The Reconfiguration of News Content Production by Machine Writing in the Intelligent Media Era: Postprint

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Abstract

Transformations in the field of journalism and communication have always been closely related to communication technology. Currently, with the rapid development of communication technology and the advent of the intelligent media era, artificial intelligence is comprehensively permeating all aspects of the field of journalism and communication, among which machine-automated production of news content has become one of the important applications. An increasing number of media organizations both at home and abroad have begun to apply machine writing, which has received widespread attention from the industry and academia. This paper systematically reviews the demonstrated advantages and existing problems of machine writing in news content production against the backdrop of artificial intelligence, and based on this analysis, explores future trends of human-machine collaboration in news content production within the field of journalism and communication, as well as the consequent optimization and reconstruction of traditional news content production models.

Full Text

The Reconstruction of News Content Production by Machine Writing in the Age of Intelligent Media

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Abstract

Transformation in the field of journalism and communication has always been closely related to communication technologies. With the rapid development of communication technologies and the advent of the age of intelligent media, artificial intelligence is comprehensively permeating every aspect of journalism and

communication, among which the automated production of news content by machines has become a significant application. An increasing number of domestic and foreign media outlets have begun to apply machine writing, attracting widespread attention from both industry and academia. This paper systematically examines the advantages and existing problems of machine writing in news content production against the backdrop of artificial intelligence, and on this basis, analyzes and explores the future trend of human-machine collaboration in news content production within the field of journalism and communication, as well as the optimization and reconstruction this brings to traditional news content production models.

Keywords: Machine Writing; Artificial Intelligence; Human-Machine Collaboration; Content Production; Production Reconstruction

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The information revolution has ushered us into an era of intelligent media characterized by high technologies such as artificial intelligence, 5G, big data, and algorithms. Intelligent technologies have comprehensively penetrated the core processes of traditional media news production, and machine writing is bringing revolutionary changes to the field of journalism and communication. Regarding machine writing, some journalists welcome it with open arms, while others worry about losing their jobs in the future. What unique advantages does machine writing possess? How should we understand the transformation in news content production triggered by machine writing? How can humans and machines achieve better collaboration and value alignment in content production in the future? These are all questions worthy of our exploration.

1. Transformation: Machine Writing Driving Innovation in Content Production

Machine writing represents a significant innovation that combines artificial intelligence, big data, and other technologies with media practices in the communication field. It primarily refers to machines learning news writing from human-curated databases, selecting appropriate algorithms for different projects, and automatically generating articles for distribution to users within a short timeframe. This technology emerged in the early 21st century. In 2001, Google began recommending personalized news in the United States, marking the beginning of machine-curated news. In 2009, the Intelligent Information Labora-

tory at Northwestern University developed StatsMonkey, which automatically generated a news article about Major League Baseball' s postseason, giving rise to AI programs that automatically recognize, analyze, and produce sports reports [1]. In 2014, the Associated Press began using intelligent robots to review machine-generated articles in addition to employing machine writing itself. Subsequently, the application of artificial intelligence in journalism and communication gradually expanded, and machine-automated news content became commonplace to the public.

In 2015, Tencent' s robot Dreamwriter wrote and published a financial news report, heralding the beginning of machine-generated journalism in China's media industry. Two months later, Xinhua News Agency launched its "Kuai Bi Xiao Xin" (Fast Pen Little Xin) writing robot project, primarily for automatically writing financial and sports articles. Following these impressive demonstrations, many mainstream media outlets and internet companies increased their investments, with notable writing robots emerging such as Alibaba' s AI copywriting tool, Baidu's Writing-bots, the China Science Daily's science news writing robot "Xiao Ke," and Shenzhen' s Giiso writing robot. These systems can rapidly and automatically collect, aggregate, and generate content, driving further innovation in media content production. Compared with manual writing, machine writing can leverage AI technology to quickly accomplish information gathering, precise processing, and accurate judgment—advantages that are incomparable to human capabilities.

1.1 Speed

Speed and high efficiency constitute one of machine writing' s greatest advantages over humans. Through an automated workflow of data collection, analysis, template application, and article generation, Tencent' s Dreamwriter robot can deliver news and related interpretations to users within one minute. Toutiao' s robot "xiaomingbot" writes at a speed far exceeding human capabilities, producing over 450 reports during the 13-day Olympic period, averaging more than 30 reports per day. The intelligent writing robot "DT King of Drafts" publishes an average of 1,900 announcements daily—a volume that would require a senior securities editor to work for five consecutive days and nights without rest. "Wordsmith," developed by American company Automated Insights, can generate up to 2,000 reports per minute when serving the Associated Press.

1.2 Accuracy

Machine writing excels at processing data information. Unlike human journalists who require interviews, machines can simply utilize big data technology to process stored materials and data, particularly for straightforward news information such as sports, finance, stock market updates, and disaster-related dynamic information. Machines can achieve rapid and precise generation and distribution, typically within 30 seconds, with error rates far lower than manual writing [2]. Moreover, much news content production no longer requires on-site

interviews by journalists; instead, machines gather and analyze data. Additionally, machines can repeatedly compare the content and details of news events through data from different sources to ensure accuracy and authenticity.

1.3 Strong Learning Capability

Learning represents one of machines' core strengths. Machines excel at intelligently learning various forms of expression. Using big data storage and algorithmic technology, they can automatically generate content in multiple styles according to human-designed templates to adapt to different user preferences, completing personalized information production in a tailored manner. For instance, for the younger "post-2000s"generation, machines can generate reporting styles specifically adapted to their linguistic characteristics to make the content more acceptable. Furthermore, in automatically generating articles, machines can collect extensive user personal data to understand users' styles, preferences, and needs, thereby presenting the same news content in different linguistic styles for corresponding user groups. They can also adapt to different terminals and channels and adjust or add new content information in real-time based on terminal feedback.

2. Concerns: Will Machine Writing Become the "Terminator" of Human Journalism?

Technological development brings new challenges to communication. As machine writing continues to evolve intelligently, the question of whether it will replace human journalists has remained a hot topic in recent years among both industry and academia. However, the answer is undoubtedly negative. Despite its unparalleled advantages, machine writing also has obvious shortcomings and limitations.

2.1 Narrow Scope of Application

Algorithms constitute one of the cores of robot writing. Robots lack thinking ability; they merely rely on big data to analyze information, use fixed algorithms for arrangement and combination, and then automatically generate content according to different reporting formats. Constrained by technical rules, machine writing cannot surpass algorithms and templates, limiting its application scope. Based on recent practice, writing robots are more suitable for simple information-based news reports in areas such as traffic, weather, finance, and sports. They perform poorly on reports requiring greater flexibility, critical thinking, and deeper ideas, or those needing detailed interviews and in-depth personal experiences from journalists, such as news commentary, investigative reporting, personal profiles, and feature stories.

2.2 Lack of Human Touch

Machines, though created by humans, lack human emotions and thinking. Their automatically generated news articles typically focus on following the 5W+H principle, converting everything into cold algorithms and data. The content tends to be flat and formulaic, relatively rigid and standardized, showing obvious deficiencies in areas involving human emotions and humanistic spirit. This becomes particularly evident in disaster reporting. While such cold, temperature-less reporting can quickly and accurately provide information and interpretation, it lacks human interest, has limited descriptive and interpretive capabilities, and offers insufficient value analysis. The lack of freedom, personality, texture, and warmth in machine writing has become a primary criticism of automated writing today [3].

2.3 Value Bias

Machine writing relies on algorithms and big data to draw conclusions and automatically generate news articles. On one hand, algorithm-generated articles are derived through data calculation and formulaic deduction, but data changes in real-time and carries significant uncertainty. Without human guidance, machine-written articles have limitations and can easily become inaccurate or even false. On the other hand, programs cannot encompass and cover everything in the world. Blindly relying on algorithms and data, machine-generated news articles may contain loopholes. Without human gatekeeping, uncontrollable biases and errors can easily emerge in news value orientation and public opinion guidance, simultaneously increasing the difficulty of oversight and supervision.

2.4 Filter Bubble Effect

Although machine writing can use algorithms and big data to rapidly achieve automatic generation and distribution of news content, it also easily leads to the proliferation of homogeneous content, lacking fairness and balance, and readily creating filter bubble effects. The concept of "information cocoons" was first proposed by Cass Sunstein, meaning that if the public always focuses on information of interest, over time they can become trapped in cocoons woven by information. Regarding machine writing, if most automatically generated and pushed content is highly homogeneous, users' information consumption and thinking will gradually solidify, falling into information cocoons. In an increasingly pluralistic and fragmented society, individual or group information cocoons can further lead to social fragmentation [4].

3. Future: Human-Machine Collaboration Will Optimize Content Production Models

"The medium is the message," a famous theory proposed by Canadian communication scholar Marshall McLuhan. This "medium" refers not only to com-

munication media and tools but also to all tools, technologies, and activities that can extend human organs. In this sense, blindly resisting the penetration and innovation of new technologies such as artificial intelligence in journalism and communication will only lead to being eliminated by the times. Currently, with the deepening advancement of 5G networks and the rapid development of AI technology, journalists should embrace artificial intelligence enthusiastically, actively promote machine writing practices, and effectively enhance media competitiveness and influence.

3.1 Human-Machine Collaboration Will Propel Media Toward Greater Professionalism

In news content production, machines and humans each have their advantages and can achieve complementary roles in future journalistic practice. Machines possess advantages in speed, massive data processing, and accurate judgment, while human journalists have capabilities in on-site interviewing, logical reasoning, and in-depth analysis. With the further advancement of intelligent technology, human-machine collaboration to achieve complementary advantages and value alignment will undoubtedly become mainstream. For instance, material collection belongs to the preparatory stage of news content production. Manual collection is time-consuming and labor-intensive with insufficient accuracy, but AI machines can quickly capture relevant materials through big data and algorithmic technology, providing extensive resources and related analysis, thereby freeing editors and journalists from tedious and heavy work and saving considerable time. In the future, with the proficient application of web crawler technologies, AI machines can also rapidly extract and analyze developing hot events, public attention focuses, and social opinion trends, quickly synthesizing news through backend algorithms. This can greatly save the time, energy, and manpower previously required by humans, substantially improving the efficiency of news content production. In terms of in-depth reporting, machines can first conduct standardized and normalized processing of massive materials, allowing editors and journalists to make better judgments and exert their strengths in deep content processing, reporting framework design, and subtle emotional judgment. Additionally, AI' s automatic image recognition technology will greatly enhance machine capabilities in image processing. It can be foreseen that in future news content production, machines will become very capable partners and assistants for media professionals. Liu Kang, head of Tencent' s Dreamwriter, once stated when discussing future work plans that Tencent' s robot will rapidly analyze and identify hot topics across the entire network and engage in seamless human-machine hybrid editing with human authors to meet readers' increasingly diverse needs for long-tail and personalized content [5]. Industry professionals should master the operation and use of automated writing machines to further improve work quality and enhance media influence.

3.2 Human-Machine Collaboration Will Continuously Drive the Reconstruction of Content Production Methods

Machine writing is leading the transformation of content production in the media and journalism field. Although machine intelligence cannot compare with human intelligence, it relies on massive storage of entire-network data supported by powerful computing capabilities. In the process of learning from human intelligence, its skills in emotionalization, anthropomorphization, and valuation are continuously improving. Experiments show that if machine-generated news templates are designed more precisely and meticulously, inputting emotion-laden words such as "sad," "painful," "happy," "depressed," "noble," and "funny" enables machines to automatically generate text that meets these requirements [6]. Moreover, with continuous learning, writing robots will further improve natural language processing technology, and their application fields will no longer be limited to sports and finance but can be extended to broader domains. Additionally, with the deepening advancement and comprehensive commercialization of 5G networks, audio-visual products such as AR, VR, video, and live streaming based on mobile, social, and intelligent scenarios will become primary forms of information expression alongside text, and machines will have great potential in these areas. Meanwhile, one result of future 5G technology—universal connectivity and always-online status—will be the gushing forth of massive data generated by ubiquitous sensors [7]. This vast amount of data can be captured by machines and, through algorithms, produce massive amounts of Machine-Generated Content (MGC). Data will become a new resource for future news content production, and machines can also use sensor information for real-time feedback, enabling precise monitoring of users' exact feelings during content reception and providing more accurate guidance for content production. Future human-machine collaborative content production capabilities will also be reflected in competition over data platforms, collection, and processing capabilities as China' s media convergence advances, further reconstructing the content production landscape. Content production will increasingly move toward distributed and collaborative models, while intelligent technology can enhance collaboration capabilities among different production entities [8].

3.3 Humans Remain the Subjects in the "Human-Machine" Structure

Kurzweil once asserted that artificial intelligence would surpass human intelligence by 2045, and Narrative Science also predicted that over 90% of news content would be created by machines in the future [9]. The future is unpredictable, but regardless of how AI develops, humans will always remain the subject and core in the "human-machine" structure of news content production. Although robots may play more roles in content production as technology develops, the "soul" of news reporting requires human participation and guidance to be completed, and the human subject role is irreplaceable. For instance, in interpretive reporting, investigative reporting, and other forms of in-depth journalism, creators need to invest substantial experience, observation, judgment,

and emotion—elements that robots cannot replace. Furthermore, to attract users, news reporting requires not only information delivery but also unique perspectives and positions, humorous and witty language expression, delicate and sincere emotional groundwork, reasonable and standardized institutional frameworks, and fresh and innovative creativity—all of which machines cannot achieve. Of course, since the subject of machine writing is the robot itself, we must also have correct understanding of machine writing. From an institutional perspective, existing relevant communication systems and laws must also be revised and improved along with technological development to truly achieve scientific management and effective supervision of machine writing. In January 2020, the Nanshan District People' s Court in Shenzhen tried the "First AI Writing Case in China," in which Tencent sued Shanghai Yingxun Technology Co., Ltd. for unauthorized use of a financial report written by its Dreamwriter robot, and Tencent won. Robot writing was granted copyright for the first time [10]. Industry insiders noted that this verdict would significantly promote more in-depth development of AI creation in the communication media field. It can be foreseen that as intelligent technology continues to advance with each passing day, machine writing technology will further mature, and AI machines will undoubtedly assist media professionals in creating more possibilities in news content production. We eagerly await this future.

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