Generation of Breaking News Contents Using Large Language Models and Search Engine Optimization

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Abstract: With easy access to the internet, anyone can search for the latest news. However, the news found on the internet, especially on social media, are often of dubious origin. This article explores how new technologies can help journalists in their day-to-day work. We therefore sought to create a platform for generating hot news content using Artificial Intelligence, namely Large Language Models (LLMs), combined with Search Engine Optimization (SEO). We investigate how LLMs impact content production, analyzing their ability to create compelling and accurate narratives in real time. Additionally, we examine how SEO integration can optimize the visibility and relevance of this content in search engines. This work highlights the importance of strategically combining these technologies to improve efficiency in disseminating news, adapting to the dynamism of online information and the demands of a constantly evolving audience.

1 INTRODUCTION

In the digital realm, the rapid evolution of technologies and the swift dissemination of information have made it increasingly challenging to verify the authenticity of the news that reach us. News should be totally impartial, not opinionated, and inform the reader effectively. However, any individual can access a social network or build a website and create fake news or news that are not totally impartial. Fake news are gaining momentum on social media, as it is increasingly easier to create and disseminate links and content or "illustrative" images of false events, and disseminate this content on WhatsApp, X and Facebook, seeking to influence the reader's opinion in a biased way. A study by the Columbia Journalism Review (Nelson, 2017) states that 30 per cent of fake news are linked to Facebook, which creates a chain of shares that lead the user to believe that they are real news (see Figure 1).

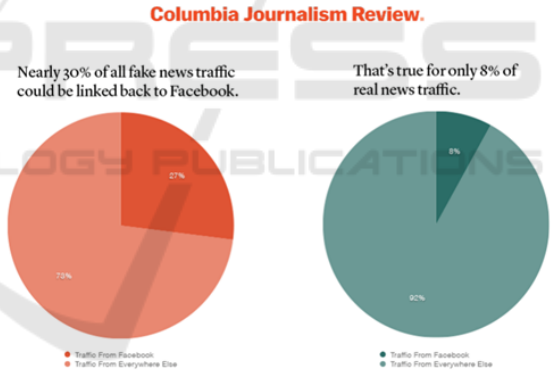

Figure 1: Connecting Fake News to social networks (taken from (Nelson, 2017)).

The main goal aim of this paper is to support the creation of credible news contents quickly, impartially and seriously. The aim is that, when a news topic is hot or trending, a journalist can quickly create a news story with all the details, without blockers, and obtain a news text with the help of AI based tools, based on the text of the same news from different sources previously catalogued as credible. The proposed news platform will generate news contents with daily trending topics, with the help of Artificial Intelligence and Search Engine Optimisation (SEO) technology (Google, 2024), so that it is optimised for search engines. This will provide journalists with an important tool to make them able to use these news items, which have been generated according to the trending words of the moment, enabling them to edit any generated text to meet the journalist's criteria so that they can then be published wherever they wish. The journalist has full control over the news item and can freely edit it to suit the required context. The generated content will cite the credi-

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ble sources from where it has been based on. To give an example: With the resignation of the Portuguese Prime Minister, news trends monitoring platforms, such as Google Trends, presented trending words like "António Costa", "Resignation António Costa", "Prime Minister", etc. When journalists log on to the proposed platform, they will see all the news created by the platform based on the trending words of the moment. This way, they will not waste time searching for trending topics, and will be able to use the platform to launch breaking news that would take much longer to build if they had to do more research, check sources, etc.

Using a Large Language Model, such as ChatGPT (ChatGPT,), the aim is to obtain a news text that summarises the news contents obtained from credible sources. From the texts collected, a complete and impartial news item will be generated, with all the details so that the reader is properly informed. At the end of this process, the user/journalist will always be in charge of editing, finalising and approving the news, being able to enter the platform and consult and approve, or not, the complete news with the latest hot topics.

The rest of this paper is structured as follows. In the next section, the research methods is presented. In section 3, a review of tools for supporting journalists in creating news texts is made. Section 5 presents conclusions and defines research lines for future developments of this project.

2 RESEARCH METHOD

The research method followed in this work is Design Science Research (DSR) (Cruz and Rosado da Cruz, 2020). DSR is an iterative problem-solving process common in areas such as information systems and computer science. This approach involves creating and evaluating innovative artefacts to deal with complex problems. The process includes several phases: problem identification, artefact design and development, demonstration or validation, evaluation and iterative refinement.

In the problem identification phase, researchers thoroughly understand the context and scope of the problem. They then move on to the design and development of artifacts, which can range from models to software systems. This stage emphasises creativity and innovation, combining existing knowledge with innovative approaches to create effective solutions.

Once the artifact is created, it undergoes demonstration or validation to show its functionality and potential impact. This involves implementing it in real or simulated environments and establishing evaluation criteria. The evaluation phase analyses the artefact's usefulness, usability and contribution to knowledge, focusing on both practical application and theoretical advancement.

Iterative refinement is a central aspect of DSR. Based on the evaluation results and feedback, researchers continuously improve the artefact to increase its relevance and effectiveness. Finally, the results and insights are communicated through publications and other channels, contributing to collective knowledge in the respective field.

This research work has concluded the problem identification phase, being here presented the context and scope of the problem, together with the definition of future work for the design and development of the main artifact, which will be a journalists-targeted news platform that will generate news contents with the help of Artificial Intelligence and Search Engine Optimisation (SEO) technology, and based on the daily trending topics.

3 STATE OF THE ART

The state of the art research has focused on the following topics: "support tools for journalists" and "artificial intelligence in journalism".

In the first article analysed (Franks et al., 2022), the authors analyse the lack of specific digital tools adapted to support journalists' creativity. While some general tools are adapted to help with story development, such as search engines and text analysis, not many are designed for journalists and do not explicitly focus on idea generation during news development.

Examples of digital tools for journalism include DocumentCloud (DocumentCloud,), which analyses documents for references and timelines, and prototypes such as NewsReader (NewsBlur,), using text analysis and AI to categorise news and financial data, although they do not focus on generating new angles for news stories.

Other tools are mentioned, such as the Story Discovery Engine (Broussard, 2014), which helps analyse text and discover stories. The text also mentions startups such as Loyal.ai, which offers interactive assistants for quick searches, but has no concrete evidence of supporting journalists' creativity.

Another article (Dhiman, 2023) discusses the role of artificial intelligence (AI) in journalism, emphasising that, although AI can automate aspects such as data analysis, fact-checking and even news production, it cannot replace human journalists.

AI is seen as a tool to complement human jour-

nalists, allowing them to concentrate on complex reporting while AI handles routine tasks. It highlights how AI can reduce variable costs in journalism by automating data analysis, fact-checking, news production and personalising content for readers. However, it notes that implementing AI can require significant technological investment.

The article also looks at how AI, such as ChatGPT, can help with tasks related to journalism, such as fact-checking, writing news articles, creating headlines and analysing data. It emphasises the importance of using AI tools judiciously and verifying information from any source.

Overall, while AI presents opportunities to simplify journalistic processes and reduce costs, it emphasises the need for ethical considerations and human oversight when using these technologies.

Another article (Kotenidis and Veglis, 2021) notes that algorithmic technology has advanced considerably in recent years, but faces challenges, especially in the automated production of content. One crucial limitation is the reliance on structured data. In addition, although algorithms can mimic human writing, they still lack in areas such as analytical thinking, flexibility and creativity. This creates a disconnect between algorithms and humans, especially in automated newsrooms.

In addition to automated content production, there are challenges in other areas, such as data mining, where the results can be insignificant or even incorrect.

Despite this, algorithmic technology is promising for solving contemporary problems in journalism, such as information overload and credibility. Although the introduction of more sophisticated algorithms may cause turbulence, it is hoped that they will help produce news faster and on a larger scale, expanding coverage to unprofitable events. However, this could lead to information overload, exacerbated by the spread of fake news.

This recent study (Lermann Henestrosa et al., 2023) investigated how readers perceive content produced automatically by algorithms, focussing specifically on science journalism articles. Although much content is already generated automatically, there is little knowledge about how artificial intelligence (AI) authoring affects audience perception, especially in more complex texts.

The researchers highlighted technological advances in automated text generation, citing large-scale language models such as OpenAI's GPT-3, Microsoft and NVIDIA's Megatron-Turing as examples of advanced natural language generation (NLG) capabilities. These models illustrate the ability to simulate human writing, but there is still a lack of studies on the impact of AI authoring on complex texts.

The studies conducted analysed readers' perceptions of science journalism articles written by algorithms. Surprisingly, even when an AI author presented information in an evaluative way on a scientific topic, there was no decrease in the credibility or trust attributed to the text. The presentation of the information was identified as the main factor influencing readers' perceptions, regardless of the declared authorship.

An interesting point was that although the participants considered the AI author to be less "human" in their writing, this perception did not impact the evaluation of the messages. This raised questions about the importance of the nature of the author for readers in terms of credibility and trust in the content.

The results indicated an acceptance of AI as an author of scientific texts, provided certain conditions were met. In addition, the studies revealed positive attitudes towards automation, suggesting a favourable attitude towards the use of algorithms in content production.

However, the studies had some limitations, including the influence of participants' prior beliefs and the perceived neutrality of the information presented. Future research should further explore how readers understand the workings of text production algorithms and the relationship between the perceived "humanisation" of AI and the credibility of the content generated.

In summary, the study has contributed to a deeper understanding of how AI authorship affects the public's perception of complex content, paving the way for reflection on the acceptance of algorithmically generated texts in more diverse contexts.

The study (Sirén-Heikel et al., 2023) examines the influence of AI technologies on journalism by studying the logics underpinning the construction of technical solutions. It uses a theoretical framework to understand the interrelationships between institutions, individuals, and organizations in social systems. The integration of AI technologies into news organizations impacts how work is organized and reshapes journalism. The study explores companies that develop and sell NLG (natural language generation) services for journalism, revealing how technologists view their interactions with news organizations.

The participants in the study represent different educational backgrounds, cultures, and languages, yet share a sensemaking of their relationship with journalism. The presupposition that technologists and journalists occupy separate fields of logic is validated through the interviews. The companies involved in

the study differ in size, market reach, and age, allowing for analysis of both established players and new entrants to the field.

It also focuses on the interplay that occurs when AI technologies are incorporated into organizations. It reveals that AI technologies in news organizations require interaction between the logics of journalism and technologists, leading to competition and assimilation of logics. The study is limited by only interviewing one representative from each company, but sheds light on the influence exerted by AI technologies on journalism.

It identifies a shared theory of rationalization, a frame of optimization, and a narrative of misinterpretation among the companies involved in developing AI solutions for journalism. The theory of rationalization is distilled as solutionist, rationalizing news organizations by solving the problem of reaching audiences at scale without adding human resources. This allows newswork to refocus on creating value for audiences. The frame of optimization centers around optimizing newswork, freeing journalists from having to do "boring news that doesn't add any value." It derives from the theory of rationalization and verbalizes a normative conceptualization of what journalism ought to be. The narrative of misinterpretation is expressed through the limitations of explaining AI systems, to whom it is explained, and when it is explained.

This also delves into the perspectives of technologists involved in developing AI solutions applied in journalism. It reveals that different companies provide different solutions for automated content, with varying generation and distribution models. The study sheds light on the influence exerted by AI technologies on journalism by studying the logics underpinning the construction of the technical solutions.

Table 1 summarizes the conclusions from the state of art.

According to a survey conducted by the media think-tank at the London School of Economics (LSE), news organizations see potential for AI throughout the entire production process, including news gathering, production, and distribution. The main motivations for adopting AI in journalism are increased efficiency in the newsroom, improved business functionality, and enhanced relevance for audiences.

AI technologies, particularly NLG, have been utilized for various applications in journalism. These include content recommendation, improved tagging, automated stories, summaries, and text-to-audio conversion. AI is also valuable for data cleansing, extraction, linking records, and identifying news angles. It is particularly useful for handling resource-intensive or technically challenging stories.

The article highlights that AI is viewed as a partner in the journalistic process, augmenting and optimizing news work. It can assist in sorting out meaning from vast amounts of information and contribute to the production of scoops, analysis, and brand building. The focus is on augmenting work processes that lack creativity, allowing journalists to concentrate on more important aspects of their work. While AI has the potential to address certain challenges in journalism, there is also recognition of the impact on jobs. The article emphasizes the importance of defining journalistic value in terms of investigative stories, analysis, and brand building, rather than simply relying on AI for routine news stories. In conclusion, the study provides valuable insights into the interplay between AI technologies and journalism, shedding light on the influence exerted by AI technologies on journalism. It highlights the need for interaction between the logics of journalism and technologists, and the competition and assimilation of logics that occur when AI technologies are incorporated into organizations. The study contributes to a better understanding of the impact of AI technologies on journalism and the dynamics of the evolving relationship between technology and news organizations.

4 DISCUSSION

Based on all the articles analysed, it is clear that there is still a long way to go on both sides. It is sometimes difficult to introduce technological evolution in certain areas, but journalism has increasingly benefited from artificial intelligence. So, in summary:

Support Tools and AI in Journalism: An article highlights the lack of specific digital tools designed to foster journalists' creativity. While there are general tools to help develop stories, few are dedicated to generating ideas during news production. Examples mentioned include DocumentCloud and NewsReader, but there is a lack of tools focussed on generating new angles for news stories.

Role of AI in Journalism: AI is seen as a complementary tool to human journalists, capable of automating tasks such as data analysis, fact-checking and even news production. However, it is emphasised that AI cannot replace essential human skills for journalism, such as empathy, understanding the nuances of language and ethical considerations.

Challenges of AI in Journalism: Automation in content production faces challenges, including limitations in interpreting unstructured data and the difficulty in replicating human analysis, flexibility and

Table 1: Summary of conclusions from the state of art.

Title and Reference	Main conclusions
Using computational tools to support journalists' creativity (Franks et al., 2022)	- Lack of digital tools to support journalists creativity.
How Artificial Intelligence Helped Me Investigate Textbook Shortages (Broussard, 2014)	- AI offers interactive assistants, but has no concrete evidence of supporting journalists' creativity
Does Artificial Intelligence Help Journalists: A Boon or Bane? (Dhiman, 2023)	- AI can automate aspects such as text analysis, fact checking, and even news production. - Algorithms or models may be biased. - Ethical considerations and human oversight when using these technologies.
Algorithmic Journalism—Current Applications and Future Perspectives (Kotenidis and Veglis, 2021)	- Crucial limitation of AI is relience on structured data. - AI lacks analytical thinking, flexibility and creativity. - Some results can be insignificant or erroneous.
Automated journalism: The effects of AI authorship and evaluative information on the perception of a science journalism article (Lermann Henestrosa et al., 2023)	- Readers tend to attribute similar credibility or trust to AI generated news contents as to human written news.
At the crossroads of logics: Automating newswork with artificial intelligence—(Re)defining journalistic logics from the perspective of technologists (Sirén-Heikel et al., 2023)	- Integration of AI technologies into news organizations impacts how work is organized and reshapes journalism. - Participants in a study, representing different backgrounds, share a presupposition that technologists and journalists occupy separate fields of logic. - AI technologies in news organizations require interaction between the logics of journalism and technologists, leading to competition and assimilation of logics. - Identifies a shared theory of rationalization, a frame of optimization, and a narrative of misinterpretation among the companies involved in developing AI solutions for journalism.

creativity.

Audience Perception of AI-Generated Texts: Studies on the perception of AI-generated texts indicate that the presentation of information is crucial for credibility, regardless of whether it is produced by humans or algorithms. Although participants recognize AI-generated writing as less "human", this does not affect their evaluation of the message.

Impact of AI on News Organizations: The incorporation of AI technologies into news organizations influences the way work is organized and transforms journalism. The interaction between the logics of journalism and technology generates competition and assimilation of logics.

Potential Use of AI in Journalism: AI is seen as a partner in the journalistic process, capable of optimizing tasks and freeing journalists to focus on more complex aspects of the job. Applications of AI include content recommendation, automatic summaries, data analysis and assistance with technically challenging stories.

Overall, AI is perceived as a promising tool for simplifying journalistic processes, but there is an emphasis on the need for ethical considerations and human supervision when using these technologies.

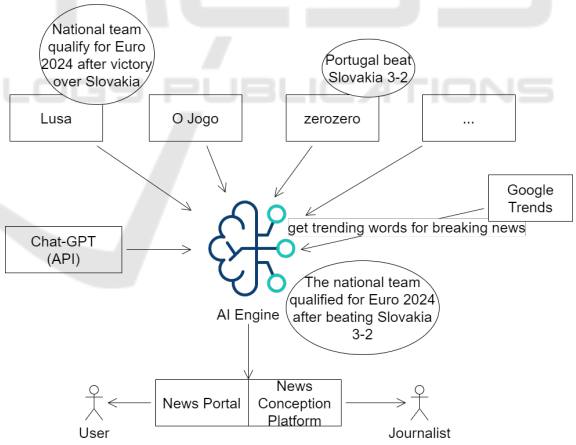

Figure 2: General architecture of the proposed project.

5 CONCLUSION AND FUTURE WORK

In this article we have reviewed the state of art related to AI-based tools for helping journalists in their daily work. A lack of tools for helping journalists creativity, especially creating news contents, has been identified. Also, it is necessary to solve a number of

existing problems in order to help journalists or even an entire newsroom. However, there have been some difficulties because, in general terms, artificial intelligence / large language models are a recent subject, which is why there are not many articles available on the subject. In other words, the field of journalism with artificial intelligence continues and will continue to be intensively explored.

This work has also set the basis for creating an AI-based news generating platform, which would become a tool for journalists, aiding in detecting news trends and compiling texts from reliable sources that would be delivered to the journalist for review and finalization before sending it to a news editorial office or a news portal. Figure 2 shows the proposed high-level architecture. As future work, we intend to continue this project, now moving on to the engineering and development of the platform itself.

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REFERENCES

Broussard, M. (2014). How artificial intelligence helped me investigate textbook shortages. *American Journalism Review*.

ChatGPT. ChatGPT. Avaible at https://chat.openai.com/.

Cruz, E. F. and Rosado da Cruz, A. M. (2020). Design science research for IS/IT projects: Focus on digital transformation. In *15th Iberian Conference On Information Systems And Technologies (CISTI 2020)*.

Dhiman, B. (March 24, 2023). Does artificial intelligence help journalists: A boon or bane? *SSRN Electronic Journal*. http://dx.doi.org/10.2139/ssrn.4401194.

DocumentCloud. DocumentCloud. Avaible at www.documentcloud.org.

Franks, S., Wells, R., Maiden, N., and Zachos, K. (2022). Using computational tools to support journalists' creativity. *Journalism*, 23(9):1881–1899.

Google (2024). Search engine optimization (seo) starter guide. Available at https://developers.google.com/search/docs/fundamentals/seo-starter-guide.

Kotenidis, E. and Veglis, A. (2021). Algorithmic journalism—current applications and future perspectives. *Journalism And Media*, 2:244–257.

Lermann Henestrosa, A., Greving, H., and Kimmerle, J. (2023). Automated journalism: The effects of ai authorship and evaluative information on the perception of a science journalism article. *Computers in Human Behavior*, 138:107445.

Nelson, J. L. (Jan. 2017). Is 'fake news' a fake problem? - columbia journalism review. Available at https://www.cjr.org/analysis/fake-news-facebook-audience-drudge-breitbart-study.php.

NewsBlur. NewsBlur. Avaible at https://www.newsblur.com.

Sirén-Heikel, S., Kjellman, M., and Lindén, C.-G. (2023). At the crossroads of logics: Automating newswork with artificial intelligence—(re)defining journalistic logics from the perspective of technologists. *Journal Of The Association For Information Science And Technology, Special Issue:Artificial Intelligence and Work*, 74(3):345–366.