AI and Automation's Role in Iberian Fact-checking Agencies

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Abstract

The improvement of automation and AI tools has prompted transformations in journalistic practices, including fact-checking. Fact-checking *a posteriori* has acquired special relevance due to the increasing amount of disinformation on digital platforms and, given its breadth, automation became a need for verifiers to check content online. In this context, AI-based and automation technologies are deployed in all stages of the fact-checking process: identification, checking itself and distribution of content. Studies that map the uses of these tools in fact-checking are still incipient, a lacuna that this study aims to fulfil. This proposal investigates the use of technologies in all specialised Iberian fact-checking agencies, signatories of the International Fact-Checking Network (IFCN): *Polígrafo, Verificat, Newtral* and *Maldita.es*. Through semi-structured interviews with representatives of these agencies, we found that automation and AI tools are used in monitoring and filtering internet and media content; transcription of verifiable phrases; verification of images and videos; selection of content submitted by the audience. Interviewees agree that automation has become crucial for monitoring content on social networks, making fact-checkers work more effective, broader, and faster, despite some ethical concerns. Finally, we advocate that technological tools are important allies, but the human element remains the key to interpreting and deconstructing disinformation.

Keywords

Automation, Artificial Intelligence, Disinformation, Journalistic Practices, Fact-checking, Verification.

1. Introduction

Fact-checking was born connected to the world of politics but has gained strength with the increasing spread of misinformation in the public sphere (**Oliveira**, 2020; **Cazetta; Reis**, 2019). The problems of misinformation and disinformation are not new, however, their spread has increased exponentially, largely due to the growing popularity of social media platforms. The breadth of social media and digital platforms makes the verification of such content impossible to be done manually, by fact-checkers alone (**Huynh; Papotti**, 2018).

This is where automation systems and AI come in. These technologies perform tasks without recurring human intervention, and humans only participate in the programming and training of these systems. Therefore, they are useful for performing tasks autonomously and quickly. **Westlund *et al.*** (2022) underline that a considerable number of technologies for fact-checking practice have emerged, many of which are indispensable resources for fact-checkers who cannot perform their function by manual work alone. Some of these systems are developed by fact-checking agencies, but others are made available by platforms such as Meta or Twitter.

In this context where new technologies play an important role in fact-checking, it proves essential to identify the uses of automation and AI in the work of fact-checkers and to analyse the main advantages and controversies. This is an emerging field of study, especially through the lens of communication and journalism. One of the most relevant studies, developed by **Westlund *et al.*** (2022) resulted in a mapping of 136 technologies used by fact-checkers internationally. We use the same division of categories in mapping the use of technologies by Iberian verifiers: 1) identification, 2) verification and 3) distribution. Our starting point is framing the uses of automation and AI in journalism because verification is an indissociable part of journalism. As **Johnson** (2023) defines "the practice of fact-checking is a defining trait of journalism's quest for the truth" (p. 4), thus we believe that the tensions felt in the practice of journalism and fact-checking are similar.

This article begins by mapping the uses of automation and AI by verifiers in the Iberian Peninsula. The study analysed all the agencies in the region that specialises in fact-checking, consisting of four agencies: *Polígrafo* (Portugal) and *Verificat, Newtral* and *Maldita.es* (Spain). Fact-checking projects associated or part of a news organisation were excluded. The agencies investigated are members of the International Fact-Checking Network (IFCN) and of the European Fact-Checking Standard Network (EFCSN). Both networks promote codes of principles to assure high-quality standards of fact-checking, with the first being associated with the North American Poynter Institute and the latter being a Brussels-based project that aims to be the voice of European fact-checkers.

The method used was semi-structured interviews with representatives of these agencies. The interviews were collected between 22 November 2022 and 19 January 2023. The main results point to the widespread and daily use of automation tools in the various phases of the verifiers' work. All verifiers recognise the need to use automation to monitor social media, given its breadth. However, problems with algorithmic biases and the lack of neutrality of machines are pointed out, something that is also extensible to the journalistic field.

2. Disinformation and Fact-checking

Disinformation is not recent, but the massive volume and the speed of its propagation have intensified with the widespread use of the internet and online social media. The popularisation of the internet makes users creators of content (**Gradim**, 2009), and the unrestricted sharing of information, created the need for new verification practices (**Curry; Stroud**, 2021; **Masullo *et al.***, 2022; **Himma-Kadakas; Ojamets**, 2022). The format in which content is presented on social media, where the user reads small, fractioned, uncontextualized pieces of information while scrolling a "news feed", makes it difficult for the user to distinguish between what is real and what is manipulated content" (**Allcott; Gentzkow**, 2017). These changes in the way the audience consumes information have resulted in an "information disorder" poses three important dysfunctions: disinformation, misinformation and malinformation (**Wardle; Derakhshan**, 2018).

On the one hand, disinformation is defined as false or inaccurate information being shared with the intent to deceive, offend, and cause confusion, usually for ideological, political or financial purposes. On the other hand, misinformation is non-intentional false or inaccurate information. If we take for example, in the first weeks of the COVID-19 pandemic, the high amount of information circulating online meant that some were getting the facts wrong and so many could share misinformation without knowing that they had created it (**Wardle**, 2019). The issue here is that if these non-intentional mistakes circulate and if they are not corrected or contained, they can easily end up in the wrong hands and become disinformation. At last, malinformation involves true information that is transmitted to cause harm and generate negative emotions. This is generally used in political struggles to discredit an individual or group by negatively portraying or undermining their social standing. Thus, the information may even be true, however, it has effects as harmful as misinformation (**Wardle**, 2019).

Although, as we've seen, the issues and dysfunctions of information distributions are broader, in this study we will focus on disinformation. The problem with the massive volume and share of disinformation is maximised by very recent contemporary factors such as the collapse of "objectivity", the change and acceleration of journalistic production practices (**Graves**, 2016), the "mechanisation and physical growth of the scale of production", "the deliberate production of fake news" (**Palacios**, 2019); the decrease of media outlets' gatekeeping role (**Graves**, 2016); and the use of algorithms that contribute to amplify or to silence discourses in social media networks (**Torre**, 2022).

Fact-checking emerged in the US in the 1990s to verify statements made by politicians, holding them accountable (**Cazetta**, 2018). Today the movement has reached global proportions, becoming a weapon to combat misinformation and fake news (**Baptista; Gradim**, 2022). Current fact-checkers are specialists in data journalism that identify, verify, and evaluate the veracity of the news, fostering a critical spirit in the digital age (**López-Marcos; Vicente-Fernández**, 2021), reconnecting the journalistic profession with its social responsibility and the commitment to the truth, and

scrutinising power, by investigating facts that have already passed with accuracy, fairness and rigour.

The fact-checking currently practised is no longer verification before publication, as when this practice was born, but *a posteriori* validation of data, text information, images, or videos, which are already in circulation and sometimes follow the format of journalistic news (**Bigot**, 2017; **Silva; Albuquerque; Veloso**, 2019). To reinforce the credibility of these works that began to spread both in newsrooms and with dedicated fact-checkers, the IFCN was created, linked to the Poynter Institute, which enabled the collaborative development of professional standards for the activity, and codified, as of 2016, ethical principles that members must follow, namely the commitment to non-partisanship, justice, transparency of sources; funding and organisation, methodology; and an open and honest corrections system (**Westlund *et al.***, 2022).

Current studies on fact-checking are mainly concerned with understanding "why fact-checking emerged in different places" (**Amazeen**, 2019), how these organisations were created (**Graves; Cherubini**, 2016), the themes they work on (**Brandtzaeg; Følstad**, 2017), the definition of their boundaries, their relationship with professional journalism (**Graves; Anderson**, 2020), its funding and independence (**Amazeen**, 2019; **Nicey; Bigot**, 2020), or with its establishment as a journalistic genre (**Bigot**, 2018) (**Bigot**, 2017; **Petrushkov**, 2019; **Li *et al.***, 2022). Over the years studies have also focused on the effects of fact-checking, not only of its credibility that has been questioned as elite power structures and collaborators for state propaganda specially linked to mainstream media trust (**Primig**, 2024). Studies also focused on how fact-checking affects beliefs proving that medical fact-checking over the COVID-19 pandemic generated more positive attitudes towards vaccines (**Zhang *et al.***, 2021), but what concerns political fact-check studies have shown that even if it can have positive effects on reducing misperceptions, they have minimal impact on vote choice (**Bachmann; Valenzuela**, 2023; **Walter *et al.***, 2020; **Nyhan *et al.***, 2020).

Even if a large part of the research on automated fact-checking is more turned to the computational fields, recently, we can observe more curiosity over the subjects of automation and AI in Communication Sciences. Some studies have been focusing on mapping the different technologies that can be used for the different steps of fact-checking (**Westlund *et al.***, 2022) while others draw attention to the technologies that can spot manipulated images and videos since most disinformation on the internet is spread in those formats (**Lindén *et al.***, 2022). A recent study also explores and catalogues the AI initiatives and tools developed and their use by Hispanic fact-checkers (**Sánchez González; Sánchez Gonzales; Martínez Gonzalo**, 2022). Studying the functioning of such organisations is, however, important for understanding "how determinations surrounding information verification are made in a changing news media landscape" (**Ekström; Lewis; Westlund**, 2020).

In Portugal, there are currently three fact-checking projects, signatories of the IFCN - *Observador Fact Check, Prova dos Factos, Polígrafo* (which has an extension dedicated to health literacy, named Viral). Among these, only *Polígrafo* is an agency dedicated exclusively to fact-checking. *Polígrafo* was launched as the first Portuguese digital media fully dedicated to fact-checking at the biggest technology conference in Europe - The Web Summit - and started to operate in 2018. *Viral* is presented as an extension of the *Polígrafo* since the symbology itself already refers to it and the texts are produced by the same journalists of the *Polígrafo*, as well as the publication is run by its director, Fernando Esteves. It aims to fight disinformation and promote health literacy, having joined the IFCN network in October 2022.

In Spain, *Newtral* and *Maldita.es* are considered the two largest and most influential fact-checking platforms, due to the dimension of their work, covering several different areas, and for the convictions of the founders of the democratic and civic role of journalism (**López-García; Costa-Sánchez; Vizoso**, 2021). However, currently, there are other five active fact-checking services in Spain and IFCN signatories, namely: *EFE* Verification, linked to *EFE* Agency; *AFP* Factual, *Agence France-Presse* section at the Madrid offices; *El Objetivo*, a programme from the television channel *La Sexta*; *Verificat*, an independent fact-checker from Catalonia, and *Poletika.org*, created by a consortium including Oxfam, Greenpeace and Save the Children.

3. Automation and Artificial Intelligence in Journalism

In the last decade, the improvement of information technologies has led to a drastic change in the field of journalism and the fields surrounding it. In general, the use of automation and AI technologies has led to greater efficiency and productivity (**Giddens**, 2008), but has also incited tensions, particularly in the ideals of professional journalism, such as objectivity, autonomy and public service (**Milosavljević; Vobič**, 2019), but also for *a priori* and *a posteriori* fact-checking.

The integration of algorithms, automation, and AI has come to revolutionise the entire logistics of the production, distribution, and reception of news content (**Diakopoulos**, 2019). These technologies contribute to a moment of rupture with theoretical, ideological, and practical assumptions: expansion of news values, multiplication of journalists' tasks and changes in the organisation of newsrooms (**Newman**, 2023; **Sirén-Heikel; Kjellman; Lindén**, 2023; **Pereira; Adghirni**, 2011). All these changes combined with economic, political, and social factors, culminated in a structural crisis in journalism (**De Mateo; Bergés; Garnatxe**, 2010), which has brought discussions about what journalism is (**García-Orosa; Canavilhas; Vázquez-Herrero**, 2023).

Around the world, there are examples of automation and the use of AI to perform routine and repetitive tasks, such as transcribing interviews, translating content, writing reports or hard news, as well as more complex tasks, such as analysing large amounts of data to find patterns, categorising documents or predicting behaviour. Essentially,

automating these tasks increases content production and reduces production costs (**Beckett; Yaseen**, 2023; **Cardoso; Baldi**, 2021). And recently, there has been increasing use of automation in news writing, especially in sports and economics, data-rich specialties (**García-Orosa *et al.***, 2023).

Diakopoulos (2019) highlights that "there is no longer any stage of the journalistic process that is not touched by algorithms, from information gathering to decision making to storytelling and content distribution", although other authors argue that journalists continue to control all stages of the information process (**Milosavljević; Vobič**, 2019). Therefore, the literature points out that the use of automation and AI in the journalistic field extend to concerns on ethics (**Pocino**, 2022), authorship (**Montal; Reich**, 2017), editorial independence (**Schapals; Porlezza**, 2020), redefinition of practices and values (**Wu; Tandoc Jr; Salmon**, 2019), among others.

Some authors suggest that this is a moment of quantitative turn in journalism (**Coddington**, 2015; **Petre**, 2013) or an algorithmic turn (**Napoli**, 2014), in which "algorithms stand out as new actors in communication and political, economic and social systems" (**García-Orosa *et al.***, 2023). Thus, their activity extends to disinformation flows on the Internet, but also to fact-checking strategies. In the latter, similar issues and tensions are raised within the journalistic field, especially around the transparency of processes, authorship, or editorial independence.

4. Uses and Opportunities for Fact-checking

The context of informational disorder on the internet (**Wardle**, 2019) leads to an increased demand for fact-checking, which has resulted in "growing interest in the development of systems and tools to automate the fact-checking process" (**Juneja; Mitra**, 2022). Automated systems and AI can "help fact-checkers to respond more quickly and effectively to political lies, online rumours, and other forms of misinformation" (**Graves**, 2018a; 2018b), to address one of the most serious challenges facing the news industry today (**Borges; Martins; Calado**, 2019).

These tools work as allies to fact-checking in several stages, from identification and verification to distribution of verified content (**Westlund *et al.***, 2022). In the first phase, automation is seen as a necessity, since it allows scanning large quantities of content that the fact-checkers, by themselves, would not be able to do so (**Hassan *et al.***, 2015).

The second phase, content verification, is the one that still arouses the most controversy regarding the use of technologies since the ability of machines to identify what is true or false is doubted, especially when it comes to text. Verification is divided into two moments: source and content. Given the need to identify and evaluate the sources of certain content, technological tools have been developed for this purpose, such as WebMii, What's My Name and Social Blade, among others (**Westlund *et al.***, 2022). In the case of images and videos, there are many platforms (TinEye; RevEye), in addition to Google Lens, that can identify the first time a certain image was published; or recognise whether there has been manipulation or not. These tools can help to recognise deep fakes, which consist of manipulation and creation, with the use of advanced new technologies, of fake images, audio, or videos with high levels of realism that look authentic (**Souza; Santaella**, 2021).

This is followed by the distribution phase of the verified content. The dissemination of verified articles is done both by the verification agencies' pages and through external mechanisms, developed by other platforms and social networks (**Herrero; Damas**, 2021). This is the case with softwares such as Dega, Facebook Fact-Checking Product, Fatima, Squash or FactSteam, which make distribution more efficient (**Westlund *et al.***, 2022).

Several media outlets around the world have begun to adopt these systems, highlighting the increased efficiency of fact-checking: "We have saved more than 80% in the process of monitoring and searching for verifiable phrases ... We are convinced that this area will have a more positive impact in the future" (**Beckett; Yaseen**, 2023). In the same report, media organisations emphasised the importance of AI in combating disinformation and polarisation and committed to improving the criteria of their programmes to make their use more reliable in detecting false narratives and hate speech.

Around 80% of organisations (from a universe of 105 media outlets in 45 countries) expressed expectations for increased integration of AI in the fact-checking process (**Beckett; Yaseen**, 2023), especially because "the number of fact-checkers remains low in comparison to the vast amount of misinformation" (**Hrckova *et al.***, 2022). And this has been verified by the growing number of agencies specialised in verifying facts that use these technologies in their work, adding to their routines. FullFact, a British fact-checking organisation, which started doing automatic fact-checking in 2013 (**FullFact**, s.d.), explains that they use three types of verification technologies: (1) one that looks for facts on a reference database; (2) one that uses a mechanical approach, which tries to find signs of the veracity of a fact; (3) and another one that has a contextual approach, which evaluates the veracity of a fact according to the survival of information online (**Dale**, 2017). *Les Décodeurs,* the fact-checking section of the French newspaper *Le Monde* also created, in 2017, an extension for Chrome and Firefox browsers, which allows you to quickly understand whether the information on the website opened in the browser is true or false (**Les Décodeurs**, 2017).

Other computational fact-checking projects are *Factmata* which uses an AI system to identify and verify statistical facts and *Claimbuster*, developed by academics, to determine the probability of a sentence containing verifiable facts. *Pheme* is also a fact-checking project aiming to identify false statements on social media (such as rumours, misinformation and speculation), through a computational platform based on Big Data.

Still, the best-known program is ClaimReview (from Schema.org), a system that identifies verifications that have been published, allowing search engines and other digital platforms to find them more easily and highlight them. This is a system used globally by fact-checkers, as it facilitates the correct identification of fact-checking articles and their distribution on the internet (**Wang *et al.***, 2018).

Even though the development of new automated tools has been growing and helping in all stages of verification, some authors have noticed that, in some cases, the human part has been neglected, and some limitations and tensions between humans and machines have been perceived (**Nguyen *et al.***, 2018). First, it is important to emphasise the complexity of fact-checking work, mainly due to the context and interpretation it requires. These tasks cannot be fully automated because they require critical thinking, investigative journalism skills and technical knowledge (**Dierickx; Lindén; Opdahl**, 2023). Second, AI systems "are limited in practice because their system design often does not take into account how fact-checking is done in the real world and ignores the insights and needs of various stakeholder groups core to the fact-checking process" (**Juneja; Mitra**, 2022).

Another issue detected is the level of trust in these tools. If someone is already sceptical of online information, automated tools need to be very transparent and audible in their predictions of claims, to win the users' trust. As noted by **Nguyen *et al.*** (2018), human accuracy improves when exposed to correct model predictions, but when the model is wrong, it often degrades human accuracy. The authors underline that developing systems with great accuracy, transparency of automated fact-checking tools is equally important to facilitate effective human interaction. Moreover, studies in the field of computer science, such as **Borges *et al.*** (2019), suggest that the first step towards improving fact-checking systems is to identify what other agencies are reporting about the same topic, through automation, and with that information, "the human checker would use his or her own judgement to assess the situation" (p. 2).

Thus, human judgement is still essential in some tasks, such as assessing the credibility of sources of evidence. Other authors also point out that aspects such as intuition, creativity or the interpretation of linguistic expressions cannot be automated (**Nakov *et al.***, 2021). These limitations are the primary reason why fully automated fact-checking is neither feasible (**Hrckova *et al.***, 2022), nor recommended.

In this sense, new approaches are needed to improve the integration of these systems with journalistic work, considering that algorithms are a new actor in fact-checking networks. For this reason, we believe it is urgent to map the uses of these technologies and analyse their consequences for fact-checking routines. Whereas disinformation still goes viral, which means that fact-checkers still don't keep up with the speed of dissemination of disinformation (**Hrckova *et al.***, 2022; **Hassan *et al.***, 2015), it's fundamental to discuss strategies for improving the operating criteria of these technologies, as well as their combination with human fact-checkers.

5. Methodology

At the time this investigation was made, we analysed all the Iberian agencies specialised in fact-checking and that also met the requirement of belonging to the International Fact-Checking Network (IFCN) and EFCSN: *Polígrafo* from Portugal; and *Maldita.es*, *Newtral* and *Verificat*, from Spain. We excluded fact-checkers that are part of larger news organisations (e.g. *Observador Fact Check*, *EFE Verifica*) since our focus is on independent agencies, which do not have the financial backing of larger, richer organisations with an established journalistic culture. Independent fact-checking agencies tend to have a more open character in terms of themes and a more pluralistic structure, often not being made up entirely of journalists, including other professional cultures in the fact-checking routines (**Andaluz-Antón; Fernández-Fernández; Pérez-Sánchez**, 2022).

The research questions for this study were:

RQ1: Which automation or AI tools are applied in the fact-checking process in Iberian agencies?

RQ2: Which changes the use of these automation tools introduce in fact-checking routines?

The objectives of this investigation were 1) to map the uses of automation and AI tools by Iberian fact-checkers, and 2) to understand the advantages and disadvantages of using these technologies and the changes this may cause to fact-checking routines.

Data were collected through semi-structured, online (videoconference) in-depth interviews, conducted between 22 November 2022 and 19 January 2023. The interviews lasted between 45 minutes and one hour. This methodology was chosen as a resource for this analysis because it makes it possible "to explore a subject or deepen it, describe processes and flows, understand the past, analyse, discuss and make prospects'' and "to explain the process production of news in a communication vehicle" (**Duarte**, 2005), being suited to the objectives of this research. For *Maldita.es, Polígrafo* and *Verificat*, the first contact was made with the founders or directors of these agencies. After this first contact, the professionals interviewed were assigned, all with a journalistic background. For *Newtral*, as the agency has a department that specialises in R&D, the responsible for this section was directly contacted, who happens to be a telecommunication engineer. The professionals interviewed were the following:

Table 1: Professionals Interviewed for the Study.

Organisation	Country	Interviewees	Role
Polígrafo	Portugal	Gustavo Sampaio	Associate Director
Newtral	Spain	Rubén Míguez	Responsible for the R&D Department
Maldita.es	Spain	Pablo Hernández Escayola	Academic Research Coordinator
Verificat	Spain	Alba Tobella	Co-founder and Head of Content

The interviews were divided into three sections. In the first one, general data related to each of the verifiers analysed was collected, namely: the name of the verifier; the name and profile of the professional interviewed; and general information about the fact-checking agency. The second one concerned more general questions regarding the knowledge about automation in fact-checking, including questions about the utilisation of such technologies in fact-checking initiatives across the globe, their opinion about the potentialities and limitations of using AI and automation technologies for fact-checking, the changes this use may cause to journalistic practices, and the advantages and disadvantages of using these technologies. The third one concerned question focused on the use of AI and automation technologies within the agencies' processes, in which phases they are deployed if they are developed in-house or by third-party companies and the agency's ethical concerns about this use.

The interviewees' responses were then transcribed using Google's AI tool Pinpoint to speed up the process. The analysis was carried out manually using a qualitative and interpretive approach based on three dimensions: 1) general knowledge about the benefits and problems of AI and automation tools; 2) how their institution is using these technologies in the fact-checking process; 3) their perceptions about the impact these technologies have on their professional routines.

6. Results

6.1. Mapping the Uses of Automation and AI Tools by Iberian Fact-checkers

As shown in the following Tables 2, 3 and 4, we first found that the Iberian fact-checking agencies use a large mix of tools and technologies to support their verification processes. According to the categories for the fact-checking process: identification, verification and distribution (**Westlund *et al.***, 2022), it is possible to see that automation and AI tools are mostly used at the first phase of the verification process, the disinformation detection phase.

Table 2: Automation and AI Tools in the Identification Phase

Organisation	Tool Type	AI / Automation Embedded	Action	Function / Role
Maldita.es Newtral	Chatbot	AI	Interacts with users on WhatsApp	Checks if the request has already been debunked
Maldita.es Newtral Verificat	Content transcription	AI	Transcribes audios and videos into text	Highlights the potentially problematic sentences that could be checked
Maldita.es	Classifying system	Automation	Organises information for the fact checkers	The system lists all users' requests coming from WhatsApp, group similar content and highlights the verifiable information for journalists to work on
Polígrafo	Search and detection tool	Automation	Detects disinformation on social media (Facebook and Instagram)	The tool searches social networks for content that is likely to be disinformation
Polígrafo	Crowdtangle	Automation	Detects disinformation on social media (Facebook, Instagram, Twitter and Reddit)	Helps search and identify viral content that could be disinformation
Newtral Verificat	Monitoring tool for social media	AI	Monitors potential disinformation on social media (Twitter)	The AI tool named Claim Hunter follows selected accounts and highlights potentially problematic sentences

Table 3: Verification Phase.

Organisation	Tool Type	AI / Automation Embedded	Action	Function / Role
Maldita.es	Toolbox	Automation	Brings together several content verification tools	The "*Caja de Herramientas*" brings together search tools, image check softwares, social media checking, translation, archive and geolocalization tools, among others including browser extensions
Polígrafo Maldita.es Verificat	Image checking tools	Automation	Checks the authenticity of static images	Tools such as TinEye and Google reverse search are used to check if an image is real or if it was manipulated and the date it was created and published
Polígrafo Maldita.es Verificat	Video checking tools	Automation	Checks the authenticity of videos	InVID tool is used to check if a video is real or if it was manipulated and the date it was created and published
Polígrafo	Automatic image labelling	Automation	Labels similar images with the fact-checkers' classification	The tool searches and attributes ratings made by Polígrafo's journalists to similar images to those already labeled, flagging deceiving content on social media. Developed within the scope of Meta's fact-checking program.

Table 4: Distribution Phase.

Organisation	Tool Type	AI / Automation Embedded	Action	Function / Role
Polígrafo Verificat	Social media software	Automation	Schedules and manages social media posts	Publishes and re-publishes content according to a time schedule and the 'hot topics' of the moment. In Polígrafo this platform also sets up custom newsletters
Maldita.es	Chatbot	Automation	Interacts with the audience and shares debunking	Automatically shares a debunk with the people that requested their evaluation on that topic. It also offers Maldita's content in different message formats.
Verificat	Image bot	Automation	Adds verification label over images	Automatically adds the verification label to an image the journalist aims to share on social media (for example a 'false' or 'true' label).

6.2. Automation and AI in the Fact-checking Process

We found that the fact-checkers investigated use several automated and AI tools for the detection, verification and distribution processes (Tables 2, 3 and 4). In the first phase, identification, both *Maldita.es* and *Newtral* use a chatbot to receive requests from citizens to check potentially fake information. This chatbot, an AI-based assistant developed for WhatsApp, alerts the fact-checkers of what people suspect may be disinformation, with automation being used to check if the user request has already been fact-checked. This system organises all the requests, automatically transcribes audio, video, and image through AI and highlights all phrases that should be verified. Both *Newtral* and *Verificat* also use automated tools for recording and transcribing audio from radio shows, podcasts, and video from TV and YouTube, an example of automation use connected to the idea of saving journalists' time from repetitive tasks, confirming what was found in previous research (**Lindén**, 2017).

In terms of tools, *Polígrafo* also works with an automation tool within the scope of a program developed in partnership with Meta/Facebook, the Third-Party Fact-Checking program, that searches social networks for content that is likely to be disinformation, and also works with Meta's Crowdtangle, that helps to search content that went viral and probably is disinformation, one of the many tools the Portuguese agency uses to automate its processes based on Meta's initiative. *Newtral* also has another system based on artificial intelligence developed by the newsroom called Claim Hunter which monitors potential disinformation on Twitter. This technology was also shared with *Verificat* and is one of the few tools based on AI used by Iberian agencies. Rubén Míguez explains that this tool is being further developed in partnership with the London School of Economics, to identify if the politicians are repeating the same content others have said. *Polígrafo* and *Verificat* also use free tools for analysing images and videos, e.g. TinEye, InVID and Google Lens, simple tools that are also available to any citizen that aims to use them, not being developed exclusively for fact-checking, aligning with the findings of **Micallef *et al.*** (2022) that independent fact-checking organisations tend to choose freely available tools due to financial constraints.

In the verification process, Pablo Hernández explains that *Maldita.es* has developed a toolbox ("Caja de Herramientas") that brings together automated tools from different developers to check the authenticity of an image or a video and content from social media, for searching the web, and translation, archive and geolocalization tools, among others, including browser extensions. This move also aims to make these tools available, all in one place, to their audiences to promote easy-to-use, simple verification tools for all, adding to the agency's education section efforts. *Polígrafo*, with the Meta partnership, also uses an automation tool to replicate the ratings they had already attributed to similar images and to flag deceiving content on social media, specifically designed for Meta's products.

In January 2023, *Newtral* was working on an AI-based tool for searching previously checked content in multiple languages, as indicated by Rubén Míguez. Another technology in development was a medium detection tool that could differentiate a trusted media website from a deceiving one. These tools (and others), developed in-house or in partnership with universities as said before, can be a slow-paced work due to two factors: the need for funding and the inexistence of commercial alternatives. Ruben Míguez highlights that the sole existence of a technology development department in the agency's headquarters is motivated by the lack of commercially available tools that suit the fact-checkers' work. Alba Tobello adds that the work with universities also aims to address this gap, with the development of adequate tools tailor-made for fact-checkers necessities.

In the distribution phase, Iberian fact-checkers also use automation tools to reach the largest audience they can. *Polígrafo* uses the EcoBox platform for sharing content on social media and to re-publish content according to the 'hot topics' of the moment. This platform also sets up newsletters based on the users' interests, a mechanical action that is also part of day-to-day work in conventional newsrooms.

Maldita.es uses its chatbot to automatically share a debunk with the people who requested their evaluation on that topic and to offer their content in different formats, in a completely automated interaction. *Verificat* also deploys a software to schedule social media posts and a bot to add the verification label over images that they will later post on social media. Again, two examples of the use of automation to do repetitive tasks that are fully automatable, and that could free journalists' time to work on other more intellectual tasks (**Beckett; Yaseen**, 2023).

6.3. Changes to Fact-checking and Journalistic Practices

Increasing the amount of information that can be processed, the earlier disinformation detection and the higher speed of the verification work are cited by the interviewees as the main advantages of the use of automation and AI within the fact-checking routine. However, respondents are divided when asked if technologies change newsroom routines.

Rubén Míguez believes that automation tools change the workflow dramatically. Since AI-based systems highlight the possible verifiable content automatically, fact-checkers have stopped dedicating time to listening to TV or podcasts to catch content that could be disinformation. While this process saves journalists' time from mechanical tasks (**Lindén**, 2017), at *Newtral*, a lot of the decisions the verifiers make end up starting with this automated system, explains Míguez, posing several changes in the workflow. Fact-checkers also moved from a paper-based system used in the newsroom to a fully digital one. In addition, Claim Hunter allowed *Newtral*'s fact-checkers to follow a much larger set of politicians and to monitor a lot more information, which was not possible before this system's implementation. Thus, this tool makes it possible to increase the amount of data collected to be analysed, which could potentiate a better response to the vastness of the disinformation problem (**Sánchez González *et al.***, 2022). On the other hand, the workers in these newsrooms see a great acceleration in their workflow (**Sánchez González *et al.***, 2022; **Beckett; Yaseen**, 2023).

Pablo Hernández also explains that, at *Maldita.es,* automation helps enlighten the hierarchy and the importance of the topics, giving clues to the newsroom's decision-making process when selecting the content, they will work on and perceiving the urgency of the fact-checking process in a specific topic. If on the one hand, these AI-based highlighting tools increase the speed and provide a better monitoring of viral content online, some important decisions (which content is being verified) are left to automated intelligent systems, instead of humans gatekeeping it, but it seems that it is a solution newsrooms found so they can cope with the massive online information flow (**Hrckova *et al.***, 2022).

Rubén Míguez and Pablo Hernández also point out that their WhatsApp' AI-based Chatbot was essential during the COVID-19 pandemic due to the large number of people that started to ask for fact-checking content, again harnessing the potential of AI systems to not only handle a huge amount of information online (**Hrckova *et al.***, 2022) but also provide a proper answer to multiple and simultaneous requests from the audience. This system allowed newsrooms to be responsive to their audiences, fostering a sense of community with their audiences and empowering citizens to seek out trustworthy information at a time when uncertainty and isolation ravaged the world.

On the other side, both Alba Tobella, from *Verificat,* and Gustavo Sampaio, from *Polígrafo*, don't see changes in the journalistic routine, only improvements due to the increase of content to check and debunk. Alba Tobella says that, while there are huge gains in the speed of the daily work, there is also a lot of time spent in training the machine. While AI may "help to enhance the speed and scale of news in routine situations, complement and augment journalists, and even create new opportunities for optimization and personalization that would not otherwise be possible", in some cases "it can creates new tasks and forms of work" (**Broussard *et al.***, 2019).

While some technologies work well, there is still a lot of work to be done, which has a lot to do with the dynamics of disinformation, as it is constantly evolving. Gustavo Sampaio highlights that these are only tools to make the work easier. The risk of relying too much on these tools is to stick to what the algorithm presents, which would be a big interference in editorial and journalistic criteria. In this sense, they argue that the core of the journalistic routines remains the same, with only some tasks being affected by automation. Although Alba Tobello does not see changes to their journalistic processes, it is possible to see that the use of AI-based systems, rather than only automation tools, may pose a significant impact on workflows and decision-making processes inside fact-checking agencies.

Alba Tobella explains that this action of filtering what can be verified is very hard to be made by humans, due to the volume of information and because it is hard to "know exactly what is viral". "In filtering, we are helped by machines", she says, highlighting her view that this is a task the machines help, but don't take over, as seen in previous research (**Nakov *et al.***, 2021). For Ruben Míguez, the monitoring and detection of potentially misleading information can be fully automated as the technology is currently. Verification is "still not fully automatable because we need a general-purpose artificial intelligence with the ability to explain everything it does", he adds. Pablo Hernández agrees and explains that the fundamental task that cannot be automated is that part of the verification process that consists of picking up the phone and talking to sources, talking to direct witnesses or gathering information in the field, that part "of classical journalism", as he says, cannot be replaced by AI (**Hrckova *et al.***, 2022). Gustavo Sampaio agrees that the verification part, especially when it comes to images and videos, would not be possible to be evaluated without the use of such tools.

Ruben Míguez stresses that in the distribution phase, AI can also be applied for some tasks such as it is already used, e.g., finding content already debunked to send to a person that requests it. In this sense, the only phase that cannot be fully automated is the verification phase, mainly because it "also relies on social and organisational variables that involve human decisions" (**Dierickx *et al.***, 2023), however, other phases of the fact-checking process are already performed by automated systems.

Could an AI tool declare if content is true or fake? In line with other academic work (**Hrckova *et al.***, 2022; **Dierickx *et al.***,

2023), all interviewees agree that it is not possible. Alba Tobello believes that if a claim is the same as another already verified, yes it could, as it already happens, but that doesn't apply to all cases. Rubén Míguez and Gustavo Sampaio agree that machines lack the context in which a phrase is shared or said, which in their opinion is essential to check before labelling a piece of information as false. Pablo Hernández also adds that there is a part of the verification process that is based on traditional journalistic methods, making, thus, human intervention essential in the fact-checking process.

The ability to understand not only the context but also the nuances of language and the use of idioms such as irony and contradictory sentences are some of the shortcomings that AI systems have yet to overcome (**Graves**, 2018a; 2018b; **Nakov *et al.***, 2021). Alba Tobello's point is that machines don't properly understand the nuances of language and can misinterpret some information. Pablo Hernández explains that there is content that uses humour or sarcasm, for example, "which are things that humans understand and that artificial intelligence has difficulty understanding". Rubén Míguez points out that when sentences are complex, especially in political language, there are many examples of people saying something by saying the opposite of what was said before, and "the machine gets very confused and needs a human". These examples show that the current development of AI is not enough to decide whether a sentence is true or false, mostly because "the task of evaluating the veracity of news articles is still very demanding and complex, even for trained specialists and much more for automated systems"

In terms of the efficiency of their work, and in line with previous research (**Sánchez González *et al.***, 2022; **Westlund *et al.***, 2022), all interviewees agree that the increased speed of the work, due to the use of automation and AI in journalistic processes, makes the work much more efficient. Gustavo Sampaio highlights that it makes their work "more effective, broader and faster in intervention". Pablo Hernández adds that when it comes to disinformation, detecting it early is fundamental to stopping its spread. With machine monitoring and filtering of the information on social media, the fact-checking intervention can be done at a much faster pace. "The sooner we can debunk it or give correct information about that content or that claim, the more effective our work will be", he says.

Although the interviewees have shown some concerns about ethics, they admit that their newsrooms have not yet developed ethical guides for the use of these technological tools. This lack of guides for the use of AI can have relevant consequences for organisations, including lower transparency in the processes and insufficient accountability about the criteria they use for fact-checking. This gap is also present in media outlets, which are slowly starting to implement concrete norms for the use of AI (**Beckett; Yaseen**, 2023). Rubén Míguez highlights that at *Newtral* there is a strong concern around ethical issues related to the use of AI and automated tools, especially algorithms, due to the risk of biases. These risks are increasing if AI develops to a point in which it can verify contents and label claims, for example. Míguez states that, since they are aware of the risk of biases in machine learning, they always feed their AI with diverse content from different political, economic and moral points of view. Gustavo Sampaio emphasises the same risks of biases when training the machine. He says that *Polígrafo* intends to maintain its editorial independence and the perception around the mechanisms of algorithms and AI tools for fact-checkers not to be manipulated.

In addition, Míguez says that since *Newtral* is a member of the IFCN, the newsroom needs to follow good practices. Pablo Hernández also stresses the association with IFCN and their new association with the EFCSN, adding that this process of adhering to the network has made them reorganise, and revise some processes and norms. As seen in IFCN's Code of Principles[1], the fact-checkers associated commit to non-partisanship and fairness; standards and transparency of sources; transparency of funding and organisation; standards and transparency of methodology; and to an open and honest correction policy. However, he explains that there is no ethical guide regarding the use of AI and automation tools in the newsroom. Alba Tobello underlines that even though *Verificat* doesn't have a formal guide towards an ethical use of automation and AI, the existence of human supervision in all automated and AI-based processes within the newsroom reduces these risks.

7. Conclusion

Fact-checkers in the Iberian Peninsula are deploying automated and AI technologies to identify potential misinformation or content that could go viral. The tools they deploy, though, are more based on automation, and the use of AI is not widespread through the fact-checking process. As far as the study could identify, there are more automation tools than AI-based instruments used in Iberian fact-checking agencies.

Nevertheless, different tools help select what should be checked and help verifiers perform their tasks faster and broader. Our results indicate that the use of these emerging technologies is widespread in all phases of verification work. Currently, they are most prevalent in the identification phase, because this is the phase in which fact-checkers must deal with the largest volume of content and must navigate a very complex universe of tangled narratives that also includes disinformation; and in the verification phase, when automation and AI make work easier and faster, helping to contextualise images and videos.

Automation and AI technologies are deployed for several tasks by Iberian fact-checkers, in response to *RQ1*, and in all

[1] The commitments of the IFCN's Code of Principles can be found at https://ifcncodeofprinciples.poynter.org/know-more/the-commitments-of-the-code-of-principles

phases of the fact-checking process. From chatbots to interact with users, to automated content transcription systems that convert audio and video into text, to AI-based classifying systems that label user queries and highlight possible verifiable phrases, and to detection tools to monitor social media content and find potential disinformation, in the first phase. From image and video verification tools to verify authenticity, to social media verification, translation, archive, and geolocation tools, and to automated image tagging for similar images that have been debunked, in the second phase. Automation also has a role in distributing content (the third phase of the process), when they use social media software to schedule and manage posts, chatbots to share debunking, and a bot to automatically add a verification label to images to be shared on social media.

The use of automation in this context is very relevant for tasks that would be very difficult for humans to do because of the volume of information circulating online, the difficulty of knowing what is viral and what is not, the need to search the web for images that could be manipulated or taken out of context, and the need to save time by delegating repetitive and mechanical tasks to machines. This is the case with the transcription of audio and video, a very mechanical task that, when automated, saves fact-checkers a lot of time and allows them to analyse a greater amount of information in a shorter period. These tools have the advantage of increasing the speed of their work, freeing fact-checkers from repetitive tasks, detecting disinformation at an early stage of its spread, and processing large amounts of information that couldn't be done without machine intervention (**Nakov *et al.***, 2021; **Hrckova *et al.***, 2022; **Broussard *et al.***, 2019).

Nevertheless, it is possible to see that the Iberian agencies use very simple tools, and some of them can be accessed by any internet user, as is the case of TinEye or InVID. We see in this research very few examples of technologies that carry AI embedded, and a great unbalance between the agencies in both Iberian countries. In Portugal, fact-checkers only use automation tools, while AI solutions are deployed in all Spanish fact-checking agencies. This may be explained by larger investments in the development of technological solutions in-house, mostly in *Newtral* due to their R&D dedicated section, and in partnership with universities and other research projects as it is the case of *Maldita.es* and *Verificat,* which is not verified in *Polígrafo*. The reduced number of AI tools used in these agencies can be explained by both the difficulty of investing in AI and the lack of commercial solutions, as mentioned by the interviewees. It is important to highlight that the technologies used by *Polígrafo* rely heavily on the partnership with Meta.

Regarding *RQ2*, the changes in newsrooms are more related to the efficiency of work than to changes in fact-checking practices. It is also possible to see that automation and AI tools support the fact-checkers' decision-making by helping them understand the urgency of a particular debunking. However, the changes that the use of these automation tools brings to fact-checking routines go beyond simple use, and there are some tasks where automated systems start to make decisions instead of humans. On the one hand, fact-checkers can't cope with the vast amount of information that circulates online, but as technologies evolve, some parts of their journalistic roles begin to be impregnated by AI, including the journalistic gatekeeping role of deciding what to verify and what not to. This change becomes clear when it is the technology itself that highlights what will potentially be checked instead of humans. When the interviewees say that the decision-making process starts with the AI tool, new processes are introduced into the journalistic routines.

It is noted that some of the limitations identified are consistent with those reported in the literature. The main limitation is the inability of machines to perform the entire fact-checking process (**Nakov *et al.***, 2021; **Juneja; Mitra**, 2022; **Dierickx *et al.***, 2023). This is because only humans can interpret the nuances of the language, the expressive resources and the context in which the claim is inserted, essential aspects in verification. Therefore, these tools still need to be improved for better results in reducing the dissemination of disinformation. Although advanced technologies are useful tools in the different steps of the fact-checking process, the interviewees are unanimous that they cannot, by themselves, label content as true or false. That is where the human perspective and sensitivity are needed to separate fake news from irony or sarcasm, for example. We also see that human sensitivity also serves as ethical guidance for the work with automation and AI tools, because the concerns around these topics are not yet codified into a handbook or an instructions manual in any of the newsrooms investigated.

Based on our research, our understanding is that fact-checking can only be effectively done if humans and machines combine efforts. Justifying, fact-checkers and journalists need automation and AI tools to make their work faster, broader and more effective, but on the other hand, technology itself cannot make the final decision whether the content is true or false, especially in text content (**Dierickx *et al.***, 2023; **Hassan *et al.***, 2015). AI will continue to change the work in newsrooms and fact-checking agencies, but in its current stage, it serves more as a complement to professionals than as a substitute for a trained fact-checker or journalist (**Broussard *et al.***, 2019). As technology advances and AI becomes more sophisticated, these perceptions may change.

Some of the concerns raised in this study also relate to the lack of regulation of the use of AI and automation in newsrooms and fact-checking agencies, as well as the possible risks of machine-induced bias. This is because most of the tools used by fact-checkers are developed by third parties, especially technology companies and social media, which have their own agendas. Given this, we believe that ethical challenges are an area that needs to be further explored in future studies. Although all the agencies studied follow both the IFCN's and EFCSN's standards, none has its regulations dedicated to the

use of these technologies, especially as this is still a recent and controversial topic. The lack of guidelines in fact-checking agencies reflects the current state of deregulation in the use of AI systems worldwide. This gap led the European Commission to reach a landmark agreement on AI regulation in late 2023 (**European Commission**, 2023). In March 2024, this agreement led to the first regulation on the responsible use of AI: the 'AI Act' (**European Commission**, 2024).

When it comes to the fact-checkers-audience relationship, the use of automation and AI seems to have a positive impact as the fact-checkers' work gains scale and speed, with automated systems being able to interact and help the community. However, as this study focuses only on the opinion of fact-checkers, through interviews, and does not address the opinion of the community, it is limited in this sense. Therefore, it is not possible to draw any further conclusions about the impact of AI on the relationship between fact-checkers and the audience, which is worth being analysed in future investigations.

The main limitation of the study is that it is based on interviews, as we believe that an ethnographic study in the fact-checking agencies would add relevant data on the use of these technologies in the professionals' productive routines. We emphasise that future studies should look at the impact of these tools on the relationship between these agencies and their audiences, to understand whether the potential to improve these communities is being realised. We also advocate that future research should focus on a more in-depth approach to the impact of these technologies on the production routines of fact-checkers. As automation and AI continue to develop, it is also important that future studies understand the impact of these technologies on the trust and credibility of these agencies.

We cannot forget that new issues are emerging, such as media and digital literacy in the age of AI. While some of these fact-checkers see these technologies as allies in their media literacy efforts by making these tools available to all users, others believe that media literacy strategies should be based on education and training. Anyhow, we believe that the combination of both approaches could lead to better outcomes not only for media literacy but also for digital literacy, to avoid the possible isolation of older people, so future research should focus on the possibility of using automation and AI to promote media and digital literacy.

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References

Allcott, Hunt; Gentzkow, Matthew (2017). "Social Media and Fake News in the 2016 Election". *Journal of Economic Perspectives,* v. 31, n. 2, pp. 211-236. *https://doi.org/10.1257/jep.31.2.211*

Amazeen, Michelle A (2019). "Practitioner perceptions: Critical junctures and the global emergence and challenges of fact-checking". *International Communication Gazette,* v. 81, n. 6-8, pp. 541-561. *https://doi.org/10.1177/1748048518817674*

Andaluz-Antón, L.; Fernández-Fernández, Á.; Pérez-Sánchez, J. (2022). "Organizational models in the fact-checking media: Comparative analyisis of The Fact Checker and Maldita.es". *VISUAL REVIEW. International Visual Culture Review Revista Internacional De Cultura Visual,* v. 10, n. 1, pp. 1–11. *https://doi.org/10.37467/revvisual.v9.3562*

Bachmann, Ingrid; Valenzuela, Sebastián (2023). "Studying the Downstream Effects of Fact-Checking on Social Media: Experiments on Correction Formats, Belief Accuracy, and Media Trust". *Social Media+Society,* v. 9, n. 2, pp. 2056305 1231179694. *https://doi.org/10.1177/20563051231179694*

Baptista, João Pedro; Gradim, Anabela (2022). "A Working Definition of Fake News". *Encyclopedia,* v. 2, n. 1, pp. 632-645. *https://doi.org/10.3390/encyclopedia2010043*

Beckett, Charlie; Yaseen, Mira (2023). "Generating Change: A global survey of what news organizations are doing with AI". *JournalismAI, Polis, Department of Media and Communications, The London School of Economics and Political Science*. *https://www.journalismai.info/research/2023-generating-change*

Bigot, L. (2017). "L'essor du fact-checking: de l'émergence d'un genre journalistique au questionnement sur les pratiques professionnelles." Doctoral thesis, Panthéon-Assas University Paris II. *http://www.theses.fr/2017PA020076*

Bigot, Laurent (2018). "Rétablir la vérité via le fact-checking: l'ambivalence des médias face aux fausses informations". *Le Temps des médias,* v. 30, n. 1, pp. 62-76. *https://doi.org/10.3917/tdm.030.0062*

Borges, Luís; Martins, Bruno; Calado, Pável (2019). "Combining similarity features and deep representation learning for stance detection in the context of checking fake news". *Journal of Data and Information Quality (JDIQ),* v. 11, n. 3, pp. 1-26. *https://doi.org/10.1145/3287763*

Brandtzaeg, Petter Bae; Følstad, Asbjørn (2017). "Trust and distrust in online fact-checking services". *Communications of the ACM,* v. 60, n. 9, pp. 65-71. *https://doi.org/10.1145/3122803*

Broussard, Meredith; Diakopoulos, Nicholas; Guzman, Andrea L; Abebe, Rediet; Dupagne, Michel; Chuan, Ching-Hua (2019). "Artificial Intelligence and Journalism". *Journalism & Mass Communication Quarterly,* v. 96, n. 3, pp. 673-695. *https://doi.org/10.1177/1077699019859901*

Cardoso, G.; Baldi, V. (2021). "Algoritmos e notícias - A oportunidade da inteligência artificial no jornalismo". *Relatório OberCom - Observatório da Comunicação*. *https://obercom.pt/algoritmos-e-noticias-a-oportunidade-da-inteligencia-artificial-no-jornalismo*

Cazetta, J. (2018). "O Fact-Checking Luso-Brasileiro: uma análise dos fact-checkings credenciados no Brasil e em Portugal pela International Fact-Checking Network." Master 's thesis, Universidade do Porto. *https://repositorio-aberto.up.pt/handle/10216/116321*

Cazetta, Jhonny Póvoa; Reis, Ana Isabel (2019). "As fontes dos serviços de fact-checking luso-brasileiros". *Comunicação Pública,* v. 14, n. 27. *https://doi.org/10.4000/cp.5348*

Coddington, Mark (2015). "Clarifying Journalism's Quantitative Turn: A typology for evaluating data journalism, computational journalism, and computer-assisted reporting". *Digital Journalism,* v. 3, n. 3, pp. 331-348. *https://doi.org/10.1080/21670811.2014.976400*

Curry, Alexander L; Stroud, Natalie Jomini (2021). "The Effects of Journalistic Transparency on Credibility Assessments and Engagement Intentions". *Journalism,* v. 22, n. 4, pp. 901-918. *https://doi.org/10.1177/1464884919850387*

Dale, Robert (2017). "NLP in a post-truth world". *Natural Language Engineering,* v. 23, n. 2, pp. 319-324. *https://doi.org/10.1017/S1351324917000018*

De Mateo, Rosario; Bergés, Laura; Garnatxe, Anna (2010). "Crisis, What Crisis? The Media: Business and Journalism in Times of Crisis". *tripleC: Communication, Capitalism & Critique. Open Access Journal for a Global Sustainable Information Society,* v. 8, n. 2, pp. 251-274. *https://doi.org/10.31269/triplec.v8i2.212*

Diakopoulos, Nicholas (2019). *Automating the News*. Harvard University Press. *https://www.hup.harvard.edu/books/9780674976986*

Dierickx, Laurence; Lindén, Carl; Opdahl, Andreas (2023). "Automated Fact-Checking to Support Professional Practices: Systematic Literature Review and Meta-Analysis". *International Journal of Communication,* v. 17, pp. 5170-5190. *https://ijoc.org/index.php/ijoc/article/view/21071/4287*

Duarte, Jorge (2005). "Entrevista em profundidade." In: *Métodos e técnicas de pesquisa em comunicação.* Duarte, J.; Barros, A. (Eds.), pp. 62-83. Atlas. *https://www.academia.edu/download/60586395/Entrevista_em_profundidade20190913-12365-1kjb1f2.pdf*

Ekström, Mats; Lewis, Seth C; Westlund, Oscar (2020). "Epistemologies of digital journalism and the study of misinformation". *New Media & Society,* v. 22, n. 2, pp. 205-212. *https://doi.org/10.1177/1461444819856914*

European Commission (2023). "Commission welcomes political agreement on Artificial Intelligence Act." [Press Release]. *https://ec.europa.eu/commission/presscorner/detail/en/ip_23_6473*

European Commission (2024). "AI Act". *https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai*

Full Fact (s.d.). "Automated Factchecking". *https://fullfact.org/automated*

García-Orosa, Berta; Canavilhas, João; Vázquez-Herrero, Jorge (2023). "Algorithms and communication: A systematized literature review". *Comunicar,* v. 31, n. 74, pp. 9-21. *https://doi.org/10.3916/C74-2023-01*

Giddens, Anthony (2008). *Sociologia*. 6th ed. Fundação Calouste Gulbenkian, Lisboa. *https://www.biblio.com/book/sociologia-6-edicao-giddens-anthony/d/1539101627*

Gradim, Anabela (2009). "Digital Natives and Virtual Communities: Towards a New Paradigm of Mediated Communication". *Communication Studies,* v. 5, pp. 53-73. *https://ec.ubi.pt/ec/05/html/gradim*

Graves, Lucas (2016). *Deciding what's true: The rise of political fact-checking in American journalism*. Columbia University Press. *https://doi.org/10.7312/grav17506*

Graves, Lucas (2018a). *Factsheet: Understanding the promise and limits of automated fact-checking*. Digital News Publications. *https://doi.org/10.60625/risj-nqnx-bg89*

Graves, Lucas (2018b). "Understanding the promise and limits of automated fact-checking". *Reuters Institute for the Study of Journalism*. *https://ora.ox.ac.uk/objects/uuid:f321ff43-05f0-4430-b978-f5f517b73b9b*

Graves, Lucas; Anderson, Charles W (2020). "Discipline and promote: Building infrastructure and managing algorithms in a "structured journalism" project by professional fact-checking groups". *New Media & Society,* v. 22, n. 2, pp. 342-360. *https://doi.org/10.1177/1461444819856916*

Graves, Lucas; Cherubini, Federica (2016). *The Rise of Fact-Checking Sites in Europe*. Reuters Institute for the Study of Journalism. *https://doi.org/10.60625/risj-tdn4-p140*

Hassan, Naeemul; Adair, Bill; Hamilton, James T; Li, Chengkai; Tremayne, Mark; Yang, Jun; Yu, Cong (2015). "The Quest to Automate Fact-Checking." In: *Proceedings of the 2015 Computation+ Journalism Symposium.* Citeseer. *https://www.naeemulhassan.info/file/factchecking-cj2015-hassan-submission.pdf*

Herrero, Esperanza; Damas, Susana Herrera (2021). "El fact-checker en español alrededor del mundo: Perfil, similitudes y diferencias entre verificadores hispanohablantes". *Revista de Comunicación de la SEECI,* n. 54, pp. 49-77. *https://doi.org/10.15198/seeci.2021.54.e725*

Himma-Kadakas, Marju; Ojamets, Indrek (2022). "Debunking False Information: Investigating Journalists' Fact-checking Skills". *Digital Journalism,* v. 10, n. 5, pp. 866-887. *https://doi.org/10.1080/21670811.2022.2043173*

Hrckova, Andrea; Moro, Robert; Srba, Ivan; Simko, Jakub; Bielikova, Maria (2022). "Automated, not automatic: Needs and practices in European fact-checking organizations as a basis for designing human-centered AI systems". *arXiv preprint arXiv:2211.12143*. *https://doi.org/10.48550/arXiv.2211.12143*

Huynh, Viet-Phi; Papotti, Paolo (2018). "Towards a Benchmark for Fact Checking with Knowledge Bases." In: *Companion Proceedings of the The Web Conference 2018.* pp. 1595-1598. ACM. *https://doi.org/10.1145/3184558.3191616*

Johnson, Patrick R (2023). "A Case of Claims and Facts: Automated Fact-Checking the Future of Journalism's Authority". *Digital Journalism,* pp. 1-24. *https://doi.org/10.1080/21670811.2023.2174564*

Juneja, Prerna; Mitra, Tanushree (2022). "Human and Technological Infrastructures of Fact-checking". *Proceedings of the ACM on Human-Computer Interaction,* v. 6, n. CSCW2, pp. 1-36. *https://doi.org/10.1145/3555143*

Les Décodeurs (2017). "Le Décodex, un outil de vérification de l'information". Le Monde. *https://www.lemonde.fr/les-decodeurs/article/2017/01/23/le-decodex-un-premier-premier-pas-vers-la-verification-de-masse-de-l-information_5067709_4355770.html*

Li, Jianing; Foley, Jordan M; Dumdum, Omar; Wagner, Michael W (2022). "The Power of a Genre: Political News Presented as Fact-Checking Increases Accurate Belief Updating and Hostile Media Perceptions". *Mass Communication and Society,* v. 25, n. 2, pp. 282-307. *https://doi.org/10.1080/15205436.2021.1924382*

Lindén, C.; Dang-Nguyen, D.; Salas-Gulliksen, C.; Khan, S.; Amelie, M.; Dierickx, L. (2022). *State of the Art in Fact-Checking Technology*. NORDIS - NORdic observatory for digital media and information Disorders. *https://www.researchgate.net/publication/360515291*

Lindén, Carl-Gustav (2017). "Algorithms for Journalism: The Future of News Work". *The Journal of Media Innovations,* v. 4, n. 1, pp. 60-76. *https://doi.org/10.5617/jmi.v4i1.2420*

López-García, Xosé; Costa-Sánchez, Carmen; Vizoso, Ángel (2021). "Journalistic Fact-Checking of Information in Pandemic: Stakeholders, Hoaxes, and Strategies to Fight Disinformation during the COVID-19 Crisis in Spain". *International Journal of Environmental Research and Public Health,* v. 18, n. 3, pp. 1227. *https://doi.org/10.3390/ijerph18031227*

López-Marcos, Casandra; Vicente-Fernández, Pilar (2021). "Fact Checkers Facing Fake News and Disinformation in the Digital Age: A Comparative Analysis between Spain and United Kingdom". *Publications,* v. 9, n. 3, pp. 36. *https://doi.org/10.3390/publications9030036*

Masullo, Gina M; Curry, Alexander L; Whipple, Kelsey N; Murray, Caroline (2022). "The Story Behind the Story: Examining Transparency About the Journalistic Process and News Outlet Credibility". *Journalism Practice,* v. 16, n. 7, pp. 1287-1305. *https://doi.org/10.1080/17512786.2020.1870529*

Micallef, Nicholas; Armacost, Vivienne; Memon, Nasir; Patil, Sameer (2022). "True or False: Studying the Work Practices of Professional Fact-Checkers". *Proceedings of the ACM on Human-Computer Interaction,* v. 6, n. CSCW1, pp. 1-44. *https://doi.org/10.1145/3512974*

Milosavljević, Marko; Vobič, Igor (2019). "Human Still in the Loop: Editors Reconsider the Ideals of Professional Journalism Through Automation". *Digital Journalism,* v. 7, n. 8, pp. 1098-1116. *https://doi.org/10.1080/21670811.2019.1601576*

Montal, Tal; Reich, Zvi (2017). "I, Robot. You, Journalist. Who is the Author? Authorship, bylines and full disclosure in automated journalism". *Digital Journalism,* v. 5, n. 7, pp. 829-849. *https://doi.org/10.1080/21670811.2016.1209083*

Nakov, Preslav; Corney, David; Hasanain, Maram; Alam, Firoj; Elsayed, Tamer; Barrón-Cedeño, Alberto; Papotti, Paolo; Shaar, Shaden; Martino, Giovanni Da San (2021). "Automated Fact-Checking for Assisting Human Fact-Checkers". *arXiv preprint arXiv:2103.07769*. *https://doi.org/10.48550/arXiv.2103.07769*

Napoli, Philip M (2014). "Automated Media: An Institutional Theory Perspective on Algorithmic Media Production and Consumption". *Communication Theory,* v. 24, n. 3, pp. 340-360. *https://doi.org/10.1111/comt.12039*

Newman, Nic (2023). "Journalism, Media, and Technology Trends and Predictions 2023". *Reuters Institute for the Study of Journalism. https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2023-01/Journalism_media_and_technology* _trends_and_predictions_2023.pdf

Nguyen, An T; Kharosekar, Aditya; Krishnan, Saumyaa; Krishnan, Siddhesh; Tate, Elizabeth; Wallace, Byron C; Lease, Matthew (2018). "Believe it or not: Designing a human-ai partnership for mixed-initiative fact-checking." In: *Proceedings of the 31st annual ACM symposium on user interface software and technology.* pp. 189-199. ACM. *https://doi.org/10.1145/3242587.3242666*

Nicey, Jérémie; Bigot, Laurent (2020). "Le soutien de Google et de Facebook au fact-checking français: entre transparence et dépendance". *Sur le Journalisme, About Journalism, Sobre Jornalismo,* v. 9, n. 1, pp. 58-73. *https:// doi.org/10.25200/slj.v9.n1.2020.418*

Nyhan, Brendan; Porter, Ethan; Reifler, Jason; Wood, Thomas J. (2020). "Taking Fact-Checks Literally But Not Seriously? The Effects of Journalistic Fact-Checking on Factual Beliefs and Candidate Favorability". *Political Behavior,* v. 42, n. 3, pp. 939-960. *https://doi.org/10.1007/s11109-019-09528-x*

Oliveira, Florence (2020). "Fazer Fact-Checking em Portugal: Análise ao Observador e ao Polígrafo." Master's Thesis, Universidade da Beira Interior. uBibliorum. *https://ubibliorum.ubi.pt/handle/10400.6/11042*

Palacios, Marcos (2019). "Fake news e a emergência das agências de checagem: terceirização da credibilidade jornalística." In: *Políticas da língua, da comunicação e da cultura no espaço lusófono. Vila Nova de Famalicão: Edições Humus.* pp. 77-92. http://repositorium.uminho.pt/bitstream/1822/62825/1/2019_Martins_Macedo_PoliticasDaLin gua.pdf#page=77

Pereira, Fábio Henrique; Adghirni, Zélia Leal (2011). "O jornalismo em tempo de mudanças estruturais". *Intexto, Porto Alegre,* n. 24, pp. 38-57. *https://seer.ufrgs.br/intexto/article/view/19208*

Petre, Caitlin (2013). "A Quantitative Turn in Journalism?". *Tow Center for Digital Journalism*. *https://blog.chartbeat. com/2013/10/31/quantitative-turn-journalism*

Petrushkov, Mikhail (2019). "Convergent Journalism and Fact-Checking: from Fact Verification to a New Genre." In: *International Conference" Topical Problems of Philology and Didactics: Interdisciplinary Approach in Humanities and Social Sciences"(TPHD 2018).* pp. 357-362. Atlantis Press. *https://doi.org/10.2991/tphd-18.2019.67*

Pocino, P. (2022). "Algorithms in the Newsrooms: Challenges and Recommendations for Artificial Intelligence With the Ethical Values of Journalism". *Catalan Press Council (CIC)*. *https://t.ly/6XLa*

Primig, Florian (2024). "The Influence of Media Trust and Normative Role Expectations on the Credibility of Fact Checkers". *Journalism Practice,* v. 18, n. 5, pp. 1137-1157. *https://doi.org/10.1080/17512786.2022.2080102*

Sánchez González, María; Sánchez Gonzales, Hada; Martínez Gonzalo, Sergio (2022). "Inteligencia artificial en verificadores hispanos de la red IFCN: proyectos innovadores y percepción de expertos y profesionales". *Estudios sobre el Mensaje Periodístico,* v. 28, n. 4, pp. 867-879. *https://doi.org/10.5209/esmp.82735*

Schapals, Aljosha Karim; Porlezza, Colin (2020). "Assistance or Resistance? Evaluating the Intersection of Automated Journalism and Journalistic Role Conceptions". *Media and Communication,* v. 8, n. 3, pp. 16-26. *https://doi.org/10.17645/mac.v8i3.3054*

Silva, M.; Albuquerque, M.; Veloso, M. (2019). "Representação da informação noticiosa pelas Agências de Fact-Checking: do acesso à informação ao excesso de desinformação". *Revista Brasileira de Biblioteconomia e Documentação,* v. 15, n. 2, pp. 410-426. *https://rbbd.febab.org.br/rbbd/article/view/1225*

Sirén-Heikel, Stefanie; Kjellman, Martin; Lindén, Carl-Gustav (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,* v. 74, n. 3, pp. 354-366. *https://doi.org/10.1002/asi.24656*

Souza, C.; Santaella, L. (2021). "Deepfakes na perspectiva da semiótica". *TECCOGS: Revista Digital de Tecnologias Cognitivas,* n. 23. *https://doi.org/10.23925/1984-3585.2021i23p26-44*

Torre, L. (2022). "Fake news, post-truth, and journalism: weaknesses and strategies in 2018 brazilian elections." In: *Disinformation Studies: Perspectives from An Emerging Field.* Amaral, I.; Correia, J. C.; Jerónimo, P. (Eds.), pp. 115-149. *https://labcomca.ubi.pt/en/disinformation-studies-perspectives-from-an-emerging-field*

Walter, Nathan; Cohen, Jonathan; Holbert, R Lance; Morag, Yasmin (2020). "Fact-Checking: A Meta-Analysis of What Works and for Whom". *Political Communication,* v. 37, n. 3, pp. 350-375. *https://doi.org/10.1080/10584609.2019.1668894*

Wang, Patrick; Angarita, Rafael; Renna, Ilaria (2018). "Is this the era of misinformation yet: combining social bots and fake news to deceive the masses". En: *Companion Proceedings of the The Web Conference 2018. pp. 1557-1561. ACM Digital Library. https://doi.org/10.1145/3184558.3191610*

Wardle, Claire (2019). "Understanding Information Disorder." First Draft News. *https://firstdraftnews.org/long-form-article/understanding-information-disorder*

Wardle, Claire; Derakhshan, Hossein (2018). "Thinking About 'information Disorder': Formats of Misinformation, Disinformation, and Mal-information." In: *Journalism,'Fake News'& Disinformation.* pp. 43-54. UNESCO Publishing. *https://en.unesco.org/sites/default/files/f._jfnd_handbook_module_2.pdf*

Westlund, Oscar; Larsen, Rebekah; Graves, Lucas; Kavtaradze, Lasha; Steensen, Steen (2022). "Technologies and Fact-Checking. A Sociotechnical Mapping." In: *Disinformations Studies: Perspectives from An Emerging Field.* Correia, J.; Jerónimo, P.; Amaral, I. (Eds.), pp. 193-236. *https://labcomca.ubi.pt/en/disinformation-studies-perspectives-from-an-emerging-field*

Wu, Shangyuan; Tandoc Jr, Edson C; Salmon, Charles T (2019). "Journalism Reconfigured: Assessing Human–Machine Relations and the Autonomous Power of Automation in News Production". *Journalism Studies,* v. 20, n. 10, pp. 1440-1457. *https://doi.org/10.1080/1461670X.2018.1521299*

Zhang, Jingwen; Featherstone, Jieyu Ding; Calabrese, Christopher; Wojcieszak, Magdalena (2021). "Effects of fact-checking social media vaccine misinformation on attitudes toward vaccines". *Preventive Medicine,* v. 145, pp. 106408. *https://doi.org/10.1016/j.ypmed.2020.106408*