Research on the Application of Artificial Intelligence in Journal Publishing (Postprint)

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Abstract

Objective: This study aims to comprehensively examine the current application status and potential benefits of artificial intelligence technology in the field of journal publishing, provide theoretical foundation and practical guidance for the digital transformation and innovative development of the journal publishing industry, promote simultaneous enhancement of journal publishing quality and efficiency, and accelerate the process of intelligentization in China' s journal publishing industry. Methods: Through the comprehensive application of literature review method and inductive synthesis method, this paper systematically examines recent application outcomes and trends of artificial intelligence technology across various stages of journal publishing. Results: Taking the current development status of artificial intelligence as a starting point, this paper analyzes the application scope and boundaries of artificial intelligence in journal publishing, and provides a detailed examination of artificial intelligence technology applications in three key areas: submission, peer review and proofreading, and typesetting. Conclusion: The introduction of artificial intelligence has brought unprecedented opportunities for transformation to the journal publishing industry. Through targeted application of artificial intelligence technology, the journal publishing industry can substantially enhance the efficiency and quality of publishing operations. Therefore, journal publishing institutions should proactively adopt artificial intelligence to adapt to the development demands of the new era, and promote China' s journal publishing industry toward higher levels of intelligence, precision, and efficiency.

Full Text

Preamble

Journals serve as crucial vehicles for academic research and knowledge dissemination, playing an irreplaceable role in advancing scientific progress, cultural

exchange, and social development. As artificial intelligence technology demonstrates enormous application potential and value across manufacturing, healthcare, finance, and other industries, its introduction into various workflows of journal publishing has become inevitable [**?**, **?**]. With its powerful capabilities in data processing, image recognition, and deep learning, AI technology has brought transformative changes to journal publishing. For instance, in manuscript proofreading, AI can rapidly identify grammatical, spelling, and formatting errors, significantly improving both efficiency and accuracy. In intelligent layout design, AI not only reduces the workload of layout staff but also automatically performs typesetting according to journal format requirements and article content, creating more rational and aesthetically pleasing pages. Furthermore, natural language processing and data mining technologies in AI can conduct in-depth analysis and mining of journal articles to extract key information and innovative points, providing editors and readers with more precise content recommendations and services. Faced with these changes, integration with AI has become an inevitable development trend [**?**]. In the future, as AI technology continues to mature and improve, its applications in journal publishing will become more extensive and profound. Publishing institutions should actively embrace this transformation, strengthen integration with AI technology, continuously enhance their innovation capabilities and competitiveness, and provide higher-quality, more efficient services for academic research and knowledge dissemination. This paper employs inductive and summarization methods to systematically review the latest application achievements and trends of AI technology in journal publishing, focusing specifically on its implementation in manuscript submission, review, and layout processes. Through in-depth analysis, we find that further deep integration between AI and journal publishing will facilitate the advancement of China' s journal publishing industry toward higher levels of intelligence, precision, and efficiency. The content of this study can also provide valuable reference for subsequent research on the deep integration of AI technology with the journal publishing industry.

1. Overview of Artificial Intelligence

The concept of Artificial Intelligence (AI) was formally proposed by McCarthy at the Dartmouth Conference in 1956. Since then, AI has undergone multiple stages from germination to preliminary exploration and then to vigorous development, with each technological leap marking humanity' s progress toward simulating and surpassing its own intelligence. In the early research stages, due to technological limitations, although scientists held great aspirations and expectations for AI, they failed to construct algorithms that could truly simulate human intelligence [**?**]. AI research during this period remained primarily at the level of theoretical discussion and preliminary attempts, without forming a complete technical system or broad application scenarios. However, with the substantial improvement in computer performance in the 1980s and the popularization of the Internet, AI research ushered in a new spring. Machine learning and data mining became research hotspots during this period. The emergence

of emerging technologies such as decision trees, support vector machines, neural networks, and genetic algorithms laid a solid foundation for the widespread application of AI.

Entering the 21st century, AI has ushered in its third wave of development, with deep learning becoming a breakthrough hallmark. Deep learning is a machine learning method based on artificial neural networks that simulates the working principle of human brain neurons to achieve automatic feature extraction and classification of complex data. This revolutionary technological breakthrough has enabled AI technology to achieve significant development in image recognition, speech recognition, natural language processing, and other fields, not only improving system accuracy and efficiency but also promoting broad and in-depth applications of AI in education, finance, healthcare, transportation, and other sectors [**?**, **?**].

Today, AI has made remarkable progress in multiple domains. In smart agriculture, Huawei and its partners have launched smart farm solutions that enable precise monitoring and control of crop growth environments, increasing the proportion of personalized crop planting to 60% while improving pest and disease warning accuracy to 95% and effectively reducing pesticide usage. In smart education, New Oriental' s AI-powered intelligent learning platform can provide personalized learning paths based on students' progress and abilities, improving score efficiency by 40% and significantly enhancing learning interest and motivation. In smart home systems, Xiaomi' s ecosystem enterprises have developed intelligent appliance systems supporting whole-house smart connectivity, allowing users to remotely control appliances via voice or mobile apps, increasing life convenience by 70% while reducing energy consumption by 20%. In smart transportation, Didi' s AI traffic brain predicts urban traffic flow through big data analysis and optimizes route planning, reducing urban congestion index by 20% during peak hours and decreasing passenger waiting time by 30%. In smart retail, Alibaba' s unmanned supermarkets employ facial recognition, RFID, and other technologies to enable autonomous shopping and rapid checkout, improving shopping experience by 65% and reducing operational costs by 40%. In environmental protection, Tencent' s environmental protection big data platform uses AI algorithms to analyze environmental monitoring data, accurately predicting air quality trends with warning accuracy improved to 85%, helping governments take environmental protection measures in advance to effectively improve air quality. In smart security, Hikvision' s intelligent video surveillance system combines deep learning algorithms to identify abnormal behaviors in real time and automatically trigger alarms, increasing security response speed fivefold and significantly improving safety coefficients in public places.

These machine learning algorithms have found extensive practical applications, achieving remarkable results in fields ranging from image recognition and speech recognition to natural language processing. They have not only improved computer intelligence levels but also brought great convenience to people' s lives and work. With continuous technological development, machine learning will

undoubtedly play an even greater role in more fields, driving AI technology forward.

2. Defining AI Applications in Journal Publishing

Artificial intelligence is a technology that enables computers to possess perception, reasoning, and behavioral capabilities similar to humans. With the continuous development of Internet technology, AI technology has been constantly evolving and improving in practice. Machine learning, as a crucial means of realizing AI, has different algorithms with unique applicable scenarios and advantages [**?**]. For example, the k-Nearest Neighbor (KNN) algorithm performs classification or regression by calculating distances between samples to be predicted and known samples; Random Forest improves prediction accuracy and stability by constructing multiple decision trees; Decision Tree is an intuitive and easily understandable classification and regression method that represents decision processes through tree structures; and Deep Learning, as mentioned earlier, is a powerful machine learning technology that simulates human thinking and learning processes by constructing deep neural networks.

This study argues that when discussing AI applications in the field of journal publishing, true AI applications should be technological implementations developed based on machine learning algorithms. As a key branch of AI, machine learning embodies AI's core capability—self-learning and adaptation—by training on known data to build prediction models and then using these models to predict and analyze unknown data. In contrast, traditional computer automation programs such as literature search, journal search, and reference checking software, although demonstrating certain automation features in data processing, cannot be considered true AI applications because they do not employ machine learning algorithms for training and optimization. These functions primarily rely on preset rules and algorithms for statistical analysis of data, lacking the ability for self-learning and adaptation. Of course, if these traditional functions further evolve in the direction of AI, they may become part of AI applications. For example, intelligent search engines can leverage machine learning algorithms to deeply analyze users' search records and preferences, thereby providing more personalized search results. Similarly, personalized report generation systems based on big data technology can create customized reports that meet users' specific needs by deeply mining and analyzing user data. These functional upgrades not only improve the accuracy of data processing and analysis but also provide users with more intelligent and personalized service experiences.

3. AI Applications in Journal Publishing

Journal publishing is a complex and cumbersome process involving multiple critical stages such as manuscript reception, review, editing, and proofreading. These stages involve not only heavy workloads but also often monotonous and repetitive tasks that consume substantial time and energy from editorial staff.

However, with the continuous development and improvement of AI technology, its application in the journal publishing workflow is gradually demonstrating enormous potential and value.

3.1 Convenient Submission

The introduction of online manuscript management systems based on AI technology undoubtedly represents a comprehensive upgrade from traditional manual manuscript reception models. This transformation not only addresses the pain points of low efficiency and frequent errors but also builds a more efficient and convenient communication bridge between editorial departments and authors. In this transition, Qinyun Manuscript Processing System and Magtech Manuscript Processing System, as two mainstream platforms, have become the preferred choices for numerous journal editorial departments due to their powerful functionality and user-friendly design [**?**]. Both systems integrate AI-based automatic recognition technology, making manuscript information extraction unprecedentedly simple and efficient. Authors only need to follow the friendly interface guidance to easily upload their manuscripts, and the system will immediately activate its intelligent analysis engine to automatically extract core information such as manuscript titles, author names and affiliations, abstracts, keywords, and funding information from complex document content. This intelligent processing flow greatly reduces the burden on authors, avoids errors that may arise from manual information entry, and makes the submission process smoother, allowing authors to focus on content creation without being distracted by tedious formatting issues. For editorial departments, this means receiving more standardized and structured manuscript data, laying a solid foundation for subsequent processing.

Beyond the efficiency of information extraction, AI technology has significantly optimized the overall manuscript management workflow [**?**]. Traditionally, editorial departments needed to spend considerable time and effort manually registering manuscript information and creating and maintaining complex Excel spreadsheets. Now, all manuscript-related information can be automatically stored in the system, forming a well-organized and easily searchable database. Editorial staff can quickly obtain required information by simply setting search conditions, with article titles, author affiliations, and research directions all clearly visible at a glance, greatly improving work efficiency. Additionally, the system supports diverse statistical analysis functions, such as monthly/annual manuscript submission statistics, expert review volume analysis, and manuscript acceptance rate monitoring, providing rich data support for editorial departments. This data not only forms the foundation of daily operations but also serves as an important basis for strategic planning and content layout optimization. By analyzing manuscript research directions and quality distributions, editorial departments can better grasp academic trends, identify research hotspots, and timely adjust topic selection and column design to ensure the cutting-edge nature and attractiveness of journal content. Simultaneously, the data provided

by the system is equally indispensable for continuous optimization of the review process and rational allocation of expert databases. In summary, AI-based online manuscript management systems not only achieve automation and intelligence in manuscript processing workflows but also provide journal editorial departments with a comprehensive and precise decision support system, helping them stand out in fierce market competition and continuously enhance their editorial capabilities and academic influence.

3.2 Intelligent Review and Proofreading

The efficiency and quality of peer review are the cornerstones ensuring the survival and development of academic journals, directly affecting the academic value of journal content and the length of publication cycles. When editors face various manuscripts, they can hardly grasp their academic frontiers and innovations comprehensively and accurately by themselves. At this point, professional judgment from peer reviewers becomes particularly crucial [**?**]. To effectively improve review efficiency and ensure quality, the application of AI technology is particularly necessary. This technology can intelligently recommend the most suitable reviewers based on manuscript content, editors' specific requirements, reviewers' professional qualifications, past review experience, and domain expertise, thereby significantly shortening review cycles while improving review precision.

In the AI era, journal editors primarily use intelligent review assistance systems and sensitive word recognition systems for manuscript review. China implements a "three reviews and three proofreads" system, requiring manuscripts to undergo three rounds of proofreading. Intelligent review assistance systems can further enhance the intelligence level of the review process [**?**]. First, the system conducts in-depth analysis of paper content, including article structure, research methods, data sources, analysis processes, and conclusions. Simultaneously, the intelligent review assistance system comprehensively examines and analyzes authors' academic backgrounds, research fields, and previous publications. Based on comprehensive consideration of this information and reviewers' actual needs —such as review scheduling, review focus, and journal-specific positioning—the system generates targeted review comments. These comments include not only evaluations of the paper's academic quality, innovation, and practicality but also accurately identify potential deficiencies and problems, providing authors with specific and constructive revision suggestions [**?**]. Notably, intelligent review assistance systems can continuously learn and analyze large volumes of review comment data. By comparing review standards and preferences across different fields and journals, the system can gradually grasp the review characteristics and requirements of specific journals, thereby generating more professional and journal-aligned review comments. This not only helps improve review efficiency and quality but also provides strong guarantees for the academic quality and reputation of journals. Sensitive word recognition technology serves as a powerful tool to ensure manuscript content compliance. Faced with potential sensitive

word variants in manuscripts—such as pinyin substitutions, abbreviations, and split expressions—editors must remain vigilant. By designing more sophisticated sensitive word recognition algorithms, the system can efficiently and accurately identify and mark these potential risk points, effectively improving detection efficiency and ensuring the health and positivity of journal content [**?**].

3.3 Journal Layout

The application of AI in journal layout is gradually reshaping the publishing industry, particularly its breakthroughs in automatic typesetting and automatic table of contents generation, which have brought revolutionary changes to editorial work [**?**]. This technological introduction not only greatly improves layout efficiency but also ensures consistency in journal design and high standards of publishing quality, providing readers with a more professional and convenient reading experience. In automatic typesetting, AI through deep learning algorithms can accurately identify and strictly follow journal-specific layout specifications. These specifications often encompass multiple dimensions including fonts, font sizes, line spacing, paragraph formats, and image and table embedding methods, ensuring unified and aesthetically pleasing journal styles. Traditionally, these layout tasks required manual completion by professional typesetters, which was not only time-consuming and labor-intensive but also prone to errors due to human factors. AI, however, can automatically complete the entire process from article import to final layout presentation according to preset rules, including complex operations such as text alignment, paragraph adjustment, and text wrapping around images, achieving highly efficient automation of layout work. This automation not only improves work efficiency but, more importantly, ensures that each issue maintains consistent page design, enhancing the journal' s professionalism and readers' reading experience.

In automatic table of contents generation, AI also demonstrates remarkable capabilities. Through in-depth analysis of article titles, author information, keywords, and other data, AI can intelligently construct the journal' s table of contents architecture. This process requires no human intervention and can automatically generate hierarchical and well-organized tables of contents, greatly improving their accuracy and generation efficiency. For readers, this means they can more quickly locate content areas of interest, whether searching for articles on specific topics or looking up all works by a particular author, making the process more convenient and efficient than ever before. Additionally, automatic table of contents generation can effectively reduce inconsistencies between the table of contents and main text content caused by human error, thereby improving the overall quality and professionalism of the journal [**?**].

Notably, AI applications in journal layout are not limited to automatic typesetting and automatic table of contents generation. As technology continues to advance, AI can also intelligently recommend the most suitable layout schemes and visual effects based on journal brand characteristics and target reader groups, providing more creative space for personalized journal design [**?**]. Simultane-

ously, through integration with other AI technologies such as big data and natural language processing, AI can more deeply analyze readers' reading behaviors and preferences, thereby providing strong data support and strategic suggestions for journal content optimization and personalized content push.

Although AI technology applications in journal publishing have achieved initial success, their deep integration with journal publishing remains in the exploratory stage, and the future development path remains long and challenging. As key forces driving this process, journal editorial departments should actively embrace AI technology, explore more application scenarios in editorial workflows, and aim to reduce editorial staff workload while freeing up more time and energy to focus on creating high-quality, exquisite, and highly readable journal content. The introduction of AI technology has brought unprecedented efficiency gains to journal editorial departments. Through automated manuscript information processing, intelligent proofreading, intelligent layout, automatic table of contents generation, and other functions, editorial staff can be liberated from tedious format adjustments and data entry work, allowing them to devote more energy to content selection, optimization, and innovation. This will be more conducive to improving the overall quality of journals and enhancing their attractiveness and competitiveness. Journal editorial departments need to continuously learn and adapt to new technologies, establish comprehensive AI-assisted editorial systems, cultivate interdisciplinary composite talents, and explore the optimal path for deep integration with journal publishing.

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