Digital Intelligence Technology Empowering Knowledge Services in Academic Journals: Mechanism of Action, Practical Challenges, and Breakthrough Paths (Postprint)

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Abstract

Objective: To address the current dilemmas in knowledge services of academic journals empowered by digital intelligence technology, including technical adaptability challenges, shortage of interdisciplinary talent, and copyright infringement risks.

Methods: In the digital intelligence era, academic journals can enhance their knowledge service capabilities and provide comprehensive, personalized knowledge services to users by strengthening user demand orientation, promoting industry-academia-research collaboration, establishing technology application evaluation and optimization mechanisms, building professional knowledge service talent teams, and improving copyright protection mechanisms.

Results/Conclusion: Based on user knowledge needs and by fully leveraging digital intelligence technology, academic journals can reshape knowledge service processes, innovate knowledge service models, and continuously enhance knowledge service capabilities.

Full Text

Preamble

Digital-Intelligence Technology Empowering Academic Journal Knowledge Services: Mechanisms, Practical Dilemmas, and Breakthrough Paths

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Abstract

[**Purpose**] To address current dilemmas facing digital-intelligence technology empowerment of academic journal knowledge services, including technical adaptation challenges, shortages of interdisciplinary talent, and copyright infringement risks. [**Method**] In the digital-intelligence era, academic journals can enhance their knowledge service capabilities and provide comprehensive, personalized knowledge services to users by strengthening user demand orientation, promoting industry-academia-research collaboration, establishing technology application evaluation and optimization mechanisms, building professional knowledge service talent teams, and improving copyright protection mechanisms. [**Results/Conclusion**] Based on user knowledge needs and by fully leveraging digital-intelligence technologies, academic journals can reshape knowledge service processes, innovate knowledge service models, and continuously improve the quality of knowledge services.

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In the contemporary era, digital-intelligence technologies represented by big data, artificial intelligence, cloud computing, and blockchain are developing at an unprecedented pace, profoundly transforming people' s lives and social operations. Digital-intelligence technology integrates the efficient data processing capabilities of digital technology with the deep analysis and autonomous decision-making capabilities of intelligent technology, enabling real-time collection, precise analysis, and intelligent application of massive data, thereby providing powerful momentum for transformation and innovation across industries. As important platforms for knowledge dissemination and academic exchange, academic journals are facing unprecedented opportunities and challenges amid this digital-intelligence wave [1]. Traditional academic journal publishing models, centered on print media with cumbersome processes and long cycles, suffer from numerous limitations in timeliness, precision, and personalization of knowledge dissemination. The intervention of digital-intelligence technologies offers new ideas and methods for the knowledge service transformation of academic journals.

1. Mechanisms of Digital-Intelligence Technology Empowering Academic Journal Knowledge Services

Digital-intelligence technology represents the deep integration of digital and intelligent technologies, encompassing a series of advanced technologies such as big data, artificial intelligence, blockchain, and cloud computing, which provide robust technical support for the innovative development of academic journal knowledge services. These technologies collaborate and complement each other to jointly construct an efficient, intelligent, and secure knowledge service ecosystem.

1.1 Restructuring Knowledge Service Processes

The deep application of digital-intelligence technology enables the restructuring of academic journal knowledge service processes. Academic journals can construct precise user profiles to provide researchers with customized services and complete solutions throughout the entire research lifecycle, including project initiation, literature analysis, project implementation, experimental assistance, academic exchange, manuscript writing, publication promotion, and outcome evaluation, thereby achieving intelligent information services [7].

First, precise topic planning. "The premise of knowledge services is understanding the knowledge needs of the nation and society" [2]. In traditional academic journal topic planning, editors primarily rely on their own professional knowledge and experience, along with limited understanding of industry dynamics, to determine topic directions. This approach involves certain subjectivity and limitations, making it difficult to comprehensively and accurately grasp frontier hotspots and trends in academic research. "The application of new technologies helps achieve problem-consciousness-oriented topic planning activities" [3]. With digital-intelligence technology, academic journals can collect massive amounts of academic data, including publication status, citation frequency, author collaboration networks, and academic conference themes. Through deep mining and analysis of this data, journals can accurately identify current research hotspots and potential research directions in various fields [4]. Machine learning algorithms in artificial intelligence can also analyze researchers' interest and behavioral data to predict future research directions they may focus on, providing forward-looking references for topic planning. By analyzing researchers' browsing records, search keywords, and downloaded papers on academic platforms, machine learning algorithms can construct user interest models to predict their future research needs. When algorithms detect that large numbers of researchers are gradually increasing their attention to an emerging field, academic journals can conduct precise topic planning to provide guidance and academic exchange services for researchers' studies.

Second, intelligent production and presentation of academic content. Content production is the core element of academic journal knowledge services. Traditional content production models rely on manual writing by authors and manual

review by editors, involving cumbersome processes, low efficiency, and susceptibility to human factors. The application of digital-intelligence technology in content production significantly improves efficiency and quality. During the author creation process, AI-assisted writing tools can provide powerful support. These tools can automatically generate paper outlines, recommend relevant references, and even polish sentences and check grammar based on keywords and research directions input by authors. In the editing and review stage, the application of artificial intelligence technology substantially improves review efficiency and accuracy, shortening the time for researchers to publish papers. Additionally, academic journals can utilize Sora text-to-video large models to achieve organic integration of text, images, audio, and animation, creating entirely new ways of presenting academic content [5].

Third, efficient dissemination and promotion. In the era of information explosion, the dissemination and promotion of academic journals are crucial. Digital-intelligence technology opens new pathways for academic journal dissemination, enabling efficient and widespread distribution. By constructing multi-channel intelligent dissemination systems, academic journals can precisely deliver content to target audiences. Utilizing various channels such as social media platforms, academic websites, and mobile applications, combined with big data analysis and user profiling technology, different types of academic content can be pushed to users interested in them. On social media platforms, based on users' fields of interest and tags, relevant academic paper abstracts and research highlights can be pushed to attract user attention and clicks. Artificial intelligence technology can also achieve personalized content recommendations, using recommendation algorithms to recommend academic literature that matches users' interests based on their historical reading behavior and search records [6]. This personalized recommendation not only improves users' efficiency in obtaining information but also enhances their stickiness to academic journals.

1.2 Innovating Knowledge Service Models

The integration of digital-intelligence technology provides broad space for innovating academic journal knowledge service models, driving journals to transform from traditional single content provision to diversified, personalized, and intelligent knowledge services. By deeply exploring user needs and combining advanced technical means, academic journals can create more attractive and competitive knowledge service models, thereby enhancing user experience and satisfaction.

First, personalized customized services. Personalized customized services represent an important development direction for academic journal knowledge services in the digital-intelligence era. With big data analysis and artificial intelligence algorithms, academic journals can deeply understand users' interest preferences, research fields, and reading habits to tailor personalized knowledge content for them. By collecting and analyzing user behavior data, academic journals can construct precise user profiles to provide researchers with

customized services throughout the entire research lifecycle. When algorithms discover that large numbers of researchers are gradually increasing their attention to an emerging field, academic journals can conduct precise topic planning to provide guidance and academic exchange services for researchers' studies.

Second, knowledge graph construction. Knowledge graph construction is one of the key technologies for digital-intelligence empowerment of academic journal knowledge services. By constructing knowledge graphs, academic journals can integrate and connect scattered knowledge resources to form a structured knowledge network, providing users with more comprehensive and in-depth knowledge discovery and exploration services. Knowledge graphs can reveal the intrinsic connections between different knowledge points, helping users discover potential research contexts and knowledge associations. When users search for a keyword, the knowledge graph not only presents a list of relevant literature but also displays a relationship graph between the keyword and other related concepts, guiding users to conduct deeper knowledge exploration. Knowledge graphs can also support academic research by helping researchers understand the development history, hotspot trends, key figures, and institutions in research fields, providing important references for research topic selection and direction determination.

Third, interactive service experiences. Interactive service experiences are important means for enhancing the quality of academic journal knowledge services. Through digital-intelligence technology, academic journals can build online interactive platforms to promote communication and interaction among authors, readers, and editors, creating a favorable academic exchange atmosphere [8]. Users can post comments, share viewpoints, and ask and answer questions within the community. After publishing papers, authors can receive timely feedback and suggestions from readers, promoting further improvement and exchange of academic achievements. Academic journals can also regularly hold online academic seminars, inviting experts and scholars to deliver keynote speeches and interact with participants in real time. This interactive service experience not only enhances users' sense of participation and belonging but also promotes the collision and exchange of academic ideas, thereby improving the influence of academic journals.

2. Practical Dilemmas of Digital-Intelligence Technology Empowering Academic Journal Knowledge Services

Currently, with the support of digital-intelligence technology, academic journals are continuously improving their knowledge service capabilities based on user knowledge needs [9]. However, due to the following dilemmas, most academic journals suffer from problems such as single knowledge service models and unclear service pathways.

2.1 Technical Adaptation Challenges

Significant differences exist among academic journals in terms of scale, resources, audience, and development goals, making technology selection and application adaptation a major challenge. Small academic journals, limited by funding and technical capabilities, often face difficulties such as high technology costs and ineffective integration when introducing advanced digital-intelligence technologies. Some small social science journals have attempted to introduce complex big data analysis systems to mine academic hotspots, but due to the lack of professional technical personnel, they cannot effectively configure and maintain the systems, resulting in low operational efficiency, inaccurate data processing results, and inability to provide strong support for the journals' topic planning. Large comprehensive academic journals may also fail to fully leverage technological advantages due to adaptation issues between technology and their business processes. For instance, after introducing intelligent review systems, some large journals have experienced significant deviations between review results and expert opinions because the systems were not effectively integrated with existing review processes and standards, affecting the fairness and accuracy of reviews and reducing review efficiency. Meanwhile, the rapid iteration and updating of digital-intelligence technologies impose tremendous pressure on academic journals to continuously upgrade. New algorithms, models, and tools constantly emerge, requiring journals to invest substantial resources in technological upgrades and updates. Failure to update technology in a timely manner will result in lagging knowledge services and declining user experience.

2.2 Composite Talent Shortage

The transformation of academic journals toward digital-intelligence knowledge services requires increasingly diverse and comprehensive talent, yet there is an extreme shortage of interdisciplinary talent who understand both academic expertise and digital-intelligence technology. Traditional academic journal editors possess deep academic backgrounds and editorial experience but lack knowledge and skills in digital-intelligence technologies such as big data analysis, artificial intelligence algorithms, and blockchain applications. This makes it difficult for editors to fully understand technical principles and effectively communicate and collaborate with technical teams during technology application, significantly diminishing the effectiveness of technology application. When constructing knowledge graphs, although editors can provide professional guidance on academic content, their unfamiliarity with graph construction algorithms and data processing techniques prevents them from jointly optimizing the structure and relationships of knowledge graphs with technical personnel, limiting the accuracy and practicality of knowledge graphs. In topic planning, the lack of composite talent makes it difficult to fully utilize big data technology to mine potential hotspot topics. Editors may only conduct simple analysis of surface data, failing to deeply explore trends and correlations behind the data, resulting in topic planning that lacks foresight and innovation. In content review, the lack

of deep understanding of the principles and parameter settings of AI review systems prevents accurate judgment of review result reliability, potentially leading to misjudgment of manuscript quality and affecting the knowledge service level of journals.

2.3 Copyright Infringement Risks

In the digital-intelligence era, academic journals face more complex and severe copyright infringement risks. With the widespread application of artificial intelligence, big data, and other technologies, copyright infringement has become more diversified and concealed. The copyright ownership of AI-generated content (AIGC) has sparked widespread controversy. Some AI writing tools can generate articles based on input instructions and data, but these articles may infringe upon original authors' copyrights by using large amounts of existing academic literature data without authorization. Big data technology makes the acquisition and dissemination of academic data more convenient but also increases the risks of data leakage and misuse. Some criminals illegally obtain academic journal databases and batch-disseminate papers for commercial purposes, seriously damaging the rights of journals and authors. Network crawler technology is abused to scrape academic journal articles without authorization, leading to illegal reprinting and dissemination that disrupts the normal dissemination order of academic journals. On social media and academic exchange platforms, users' sharing and dissemination behaviors may also trigger infringement issues. Some users share full texts or partial contents of academic journal articles in social groups or personal blogs without permission from copyright holders, posing significant challenges to copyright protection due to the rapid speed and wide scope of dissemination in the digital-intelligence environment.

3. Practical Paths for Digital-Intelligence Technology Empowering Academic Journal Knowledge Services

The revolutionary progress of information technology and its application in the publishing industry provide conditions for the high-quality development of academic journals and guarantee and intellectual support for their knowledge services [10]. In the digital-intelligence era, academic journals can enhance their knowledge service capabilities and provide comprehensive, personalized knowledge services to users through the following paths.

3.1 Strengthening User Demand Orientation

"Orienting toward user needs to improve publishing service capabilities is an important manifestation of academic journals accelerating the development of new quality productive forces, which will shape new core competitiveness and provide strong development momentum for academic journals, promoting their high-quality development" [11]. Academic journals should utilize big data analysis technology to deeply mine users' browsing history, search records, download

behavior, and other data to accurately understand their research interests and knowledge needs [12]. For example, by analyzing users' high-frequency browsing and downloading behaviors regarding papers in specific fields over a period, journals can determine users' in-depth research needs in those fields. Based on accurately grasping these needs, academic journals can provide personalized knowledge services for users. According to users' disciplinary backgrounds, research directions, and interest preferences, journals can customize exclusive knowledge push plans. For instance, for researchers in artificial intelligence, journals can push the latest algorithm research and application case analyses; for graduate students, journals can push not only cutting-edge research results in their professional fields but also relevant academic research methods and paper writing techniques. Through such personalized services, user satisfaction with knowledge services can be improved.

3.2 Promoting Industry-Academia-Research Collaboration

Industry-academia-research collaboration is an effective pathway for promoting digital-intelligence technology innovation and application in academic journals. Academic journals should actively establish cooperative relationships with universities, research institutions, and relevant enterprises to integrate resources and jointly tackle technical challenges [13]. Taking *Science China* as an example, this journal has conducted in-depth cooperation with computer science and technology schools of multiple top domestic universities, big data research centers of research institutions, and enterprises specializing in AI technology research and development. Through close collaboration among the three parties, *Science China* successfully developed an advanced intelligent semantic analysis system that can accurately identify key information such as professional terminology, research methods, and experimental data in papers, process them structurally, and construct them into knowledge graphs, providing readers with more comprehensive and in-depth knowledge association services. This achievement not only enhances the knowledge service quality and academic influence of *Science China* but also provides valuable reference experience for other academic journals in digital-intelligence technology application. Of course, during industry-academia-research collaboration, all parties should clarify division of labor and responsibilities and establish effective communication and benefit distribution mechanisms. As the demand side of knowledge services, academic journals must accurately propose technical requirements and application scenarios; universities and research institutions are responsible for technology research and innovation, providing theoretical support and technical solutions; enterprises ensure the industrialization and commercialization of technology to guarantee its practical operation [14]. Through this complementary cooperation model, digital-intelligence technology innovation and application in the academic journal field can be accelerated, enhancing the core competitiveness of academic journals.

3.3 Establishing Technology Application Evaluation and Optimization Mechanisms

To ensure that digital-intelligence technology achieves maximum effectiveness in academic journal knowledge services, a comprehensive technology application evaluation and optimization mechanism should be established. *Acta Mathematicae Applicatae Sinica* regularly conducts comprehensive evaluations of digital-intelligence technology application effects in the journal publishing process. Through data analysis and user feedback, the journal gains in-depth understanding of the operational status of technologies such as intelligent typesetting systems, online submission and review platforms, and literature recommendation algorithms. Regarding problems identified during evaluation, *Acta Mathematicae Applicatae Sinica* promptly organizes technical teams and editorial staff to discuss optimization solutions. For instance, upon discovering that the literature recommendation algorithm' s recommendations poorly matched user interests, the technical team optimized the algorithm by readjusting parameters and increasing analysis dimensions of user behavior data, while editorial staff provided professional suggestions from an academic perspective to ensure recommended literature better met user needs in terms of academic quality and relevance. After multiple optimizations, the literature recommendation accuracy of the journal was effectively improved, and user satisfaction with the recommendation service significantly increased. Therefore, academic journals can also continuously identify and solve problems in technology application through such continuous evaluation and optimization mechanisms, constantly improving knowledge service quality and user experience.

3.4 Building Professional Knowledge Service Talent Teams

Talent with academic literacy and service capabilities is an important guarantee for promoting the improvement of academic journal knowledge service capabilities [15]. Academic journals should strengthen training for editorial staff, regularly organizing them to participate in academic seminars and professional training courses to enhance their academic levels and professional qualities. For example, editors can be arranged to attend frontier academic conferences in relevant disciplines to understand disciplinary development dynamics and latest research achievements, enabling better topic planning and manuscript review. Journals should also focus on cultivating editors' service awareness and communication abilities to enable them to establish good interactive relationships with authors and readers. Through service awareness training and communication skills training, editors can learn to listen to users' needs and opinions and solve their problems promptly and effectively. Additionally, journals should actively introduce professional talent with interdisciplinary backgrounds and information technology capabilities to inject new vitality into knowledge service innovation. For example, introducing talent with backgrounds in computer science and information management to be responsible for the digital platform construction and data analysis of academic journals can enhance their technical

level and service quality.

3.5 Perfecting Copyright Protection Mechanisms

In any era, academic journals must legally use literature data while protecting the rights of authors and copyright holders when providing knowledge services. Therefore, academic journals must perfect copyright protection mechanisms, clarify digital copyrights, explore copyright commercialization potential, and strive to maximize the utilization of intellectual property [16]. Whether digitizing journal content for uploading to online platforms for readers to search, read, and download, or organizing and compiling articles from journals to form new knowledge products, strict compliance with copyright laws and regulations is required. When copying literature, the quantity and scope of copying must be ensured to be within the range of fair use or statutory licensing; when disseminating literature, authors and sources must be indicated to protect authors' copyright. "Copyright runs through the entire process of knowledge services, and copyright law protects the legitimate rights and interests of copyright holders, publishing institutions, users, and knowledge service platforms, escorting the stable development of knowledge services" [17]. *Academic Monthly* clearly states in its copyright agreement that the journal has the right to digitize papers and disseminate them on its official website, cooperative databases, and other platforms, while authors enjoy the copyright of their papers and have the right to use them in specific scenarios such as personal academic achievement display. Journals should also clearly elaborate on key information such as the scope and duration of copyright transfer to avoid potential copyright disputes. Regarding copyright management processes, a strict review system must be established. During the manuscript acceptance stage, copyright self-inspection should be conducted on submitted papers to ensure they do not involve infringement such as plagiarism. After paper publication, copyright dynamics should be continuously tracked, and timely measures should be taken against unauthorized reprinting and usage.

"From informatization to intelligence in academic journal knowledge services, the participation of artificial intelligence technology can not only optimize knowledge expression, cognition, and recreation but also become an expression method that changes academic journals and thereby changes the world" [18]. This paper deeply analyzes the mechanisms, practical dilemmas, and practical paths of digital-intelligence empowerment of academic journal knowledge services. Looking forward, digital-intelligence technology will continue to deeply penetrate the field of academic journal knowledge services, bringing about more profound transformations. With continuous technological maturation and innovation, academic journals are expected to achieve comprehensive intelligence and personalization of knowledge services. Big data analysis will more accurately understand user needs, and combined with deep algorithms of artificial intelligence, provide ultimate personalized knowledge push for users, truly realizing a "thousand people, thousand faces" knowledge service experience.

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Note: The references section contains some duplicate entries and formatting inconsistencies that were present in the original text and have been preserved as required.

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