Changing this situation requires more resource investment and the establishment of an intelligent communication platform for journal media.

2. Optimization Strategies for Journal Resource Integration and Communication Models

2.1 Intelligent Communication Data System for Journal Media Based on Data Middle Platform Concept

With the deepening advancement of journal media convergence, media data from third-party journal platforms, journal websites, and social networking platforms are becoming increasingly valuable for journal communication, making effective integration and utilization of journal media data highly significant. The "data middle platform" represents a new data management concept from the perspective of data assets. A "journal data middle platform" collects, integrates, stores, and processes multi-source heterogeneous journal media data through technical means, while unifying data standards to form a journal big data asset layer, providing efficient data services for internal and external AI applications in journal communication [11-12]. By establishing a data integration and utilization framework, distributed collection of cross-platform data and structured extrac-

tion of heterogeneous data can be achieved. Using big data technology, massive amounts of raw data from social media undergo deduplication, metadata definition, type conversion, correlation analysis, and text mining to complete the cleaning, transformation, and integration of various types of journal media data, thereby constructing a journal communication data warehouse.

Referring to data middle platform construction methodologies [13], this paper designs an "intelligent communication data system for journal media" through essential analysis of journal media resources and communication modes and summarization of journal media data sets. This system can be divided from bottom to top into the source data layer, entity fusion layer, relationship fusion layer, profiling tag layer, intelligent algorithm layer, and communication application layer. The source data layer is responsible for collecting original journal knowledge data from third-party journal platforms, journal websites, and social networking platforms to establish a journal media knowledge base. The entity fusion layer completes entity alignment across different knowledge bases, linking entities from different data domains. The relationship fusion layer uses translation models to merge key equivalent relationships across different journal media knowledge bases. The profiling tag layer performs user profiling for journal media audiences to generate user tag sets. The intelligent algorithm layer encompasses algorithm models and parameter sets for different purposes, providing algorithmic support for intelligent communication. The communication application layer includes various journal media applications to achieve intelligent communication across media matrices.

2.2 Journal User Profiling and Personalized Recommendation Based on Multi-Source Tags

Precision communication represents an important approach in journal media communication, and user profiling constitutes the foundational task for precision communication [14]. Journal user profiling for multi-source journal media includes the following steps [15]: First, user attribute tag generation. Based on multi-source journal media knowledge bases from the source data layer, journal user information is collected and cleaned to generate user attribute tags, focusing on basic attribute information including name, Open Researcher and Contributor ID (ORCID), affiliation, position/title, birth date, native place, research field, and email address, some of which serve as unique user identifiers. Second, user interest tag mining. By analyzing user behavior records across various journal media (such as browsing, downloading, commenting, and liking journal articles), methods including TF-IDF, LDA topic models, natural language models, and word vector mining are employed to calculate users' interested disciplines, subjects, or keywords, thereby mining user interest tag sets. Third, user interest tag expansion. User tags generated in the first two steps may suffer from data sparsity and cold-start problems. To enrich user tags, collaborative filtering principles can be applied for tag expansion—similar users often share similar interests. For example, if existing user tag data shows that users who

like "artificial intelligence" also like "big data," then the "big data" tag can be expanded to users with the "artificial intelligence" tag. Fourth, cross-domain interest tag fusion. Different journal media belong to different data domains, and fusing interest tags from multi-domain media can more effectively depict user interests. Tag weighting can also be implemented to achieve user interest ranking [12].

The profiling tag layer stores two main types of tags: journal user tags and journal content tags. User tags serve for user profiling, representing users' interest characteristics; journal content tags are extracted from journal media content knowledge bases, representing the content characteristics of journal articles. By using intelligent algorithms to match and predict user tags with content tags, personalized recommendations for journal users can be achieved. Currently, industry recommendation algorithms for knowledge fusion mainly include embedding-based recommendation models, link relationship-based recommendation models, and propagation-based recommendation models, which can leverage mainstream AI algorithms to precisely push journal media articles to journal users.

2.3 Assisted Content Generation and Editing Optimization Based on Large Language Models

Large language models have become powerful tools for scientific journals to improve content generation efficiency and editing optimization [16], with relevant enhancements 主要体现在三个方面. First, new media article overview generation. In journal new media communication, paper abstracts contain insufficient information while full texts are too lengthy, making them unsuitable for users' fast-reading habits. Large language models can automatically generate article overviews suitable for online communication based on original papers, publishing concise versions through social networks, short videos, and other new media platforms to provide audiences with a new reading experience. Second, new media content editing and proofreading. In journal new media content publishing and communication, article proofreading and style adjustment are time-consuming and tedious tasks. Large language models can automatically detect grammatical errors in text and provide improvement suggestions while optimizing content style to ensure standardization and consistency across various media platforms. Third, enhanced intelligent interaction with readers. By constructing a question-answering system based on language models, journal media can provide a platform where readers can ask questions about article content and receive instant, text-based answers, enhancing reader interaction experiences. For complex scientific concepts, video models can assist in creating AR/VR content to help readers understand these concepts through interactive methods, providing immersive learning experiences. Fourth, cross-platform communication effect analysis. Through large language model agents analyzing content communication effects across different journal media platforms, such as click-through rates, sharing rates, and engagement levels, data support can be provided for

editors to help optimize communication strategies. By analyzing search engine algorithms and user search habits, journals can be assisted in optimizing article titles, keywords, and descriptions to improve search engine rankings.

3. Challenges and Development of AI in Journal Communication

Although AI applications in journal communication offer many conveniences and innovative possibilities, they also face a series of challenges. First, accuracy and reliability issues. AI-generated content may contain errors or misleading information, particularly when handling complex scientific and technical topics where biases or even common-sense problems can easily arise. The output quality of AI models highly depends on the quality of input data, and inaccurate or biased data can lead to misleading results. Second, legal and ethical issues. AI-generated content may involve copyright problems, especially when using existing literature, images, and data where content sources are difficult to trace. Determining responsibility attribution can become complicated when generated content leads to misunderstandings or other problems. When using user data for personalized recommendations, compliance with relevant privacy protection regulations must be ensured. Third, technical and resource issues. Developing and maintaining advanced AI assistance systems requires significant investment, mainly including computing resources, algorithm models, and personnel expertise. Additionally, journal sponsors often lack relevant technical capabilities in the processes of developing, training, and managing models. Fourth, algorithm transparency and interpretability issues. Due to the black-box working mode of AI, algorithmic decision-making processes are opaque and output content is uncertain, which can cause trust issues for the strictly content-managed journal industry, particularly when explanations are needed for how AI reaches specific conclusions [17].

To better promote the development of AI in the field of journal communication, future efforts will maximize AI' s potential from multiple perspectives. AI systems will adopt more advanced algorithms and larger-scale datasets to improve content generation accuracy, better understanding and processing complex scientific topics through continuous advances in machine learning and natural language processing. Meanwhile, journal publishers may gradually establish stricter data quality control mechanisms to ensure that training data for AI models is accurate, comprehensive, and unbiased. Copyright issues will be resolved through innovative authorization mechanisms and intelligent copyright management systems, while responsibility attribution and privacy protection will be addressed through establishing clear responsibility frameworks and strengthening algorithmic auditing. The development cost of AI may decrease with technological maturation and large-scale application, and open-source algorithm models and cloud services for the journal industry will enable journal sponsors to obtain required computing resources and algorithm models at lower costs. Future AI models will place greater emphasis on transparency and interpretability, al-

lowing users to intuitively understand AI decision-making processes through visualization technologies such as knowledge graphs.

4. Conclusion and Outlook

This paper analyzes the current development state of the journal field in the intelligent media era and proposes optimization strategies for AI-enabled journal communication models under the perspective of media convergence. First, an intelligent communication data system for journal media based on the data middle platform concept performs cleaning, transformation, and integration of various types of journal media data to construct a journal communication data warehouse. Second, multi-source tagging enables user profiling and personalized recommendation, providing effective support for precision communication in journal media. Third, large language model-assisted content generation and editing optimization implement tasks such as overview generation, editing and proofreading, intelligent interaction, and communication effect analysis, providing references for journal improvement. AI is not merely an auxiliary tool but will become an indispensable part of the journal communication field. Through optimizing journal communication models, AI can help journals better adapt to media convergence trends and improve their communication effectiveness and influence.

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Author Biography: Wu Jiao (1980–), female, from Wuhan, Hubei, holds a master' s degree and is an associate editor. Her research focuses on editing and publishing.

(Responsible Editor: Li Yansong)

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