



New Challenges and Emerging Prospects in the Era of Artificial Intelligence and Robotic Reporting

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ABSTRACT:

Today, artificial intelligence (AI) is a crucial component of the modern media ecosystem. As a result, this study aims to (1) describe the status quo of technology and its role in renewing and modernizing journalism, (2) provide insights about the impact of artificial intelligence in changing journalism practice, (3) identify potential implications of artificial intelligence on the future of journalists, and (4) extrapolate ethical and professional challenges that may disrupt the practices of journalism professionals. The conclusion of the study is that artificial intelligence technologies are regarded as the added value of journalism in the digital age, particularly in terms of their capacity to overcome the fundamental challenges of contemporary journalism, such as combating fake news, news editing in accordance with editorial policy, and content personalization. The research also discovered that the use of artificial intelligence in journalism raises professional and ethical concerns, including the following: stifling innovation, the absence of supervision, prejudice, lack of transparency, unfairness, data use, and data quality. It also found that artificial intelligence technology would improve journalists' job rather than replace them. Therefore, artificial intelligence poses no danger to the profession of journalism.

Keywords: *Artificial intelligence, automated journalism, algorithm journalism, robot journalism, professional identity, journalism ethics*

1. INTRODUCTION

Due to the fast development of information and communication technologies (ICTs), which drives innovation [1] and continues unabatedly [2], as well as its role in renewing and modernizing journalism, the media landscape has experienced rapid and unprecedented changes in recent years. Indeed, conventional media firms throughout the globe are challenged with a multitude of obstacles resulting

from the profound digital change of the publishing sector [3]. Therefore, these businesses are seeking fresh answers to the issues that the digital revolution has brought to the news industry [4]. As a result, we have seen the emergence of new mechanisms capable of disseminating information to groups and people at an unprecedented rate, as well as the transition from one-way to interactive media.

Today, artificial intelligence (AI), algorithms, robotics, and other technologies are fundamental components of the new media ecosystem. Several corporations, including Microsoft, Google, Facebook, and Minecraft, are now investing in artificial intelligence. In this context, AI provided a new media idea that symbolizes a tremendous breakthrough in journalism and is known today as "Robot Journalism," "Algorithm Journalism," and "Automated Journalism." Indeed, when we think about robots, keyboards are hardly the first thing that comes to mind. In reality, they are algorithms designed to translate data into messages.

The rest of the paper is ultimately arranged as follows: The current quo of technology and its role in rejuvenating and updating journalism are discussed in Section 2. The third section provides context for artificial intelligence and journalistic practice. I will examine briefly the quantitative trend in journalism as well as the significance of automation systems in newsrooms, which have become an intrinsic component of editorial labor. The fourth section provides an overview of the possible consequences for the future of journalists, particularly in the light of the integration of AI processes into every facet of news creation and distribution. In Section 5, the problems of AI in journalism are discussed. The report finishes with a number of findings.

Objectives

The purpose of this study is to (1) describe the status quo of technology and its role in renewing and modernizing journalism, (2) provide insights about the impact of artificial intelligence on journalism practice, (3) identify potential implications of artificial intelligence on the future of journalists, and (4) extrapolate ethical and professional challenges that may disrupt the practices of the journalism profession.

Methodology

The increased reliance on artificial intelligence technology in journalism underscores the need for a comprehensive examination of this phenomena. This study is based on a systematic literature review, which is distinct from a narrative review. A narrative review offers an overview of the existing literature on a specific issue, but a systematic review is more tightly focused and aims to collect, critically appraise or assess, and integrate the findings of primary research in an integrative manner.

2. New Technologies And Journalism Renewal

Technology has been a major factor in the media industry's production of new digital content to meet the needs of Internet consumers. Thus, we may conclude that the enormous changes in the area of journalism are directly attributable to technologically enhanced instruments [5]. In this environment, several writers have a favorable and hopeful perspective of technology's leading position in the media and journalistic fields. Thus, the employment of AI technology has become an integral component of the media industry, which must lead to fundamental changes in the journalism industry [6]. Specifically, this technology was seen as an objective alliance to modify the professional practices of journalism, as well as the talents of journalists [7] and has become a need for modern newspaper production [8].

However, it is evident that the technical changes in journalism are closely intertwined with the changes in the media environment [9]. As noted by Postman, technologies, which include communication technologies ranging from writing to digital media, produce environments that impact the daily lives of actors who employ them [10]. In conclusion, in the age of media convergence, technological skills have become crucial in the journalism industry, which has been radically transformed by the digitalization of the work process in ways that no one could have predicted even a few years ago.

3. The relationship between artificial intelligence and journalistic practice

Quantitative Sift in Journalism

The prevalence of quantitative forms in modern journalism has increased [11]. Nonetheless, despite their relative freshness, these new kinds of journalism have garnered great attention in academic literature and have lately attracted considerable interest in the media industry. Loosen (2018) highlights four new forms of journalism, which may be seen as a transition process journalism is undergoing not just at the fundamental phases of news generation and consumption, but also at its core [12]:

- **Data journalism:** This concept has emerged gradually in newsrooms over the past decade. It refers to the process of extracting useful information from data, writing articles based on the information, and embedding visualizations in the articles to help readers comprehend the significance of the story [13]. According to Lindén (2017), "the digital revolution has enhanced the amount and availability of data that may be utilized for computational journalistic processes, as well as the anticipation of occurrences" (p. 24) [14]. Nevertheless, data journalism reflects the intersection of a variety of professions that are noteworthy in their own right, including investigative investigation, statistics, design, and programming [15].
- **Algorithm Journalism:** "the inventive processing that happens at the interface of journalism and data technology" [16] Moreover, it might be "the merging of algorithms, data, and social scientific expertise to enhance journalism's accountability role" [17].
- **Automated Journalism:** This phrase emphasizes the growing volume of material that is being generated automatically and via the use of technology created by suppliers of automated content solutions [18]. In other words, "algorithmic procedures that turn data into narrative news pieces with little to no human participation beyond programming" [19].
- **Metrics-Driven Journalism:** Refers to the many efforts to make sense of an ever-increasing quantity of digital traces left by viewers, which have the ability to impact decision-making processes at all stages of news creation [20].

Automation and Newsrooms

There is little question that AI is increasingly penetrating a variety of creative fields, including journalism, which has already been influenced in light of constant economic upheaval and the digital revolution [21]. In this regard, we can state that the emergence of artificial intelligence methods significantly transformed newsrooms [22], notably in all elements of news creation and transmission, as seen in figure [23]. Loosen (2018) noted that the technology made possible by advancements in the area of automated content generation challenges the fundamental essence of journalism: the production of news [24].

Today, viewers may get stories wholly authored by a journalist with no human form. In this context, the Washington Post has created its own technology, an artificial intelligence named "Heliograph," to assist its editorial staff during the 2016 Summer Olympics in Rio de Janeiro. Since then, the Washington Post has utilized "Heliograph" to generate 850 pieces, with a primary concentration on political and sports-related content.

In a recent Reuters article titled "Media, Trends and Technology Expectations in 2018" that comprised a poll of a number of media outlets, over three-quarters of respondents said that artificial intelligence is used in their output. On the other hand, they also develop projects to increase their use in terms of improved content, increased marketing efficiency, and economic viability, automation of information validation within the information material, and accelerated classification of information contained in a massive data stream [25]. In a 2017 study titled "Intrusion of software robots into journalism: The public's and journalists' perceptions of news written by algorithms and human journalists," Jung et al. [26] discovered that the audience tended to place more trust in journalistic materials written by software than those written by journalists.

The relationship between technology and content creation in contemporary newsrooms is summed up by the following fundamental concept: "This trend in journalism demonstrates the changing nature of the newsroom staff, where programmers are working steadily closer with journalists, and journalists are becoming programmers and vice versa" [27].

4. The Future Of Media persons: Practical Concerns

Due to advances in artificial intelligence, the journalistic environment has experienced quick and extraordinary alterations in recent years. Unsurprisingly, this trend raises worries about the future of journalists, especially in the context of automated content generation. According to Carlson (2015), "automated journalism recalls the repeating technical drama between automation and labor that has existed since the dawn of industrialisation" [28]. However, there is a wide variety of opinions on the problem, which may be summed up by two major trends:

First Trend: Pessimists

According to this tendency, Today's journalistic society faces a variety of possible job-related issues. As a result, several practical difficulties threaten the future of journalists, particularly in light of the growing dominating role of algorithms in large news organizations and the resultant replacement of journalists by non-human equivalents [29]. Moreover, the necessity for human reporters in the newsroom is diminishing to the point where they will no longer be the ultimate source of news. In this context, authors' concerns about the introduction of robots are based on bleak scenarios [30], implying that journalists may lose their jobs in the near future, resulting in widespread unemployment [31], as well as the pressures associated with journalists acquiring digital skills and learning programming [32].

Frey and Osborne (2013) noted that around 47% of all US employment are at danger of becoming automated during the next two decades [33]. According to Bernard (2013), the combination of robot innovation and the availability of massive data sets is a potent combination that poses a significant threat to the majority of occupations, including that of journalists [34]. Smith and Anderson (2014) estimated that by 2025, robots and artificial intelligence would pervade many aspects of everyday life, including journalism: "Journalists have lost their employment due to changes in advertising; academics are endangered by MOOCs [massive open online courses]; and retail salespeople are losing their jobs to Internet marketers. "Improved user interfaces, electronic distribution (movies, music, etc.), and more independent clients lessen the need for labor" (p. 6) [35].

The second axis is optimists

Despite the increasing usage of artificial intelligence in news organizations, optimists assert that these technologies will improve rather than replace the job of journalists [36], meaning that AI algorithms will not completely replace human journalists in newsrooms in the near future. Thus, recent developments indicate that journalism continues to play a vital role in educating the public about current events, and artificial intelligence poses no danger to professional journalism. Ginni Rometty, CEO of IBM, says that the threat resides less in the quantity of jobs than in their changing nature and complexity: "when it comes to total job replacement, it will be a very tiny proportion; when it comes to altering a job and what you do, it will be one hundred percent" [37].

In conclusion, AI technology is an opportunity that reflects a remarkable development in the field of journalism, particularly the ability to extract information from various sources and assemble it in the best way possible, with fewer errors and biases, and to produce high-quality news articles [38].

5. THE DIFFICULTIES OF AI IN JOURNALISM

Even while media firms are undergoing tremendous changes owing to the entrance of automated AI processes into all elements of news creation and distribution, the professional and ethical problem is still in its infancy in terms of awareness and discussion. Nevertheless, these concerns are important and must be explored.

Professional obstacles

Impede creativity

Indeed, creativity is the fundamental notion in journalism [39], which represents the human way of thinking and encompasses creative writing, interpreting, etc. In this regard, Latar (2018) observes, "AI algorithms cannot "think" outside of the conceptual framework created for them by their human algorithm designers; they are incapable of achieving the highest level of creativity, which requires the mental ability to cross into new unexpected conceptual frameworks" (p.24)[40]. For instance, AI algorithms cannot create the ambiance necessary to elicit emotional responses from readers, such as laughing [41], attend to an accident scene, interview individuals on the street, or perform any kind of investigation. Therefore, analytical abilities and originality continue to be the primary benefits of journalists over algorithms [42].

Insufficient Monitoring

Journalism is vital to the sustainability of the social system owing to its significant influence on society. Therefore, preserving journalism as a public benefit in the digital era is crucial. As noted by Latar (2018), "AI systems cannot be expected to comprehend and monitor unexpected, disturbing changes since they lack the human ability to draw novel connections." [40].

Prejudice

The most major difficulty in the area of automated journalism is that biases, such as gender bias [43] and racism bias [44], may be developed inside AI systems. From this viewpoint, AI algorithms are not devoid of human influence, meaning that they are inevitably impacted by their creators' ideals. Osoba and Welser (2017) remark, "The danger of inaccuracy and prejudice in algorithms and AI will persist as long as artificial agents continue to play more important roles in our lives and remain uncontrolled" (p.25) [45]. In 2015, Google was forced to issue an apology when the Photos app's algorithms misidentified two black individuals as gorillas, perhaps because its training dataset lacked sufficient images of black people. An study by ProPublica in 2016 revealed that the "AI-driven software" used by COMPAS to estimate the danger of criminals in the United States was prejudiced towards persons of race, namely black offenders, despite the fact that white criminals had more severe criminal histories [46].

Ethical Difficulties

Transparency

This word relates to being transparent about how data is acquired and used, as well as avoiding the gathering of superfluous data. To guarantee reader confidence, though, openness is crucial, which would include making the underlying data accessible and enabling people to engage with it. According to Leppanen et al. (2017), transparency is "confidence in the mechanism that converts the data into an article" [47]. Therefore, the publisher must first distinguish between articles authored by a human journalist and those created by an intelligent algorithm [48].

Fact-Checking

In this regard, the reader should know how the raw data is selected, what criteria were used to choose the data, how the data was reviewed, whether the reader's personal data are being processed, and how the reliability and objectivity of the utilized sources are assured [49].

Fairness

Fairness entails avoiding damaging prejudices and preconceptions in the lives of others. The exploitation of data as a weapon for breaching privacy, social manipulation, and tyranny is therefore seen as the central problem for journalism posed by AI. The Declaration on Ethics and Protection in Artificial Intelligence was issued by the International Conference of Data Protection and Privacy Commissioners (ICDPPC) in October 2018. The statement declares that "illegal prejudices or discrimination that may come from the use of data in artificial intelligence should be avoided and eliminated."

Data Utilization

Due to the absence of ad hoc regulations and norms, data use is now one of the ethical challenges associated with AI in the area of automated journalism. Wang and Siau (2018) contend that data security and privacy pose major concerns not just to consumers but also to developers and governments [50]. Concerning this topic, Monti (2019), in his research titled Automated Journalism and Freedom of Information: Ethical and Judicial Problems Related to AI in the Press Field, argues that an ethical obligation should be the need to employ only correct, objective, and accurate data [51].

Data Quality

One of the primary major problems of the present usage of AI in newsrooms is the quality of the data utilized, which may lead to erroneous findings, including the source and the veracity of the data. In this context, the European Parliament (EP) has accepted a report on robotics that defines an Ethical Code of Conduct including a number of core principles, including the protection of privacy and data usage [52].

6. CONCLUSION

As a result of fast breakthroughs in digital technology, journalism globally is experiencing a historic transformation. Significantly, this development is another facet of technology advancement that has resulted in significant changes to the organizational structures and roles of media firms. In this regard, artificial intelligence algorithms are regarded as the most significant revolution of journalism in the digital era, which has fundamentally reshaped the newsroom. On the other side, these technologies provide a tremendous deal of promise for advancing journalism now — allowing journalists to analyse a large volume of data in a short amount of time, construct news

stories from structured data and distribute them automatically, and provide more diversified coverage.

In conclusion, artificial intelligence poses no danger to the profession of journalism. In other words, artificial intelligence technologies are seen as the additional value of journalism in the digital era, which cannot entirely replace journalists, meaning that these technologies would augment rather than replace the job of journalists. Following is a summary of some of the most important points.

Conquer the Obstacles of Modern Journalism

Artificial intelligence (AI) has altered how journalists connect with the world outside of the newsroom and made editorial responsibilities simpler to handle [14]. Alternatively, AI helps journalists to evaluate data from many sources, in addition to converting spoken words to text, texts to audio and video, and picture analysis and categorization. In conclusion, we can say that artificial intelligence will aid journalists in surviving and overcoming the core problems of modern journalism, including (1) the abundance of information and sources, (2) the credibility and falling trust, and (3) the business model crisis [53], in order to continue producing "quality journalism".

Combating Fake news

The problem of false news and disinformation is now one of the greatest difficulties journalists face. Therefore, the use of intelligent software, specifically journalistic algorithms, has become essential to both detect false news and improve news quality and accuracy [54]. In order to decrease internet disinformation and harmful material, software such as Factmata is developing contextual artificial intelligence. Kalina Bontcheva² (2018) developed a system that automatically verifies internet rumors and enables journalists to examine the validity of articles on social media platforms in order to combat the issues of disinformation. Graves (2018) discovered that automated fact-checking may assist journalists in identifying and confirming disinformation throughout the media ecosystem and responding as promptly as feasible, as seen in Figure 55 below.

Editing news according to editorial policy

Artificial intelligence approaches offer the benefit of relieving the journalist of as much regular labor as feasible [56], and one of these tasks may be rephrasing the article to match the editorial policies of each media. Urbs, which the Associated Press uses to deliver certain news, is one example of software that collects news from a vast number of diverse sources

and rephrases it in accordance with the editorial philosophy of each organization without human intervention. [57] According to Johnston and Forde (2017), the new technologies "have the potential to greatly alter news collecting and assembling processes, as well as editorial judgments over reusing material."

Content Personalization

In recent years, a rising number of media organizations have rapidly adopted artificial intelligence. Consequently, there has been a significant change in how these organizations communicate with their consumers. Consequently, AI provides the chance for consumers to develop their own tailored news agenda, as well as the ability to make news in many languages and so reach a larger audience and new markets [58]. However, personalization in general refers to making material more appealing to customers by making it personalized and relevant [59]. In this regard, Smith and Linden (2017) demonstrated that filtering algorithms are capable of collecting, sorting, and prioritizing user activity data [60]. In a 2017 study titled PersaLog: Customization of News Article Content, researchers unveiled the PersaLog system for journalism professionals, which is capable of content personalization, as well as enhancing learning, behavioral changes, and reader engagement [61]. In conclusion, modern news websites may provide what the majority of users want by using "cookies," such as tailored content by registering various information about users' actual usage of the website [62].

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