Reflections on the Application of Artificial Intelligence Technology in Journalism and Communication: Postprint

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Abstract

Objective: To investigate the application of artificial intelligence technology in the field of news communication, aiming to provide insights for the innovative development of the news media industry.

Methods: This study analyzes the development trends of science and technology utilization in news communication and examines the application of artificial intelligence technology within this domain.

Results: The findings clarify that big data and algorithmic technologies constitute the core of artificial intelligence applications in news communication, with targeted discussions on their deployment in news production and news distribution stages.

Conclusion: Empowered by new-generation artificial intelligence technologies, the news communication field will encounter new development opportunities. Big data and algorithmic technologies will emerge as the core of AI applications in news communication, while data and algorithms will become critical drivers for the intelligent transformation and development of both news production and distribution stages.

Full Text

Reflections on the Application of Artificial Intelligence Technology in the Field of News Communication

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Abstract

Purpose: This study examines the application of artificial intelligence technology in the field of news communication to provide insights for the innovative development of the news media industry. **Methods:** We analyze the developmental trends of science and technology utilization in news communication, as well as the specific applications of AI technology in this domain. **Results:** The study identifies big data and algorithmic technologies as the core of AI applications in news communication, with targeted discussions on their deployment in news production and distribution ends. **Conclusion:** Empowered by next-generation AI technologies, the field of news communication will embrace new development opportunities, with big data and algorithmic technologies serving as the core of AI applications. Data and algorithms will become the key drivers of intelligent transformation in both news production and distribution.

Keywords: news communication; artificial intelligence; technology application; big data; news commentary

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Artificial intelligence technology represents a modern approach aimed at imbuing machines with intelligent attributes, enabling them to foresee and appropriately perform various functions within their contexts. Across psychology, neuroscience, biology, statistics, and linguistics, researchers hold divergent views on "intelligence," with most considering it a difficult and complex attribute. Current AI technology remains far from achieving "complete intelligence," and its development fundamentally depends on continuous scientific advancement. In the evolution of the news industry, AI applications have penetrated every aspect of journalistic practice. From a general news workflow perspective, AI technology involves innovations in news gathering, editing, distribution, and commentary, profoundly transforming information and communication in journalism. Over the past decade, with the rapid development of cloud computing, big data, and neural networks, big data and algorithmic technologies have emerged as a primary category of AI applications in news communication, achieving significant advances in computer vision, speech recognition, and numerous other domains.

In the process of digital and intelligent convergence, news media information has aggregated on internet platforms. With the rise and popularity of social networks, new technologies have once again transformed the news information ecosystem, shifting distribution platforms toward various emerging social media outlets. Traditional and digital media possess distinct characteristics. Throughout the developmental history of science and technology application in news communication, traditional media have gradually been liberated from the constraints of limited bandwidth and print space. Against a digital backdrop, news media can now carry vastly more information than before, while diversification has become both a requirement and a challenge for traditional media. In terms of speed, the traditional media industry has entered an era of "velocity competition" on the internet [1]. Internet-based information content and presentation

modes are highly diverse and can refresh continuously around the clock, disrupting conventional news workflows. Consequently, today' s rapidly advancing technology, with its escalating demands for news communication and pursuit of faster information delivery, poses greater challenges to news production. In this context, traditional media must develop deeper understanding of internet-era technologies and trends to achieve substantial growth.

The integration of traditional and new media, connecting various internet technologies and platforms, enables not only complementary content but also mutual learning of technologies and concepts, thereby accelerating media industry development. Rapid internet technology development has also driven transformation in communication concepts and methods, allowing traditional and new media to interact on unified platforms. This media convergence is characterized by diversity, fostering both rapid industry development and expanded opportunities for China' s news sector.

1. Development Trends of Science and Technology Application in News Communication

Driven by scientific and technological advances, news production and communication continue to transform. Early journalism largely aimed to attract the broadest possible readership within limited time or space. However, with the development of internet technology and information distribution technologies, information reach has gradually narrowed and become more personalized. In the era of rapidly developing social websites, social network information has partially replaced traditional news distribution. Through internet community interaction and active audience engagement, media can disseminate news more extensively.

In social media, information dissemination is characterized by weak spatiotemporal constraints and platform-based mediation replacing traditional reporting. Online forums and social media provide communication channels for mass community users, granting journalists access to boundless spatiotemporal opportunities for exchanging and gathering information online. Unlike professional media institutions that emphasize systematic information production processes, the general public typically collects scattered information roughly, which still requires media integration to become more compelling content.

2. Application of Artificial Intelligence Technology in News Communication

At the Dartmouth Conference, humanity first proposed the concept of AI, sparking the initial wave of AI enthusiasm. To date, AI technology experienced two downturns in the early 1970s and late 1980s. In recent years, however, brain-inspired technology has provided machine learning with novel operational models, yielding tremendous progress in processing capabilities and deep learning. The continuous development of new technologies and reduced research costs

have refocused attention on AI research. Today, AI is widely applied in graphics recognition, text recognition, license plate recognition, autonomous driving, and other domains.

AI encompasses numerous fields and fundamentally constitutes a discipline concerning how to create machines with intelligent thinking that simulate and extend human intelligence. Based on this definition, AI aims to simulate human intelligence, though this characterization appears somewhat ambiguous. In terms of problem-solving capabilities, AI can be categorized as "weak" or "strong" [2]. "Weak" AI, or narrow AI, targets specific problems requiring high intellectual computing power, while "strong" AI possesses human-like intelligence with comprehensive, broad thinking and problem-solving skills. Furthermore, based on human understanding of problems, strong AI can be divided into "general AI" and "super AI," with the latter representing computers surpassing the human brain. Despite various AI types and expectations, even renowned applications like AlphaGO remain confined to specific industries and domains.

In information dissemination, AI technology development and application also fall under the "weak" AI category. Numerous global examples demonstrate AI' s routine use in news production workflows. Current AI utilization in news communication can be divided into three types: first, large media organizations with high technology as their main body; second, influential mainstream media with strong AI focus that promotes development and application in their own news industries; and third, small tech media targeting specialized intelligent information services. Among these, mainstream media have long applied AI to news reporting—for instance, Amazon began using Wordsmith machines to write financial reports for publicly traded companies in 2014 [3].

AI' s rapid adoption in journalism largely stems from its advantages distinguishing it from human work patterns. AI' s primary task involves performing tedious foundational work, freeing journalists to engage in more complex, high-quality reporting and analysis. AI can help journalists analyze various data, verify patterns and trends, and discover underlying causes and significance. Overall, AI in news media offers advantages including precise content, rapid response, and personalized content distribution.

Currently, mainstream AI technologies in information technology include machine learning, automation, and data processing, primarily applied across three major news production domains: news gathering, news production, and news distribution. Through big data, algorithms, data mining, natural language processing, and natural language generation, these technologies enable automatic collection of news information, automated news production processing, user data analysis, and distribution—all employing weak AI for news production. The core of AI technology application in media lies in utilizing big data and algorithmic technologies.

3. Impact of Artificial Intelligence Technology in News Communication

As AI technology continues developing, it has attracted increasing attention in news reporting and information dissemination. AI's impact on the news industry manifests in several aspects. First, it enables journalists to better serve audiences. AI technology can produce news content tailored to different audience needs and preferences. For example, robot writing allows audiences to access the latest, most important information immediately, providing better, faster, and more convenient services. Correspondingly, some personalized customized news products have emerged, offering news services based on users' different hobbies and demands to achieve customized content production, which will bring users improved experiences.

Second, AI makes information dissemination more precise and efficient. Due to mature big data technology and deep learning algorithms, AI can already analyze and predict user behaviors such as browsing, liking, and forwarding. Based on this transformed information dissemination model, people can obtain relevant information promptly and select needed news content according to their requirements. Consequently, AI technology can more accurately grasp audience group needs, providing more personalized, customized, and precise information services.

Third, AI enables news reporting with greater depth and breadth. AI technology can help journalists process and refine large volumes of material, providing audiences with more substantive news content. For instance, when covering major events, AI can organize and integrate generated content, helping journalists save time and energy to complete in-depth reporting while better informing audiences about event developments, outcomes, and underlying causes.

Big data and algorithmic technologies have transformed news dissemination processes. Social media provides numerous individual users with decentralized, instant communication methods centered on individuals and accessible from any location. Algorithmic and big data communication technologies in social media eliminate opinions from people with different viewpoints or positions, creating "filtering" and "repetition" phenomena. Each person' s accessible reality becomes fragmented into many separate spaces. In fact, because rules strictly constrain information, limiting it to "filtered" spaces, this becomes a practice of working behind closed doors, allowing social network users to see only content that aligns with their thinking.

In the social network era, journalists often obtain news through community websites, forums, and other online platforms, while social media acquires news through networks [7]. This causes community site algorithms to permeate news dissemination and diffusion, with news media losing some rights over news manufacturing. Search engines and social media operate in visible and invisible ways, with search results sometimes determined by search engines. To compete for click-through and reach rates, many news media regard social media as a

new medium for news production, using community information to gather intelligence, observe reports from other media, identify hot topics, and monitor public opinion trends [8]. In summary, in the social media era, technology companies have significantly impacted news media production and warrant attention.

4. Application of Big Data and Algorithmic Technology in News Production

Many researchers refer to "robot journalism" as an emerging news production model formed during information technology development. In contemporary society, all human activities are digitally stored in massive datasets within enormous information systems, including voice, image, text, and other information forms, as well as unstructured data such as social media comments and user-generated information like emails and other texts. On social networks, humans share experiences and ideas by establishing connections. Users can build contacts with personal profiles (names, email addresses, photos, and other images) and communicate with other users, sharing experiences or seeking needed information, even from the world' s best sources. Social media helps people find connections by establishing interpersonal links on platforms, making the world more open. For example, Facebook and Twitter have become social platforms providing venues for exchanging and sharing ideas. Various subtle human social activities conducted digitally can be used for nuanced, potential connections and even applied to prediction [4]. Using computer technology to find new development directions and applying it to "data mining," media can use AI technology to locate news material sources online, generate reporting inspiration, observe trends, conduct investigations, and monitor events and topics. According to Beckett' s research, approximately 50% of media workers have used AI technology.

Today, news reporting through internet platforms has become commonplace, with journalists often leveraging computer technology convenience to obtain data from relevant databases or professionals [5]. During the Web 2.0 era, this AI technology was developed to search for information online, identify sources and targets, and conduct investigations. Big data journalism extends previous news practice methods, inheriting both accurate journalism emphasizing investigation and data science application, and computer-assisted news reporting focusing on utilizing computer-aided functions in all news production stages while emphasizing data collection and analysis.

The big data journalism production process can be roughly divided into three stages: data acquisition, data analysis, and data visualization, which respectively involve collecting data, identifying similar patterns from different user needs, and integrating them into calculations. This process includes analyzing data, filtering data, visualizing data, and finally generating specific information [6]. Big data serves as an information production method whose key lies in screening and analyzing massive, spatiotemporally distributed data, transforming it into interpretable methods readers can understand, and ultimately

converting data into new information through visual technology.

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5. Application of Big Data and Algorithmic Technology in News Distribution

Big data and computational technologies affect not only modern information collection but also information resource distribution. Big data serves as both important news information and the foundation for deep audience understanding. Comprehensive research on audience psychology, needs, and behavioral habits using big data enables better fulfillment of audience demands [9]. Communities serve as media for news organizations to disseminate and analyze information, with many news media now operating fan pages on social networks and employing community journalists responsible for social media information.

Social news editors perform diverse tasks including sourcing news, publishing on community sites, and communicating with users through these platforms. Essentially, social news editors function as "social media administrators" on community sites, apart from traditional reporters and editors [10]. During the "gatekeeping" stage, their information evaluation prioritizes increasing click-through rates, traffic, and reach as primary assessment metrics. A normative behavioral model has emerged for social media visibility. Social news editors understand reader-media interactions—such as likes, comments, and shares—through social networks, using this understanding to determine appropriate actions or lead writing [11].

The close production-distribution relationship between social media and news organizations represents a modern technology-based news dissemination method, but it also constrains media production and marketing by social network algorithms. The core issue in social media production workflows involves determining users' primary messages to influence their interaction. Social news editors observe and research user-news interactions, adjusting news material selection, headline writing, and commentary approaches to achieve higher readership and engagement [12]. In this information production and sales ecosystem, technology company backends actually control the gates, while news media operate under these constraints.

As AI technology develops and matures, it has been widely applied across all aspects of the news media industry. While this technological development significantly promotes the news communication field, it also raises many concerns requiring attention. If AI technology is applied to news media work merely as a technological replacement, it cannot simulate "human thinking" at a fundamental level. Essentially, AI technology application represents not just a choice but an upgrade of media philosophy. When applying AI technology to news communication, media must not be driven solely by technology nor allow technological momentum to deviate from the correct path of journalism. Therefore, regardless of what technologies are employed in news communication, media must maintain their independence and authenticity to better apply technology to concrete journalistic practice.

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