

# IA as a tool to combat disinformation. Approaching a model focused on hoaxes in an electoral context

## *La IA como herramienta para combatir la desinformación. Planteamiento de un modelo enfocado en los bulos en un contexto electoral*




**Mercedes Herrero de la Fuente.** PhD in Information Sciences (Complutense University of Madrid), Master's Degree in Radio Communication (Spanish National Radio-Complutense University of Madrid) and Master's Degree in Linguistics Applied to the Teaching of Spanish as a Foreign Language (Antonio de Nebrija University). Researcher with an active six-year research period and member of the INNOMEDIA research group. Principal researcher of the Chair in Cinema, Women and Education, promoted by EGEDA (Audiovisual Producers' Rights Management Association) and Platino Educa. Member of the R+D+I research project COM2GENDER, focusing on digital divides in university education. She has previously participated in other competitive research projects with public funding, including COMPENSA, focused on the labour insertion of people with disabilities in the audiovisual sector. He has been a research fellow at Cornell University (USA), Salford University (UK), Radboud Universiteit (The Netherlands) and Univerzita Karlova (Czech Republic). She publishes articles in highly indexed journals focusing on: application of technology to news discourse, new professional profiles and women's participation in the audiovisual sector. She is currently Coordinator of the PhD in Innovation in Digital Communication and Media and an accredited lecturer at the Antonio de Nebrija University. She has been a news producer at Telemadrid for fifteen years.

Nebrija University, Spain   
mherrero@nebrija.es  
ORCID: 0000-0002-5361-9056



**Celia Sancho Belinchón.** PhD in Audiovisual Communication, Advertising, and Public Relations. She currently directs the Master's Degree in Digital and Data Journalism at Antonio de Nebrija University and teaches in the Journalism degree program and the Master's Degree in Political Communication and Crisis and Emergency Management. Her research interests include journalism, digital communication, social media, social media strategy, fact-checking, and advertising.

Nebrija University, Spain   
csanchobe@nebrija.es  
ORCID: 0000-0001-5979-1853

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**Jorge Sedeño López.** PhD in Computer Engineering, Master's Degree in Information and Communications Technology Management and Computer Engineering from the University of Seville. He has more than twenty years of professional experience in different Public Administrations and belongs to the Senior Corps of Information Systems and Technologies of the State Administration and to the Corps of Experts in Information Technology of the Bank of Spain. His lines of work are oriented towards digital transformation through agile methodologies, e-Government, Data Governance and Artificial Intelligence. He belongs to the ES3 research group (Engineering and Science in Software System) and is a member of the EQUAVEL Project PID2022-137646OB-C31 funded by MICIU/AEI /10.13039/501100011033 and by FEDER, EU. He is a lecturer on the Master's programme in Digital and Data Journalism at the University of Nebrija, as well as at other public and private institutions.

Sevilla University, Spain   
jorgesedeno@us.es  
ORCID: 0000-0002-5368-5547

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### Abstract:

Artificial intelligence (AI) has contributed to disinformation through its ability to generate false content. But the potential of this technology can also be focused on designing a prototype tool that detects hoaxes, particularly those amplified in social networks and in electoral contexts and moments of political relevance. This article analyses the main patterns followed by the fake news launched on X during the last Catalan elections (12 May 2024), following criteria such as subject matter, format, origin and dissemination, among others. With the information obtained, an AI resource with the capacity to recognise such content is preliminarily developed. We start from these specific results: the most recurrent topic is immigration, the text plus photograph format predominates, in most cases it comes from profiles registered as any citizen, and the conventional media do not generally participate in its propagation. Based on these guidelines, we propose the main characteristics of an AI system that combines dissemination patterns with analysis of text, images and sentiment, which, together with real-time verification of facts, allows us to filter with a sufficient degree of sensitivity (proportion of hoaxes correctly identified) and specificity (proportion of truthful content erroneously classified as hoaxes).

### Keywords:

Artificial Intelligence; disinformation; verification; Catalan elections; algorithm.

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### Resumen:

*La inteligencia artificial (IA) ha contribuido a la desinformación por su capacidad para generar contenidos falsos. Pero el potencial de esta tecnología puede también enfocarse en diseñar un prototipo de herramienta que detecte los bulos, en concreto aquellos amplificados en redes sociales y en contextos electorales. Este artículo analiza los principales patrones seguidos por las noticias falsas lanzadas en X durante las últimas elecciones catalanas (12 mayo 2024), siguiendo criterios como la temática, el formato, el origen o su difusión, entre otros. Con la información obtenida se elabora de forma preliminar un recurso de IA con capacidad de reconocer tales contenidos. Partimos de estos resultados concretos: el tema más recurrente es la inmigración, predomina el formato texto más fotografía, en la mayoría de los casos procede de perfiles registrados como un ciudadano cualquiera y los medios convencionales no participan, en general, en su propagación. Sobre estas pautas planteamos las principales características de un sistema IA que combina patrones de difusión con análisis de texto, imágenes y sentimiento, que junto con la verificación en tiempo real de hechos nos permita filtrar con un grado suficiente de sensibilidad (proporción de bulos correctamente identificados) y especificidad (proporción de contenidos veraces erróneamente clasificados como bulos).*

### Palabras clave:

*Inteligencia artificial; desinformación; verificación; elecciones catalanas; algoritmo.*

## 1. Introduction

Artificial intelligence (AI) is present in many areas of our society, especially in the journalistic sector (Lopezosa-García et al., 2024). The first examples of its use in writing date back to 2014, when the Associated Press agency began to use it in sports summaries and business reports (Badgamia, 2023). However, it is in the present time when the debate about generative AI has gained strength, due to its potential for aggravating the phenomenon of disinformation. The present work is based on this problem, but it is centered on the possibilities of AI as a tool that can help in the detection of fake news.

According to the UNESCO (United Nations Educational, Scientific and Cultural Organization) (2021), AI is the “simulation of human intelligence processes by machine”. These developments include learning, reasoning, and self-correction. With respect to this definition, Blanco-Marañón (2023) emphasizes the term “simulation”, affirming that imitating does not mean being equal. Criado-Grande understands that the former refers to the possibility that machines attain “some kind of rationality through the perception of the environment with which they interact” (2021, p.351), using sensors, obtaining and processing data, reasoning on them, and adopting decisions.

In the area of communication, one of the changes that has been accelerated by AI is the increasingly liquid character of information. Thus, “we will see texts that will turn into images, audio, or video, which will imply the alteration of production models and processes, distribution, and monetization, as never experienced before” (Cerezo-Guilarranz, 2024, p.49). The potential of AI is presented as a double-edged sword that can function as an efficient tool for journalism, but it also turns into a threat due to its capacity to generate fake contents in any format.

From the technical point of view, it will be necessary to identify sources of data, which in the case of disinformation, will be related to the web and social networks, in addition to knowing how this information will be stored and accessed. According to the study by the IDC (International Data Corporation), the “data sphere” will grow to 175 ZB<sup>1</sup> in 2025 (Reinsel et al., 2018, p.3) which is a great challenge. It is also necessary to know who this information will be treated, a field in which data science (artificial intelligence and machine learning) comes into play for developing indicators of the degree of falseness/truthfulness of the information. Lastly, the way of extracting and presenting the value obtained from the previous treatment and its degree of quality will have to be defined.

### 1.1. Disinformation and AI

The EC (European Commission) defines disinformation as “all forms of false, inaccurate, or misleading information designed, presented and promoted to intentionally cause public harm or for profit” (2018, p.3). The emphasis is therefore on the intention of causing harm to obtain profit, even if it is done in an unethical manner. For Alandete-Ballester (2019), fake news do not have to be an outright lie; they can have some link with what is occurring, but they are characterized by distorting reality in pursuit of sensationalism.

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1 1 ZB (Zettabyte) = 1.000.000.000.000 GB (Gigabyte).

The phenomenon of disinformation is a serious concern for democratic countries (Rodríguez-Martelo et al., 2023). Through the use of fake news, the intent is to manipulate the population and undermine the main political institutions (Arrieta-Castillo and Rubio-Jordán, 2023). The White Paper against Disinformation published by the Spanish Government in 2022 warns against the threat it implies to political stability and national security, “due to its potential to corrupt public debate, erode trust in the institutions, manipulate public opinion, and condition foreign policy” (2022, p.9).

Disinformation is increasingly affecting public opinion, according to different national and international reports. The Reuters Institute affirms that this concern has grown in 2023 by two points with respect to the previous year, and 56% of those surveyed fear not being able to distinguish what is true and what is false, when reading news on the Internet (Newman, 2024, p.17).

AI possesses sophisticated tools that can be used to amplify this undesirable phenomenon. The best known in recent years have been the automatic generation of text and bots. Both have been used in social networks for the massive fabrication of misleading texts and their dissemination through fake profiles, widening their reach.

The most novel element as of today is the deepfake, or a video and audio in which the images and sound (normally both) have been manipulated (Herrero-De-La-Fuente and Ríos-Calvo, 2022). As Deeptrace (2019) points out, the first creations of this kind emerged in November, 2017, with the creation of a forum in Reddit with the same name centered on the use of deep learning programs to edit pornographic videos. Since then, the availability of AI tools for this type of edits has continuously grown, with some of them being easy to access and manage. It can be said that a proof of this is that the circulation of deepfakes has grown by 5505% between 2019 and 2023, according to the online security organization Home Security Heroes (2024). Deepfakes represent a loss trust between society and images (Jacobsen and Simpson, 2023), and due to this they represent a change in paradigm, where “seeing is believing” ceases to make sense<sup>2</sup>.

As pointed out, social networks are an essential agent in the dissemination of disinformation. In the past few years, communication media have lost their monopoly on the distribution of news, so that informational contents have proliferated outside of media circuits and are propagated by millions of accounts created by individuals, political groups, businesses, or any organization (González-Quintero and Cardona-Restrepo, 2023), who may or may not show their real identity. In Spain, the number of daily Internet users (87%) is already higher than those who watch television (81%) (AIMC, 2024, p.38 and p.64). Access to current information was among the main uses of the Internet in 2023 (as declared by 60% of those polled), at the same time that 70% used it to navigate social networks, and 97% for instant messaging (AIMC, 2024, p.67). It must also be mentioned that due to its closed nature, it constitutes one of the main channels of dissemination of fake news (Díez-Garrido *et al.*, 2021).

In addition, the news created in the journalistic area, that is, by journalists or experts, lose relevancy within the set of supposedly informational content that is consumed in social networks, especially by the youth (Newman, 2024, p.11). According to the last report by the Reuters Institute, “while mainstream journalists often lead conversations around news in Twitter and Facebook, they struggle to get attention in newer networks like Instagram, Snapchat, and TikTok” (Newman, 2024, p.13), where

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2 One of the most notorious in recent years was the manipulated video of Ukrainian President Volodymyr Zelensky declaring his country's surrender to Russia in the first days of the war that began in February 2022. <https://cutt.ly/0w2geeXl>

influencers are more prominent. Therefore, this data shows a trend that was also observed by the Edelman Trust Barometer, which detected, in its last global study, an increase in mistrust in the media in fifteen out of twenty-eight countries consulted. Italy, Germany, and Brazil were the three countries in which this media discredit is greatest, with Spain found only four places behind (2024, p.43).

### *1.2. AI as an instrument to combat disinformation*

Peña-Fernández *et al.* (2023) point out that among the main applications of artificial intelligence is the development of tools to detect disinformation. As García-Marín explains, “AI makes it possible to determine the credibility of news sources based on their reputational analysis, while offering a powerful answer to identify false profiles on social networks” (2021, p.53). It is also able to detect disinformation contents through the use of computational linguistics (with semantic and syntactic models) and non-linguistic models, to discover image manipulation (photographs or videos).

Along with big data, AI can be an instrument to unmask fake content, as pointed out by recent studies (Moreno-Espinosa *et al.*, 2024; García-Marín, 2021; Flores-Vivar, 2019). Among the most utilized devices to find fake news, different types of bots stand out, developed in many cases with collaborations between universities, companies, and media. They are based on aspects such as adaptive algorithms, which examine sources and diffusion patterns, mainly. Some examples are Fact Machine (from the Brazilian verifier Aos Fatos), TruthBuzz (promoted by the International Center for Journalists) or Les Décodeurs (from the newspaper *Le Monde*). Recently, many AI tools have been developed based on machine learning, which work with linguistic patterns through automated learning classifiers, indicating the veracity of news bit as a function of different variables (Luengo-Cruz and García-Marín, 2020). Here we mention, to cite one of them, Fakebox, which discriminates articles written in a similar manner to real news articles, and texts that do not follow these guidelines, providing a score (Telefónica Tech, 2018). Other novel systems include ClaimBuster (<https://idir.uta.edu/claimbuster/>) and Full Fact (<https://fullfact.org/>) with the latter especially designed for political content with real-time systems and databases of verified facts (although not in Spanish). In the present article, in the presentation of our results, an in-depth analysis of these resources will be performed.

Social network platforms lead many projects that develop AI systems to automatically eliminate malicious content through text-based analysis; some of them include Facterbot or Projeto Lupe (Flores, 2019). However, many publications are pictures, videos, or audios, and the verification methods for these are still not very developed (Moreno-Espinosa *et al.*, 2024). This implies that the identification of disinformation is an important challenge in the field of automated learning (machine-learning) and artificial intelligence. It can be said that there is not only one “better” algorithm for this, as the adequate approach depends on many factors, such as the type of data and the available formats, the complexity of the problem and the specific characteristics of fake news that are to be detected, which points to the need for a multidisciplinary approach (Ruffo *et al.*, 2023).

The European Union has already started to promote initiatives to combat disinformation from different approaches. Since 2018, a series of areas of action were established, in: specific research on this phenomenon in the different areas involved (the project Fandango has existed since 2018), the creation of independent networks of verifiers (FactCheckEU was created in 2019), as well as the promotion of media literacy, among others. The community institutions are committed to tackling fake news with a cross-cutting strategy, which goes beyond the creation of technological tools for the detection of fake news. These

resources must rely on information professionals and all citizens. “The key is to have citizens that understand the importance of obtaining quality information from reliable sources, that are capable of identifying potentially false content, and, in short, that value the truth” (Sádaba and Salaverría, 2023, p.27). On this respect, the new Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024, which establishes harmonized rules on AI, mentions the potential negative effects “on the democratic framework, civic discourse, and electoral processes” (BOE, 12 julio 2024).

## 2. Method

The main objective of this study is to extract the main characteristics of the hoaxes spread in the last regional elections in Catalonia (May 12th, 2024) and to extrapolate these rules to design a prototype of an AI tool that will be able to detect fake news related with this typology in the electoral context.

For this, the present study was developed in three phases. The first was descriptive, and was centered on consulting sectorial reports and previous studies. A review was performed of the literature related with our object of study and the most current data, to establish the basis for a reflected directed towards creating a conceptual framework on which our work is based.

The second phase consists of a content analysis of the most popular fake news on the X (formerly Twitter) website during the pre-campaign period (starting on April 2nd), campaign (from May 3rd to May 10th) and the day of the Catalan elections (May 12<sup>th</sup>, 2024). The selection of the fake news (fourteen) was performed starting with an article from the blog Maldito Bulo (Maldita, 2024), which collects the ones that had the greatest repercussion in social networks (specifically X). It is believed that this sample represents a larger set, as it gathers the most significant ones. Credit is given to the compilation carried out by Maldita, as it is a foundation that is dedicated to verification, of recognized prestige in Spain<sup>3</sup>. Nevertheless, intentional sampling is proposed, which follows a criteria of ease, as it is an accessible sample to which Maldita has already applied some filters. It is considered to be a starting point for this initial phase of the development of an AI tool, as pointed out in the explanation of the third phase of the study.

It must also be added that all the contents analyzed were written in Spanish, except for those published by the television channel TV3, which were in Catalan, although this media outlet re-tweets texts in Spanish.

The analysis pattern that was followed to analyze the fourteen highlighted fake news was the following:

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3 Maldita was founded as a non-profit digital native media outlet in 2018 and has since its inception collaborated with the European Commission on several initiatives to combat disinformation. It is a pioneer in fact-checking work in Spain and enjoys international recognition, being a member of the International Fact-Checking Network.

**Table 1. Hoax analysis variables**

Variable	Description
Date	Day the hoax was published
Subject matter	Thematic area to which the hoax refers *
Political party	Political party subject of the hoax
Format	Text; text and photograph; edited photograph; text and video; video; text and audio
Writing of the hoax	The way in which information is addressed (direct, indirect, explanatory, sensationalist)
Type of profile that created the hoax	Political spokesperson (public office, party office, or related organization); media outlet; unknown citizen
Dissemination of the hoax by the media	Yes/No Digital media are considered in social network X. Traditional media are analyzed, such as: newspaper ( <i>El País, El Mundo, ABC, La Razón, El Diario, Público</i> ), radio stations ( <i>SER, COPE, Onda Cero, RNE</i> ) and television channels ( <i>La 1, AT3, Telecinco, La Sexta and TV3</i> )

**\* We chose to leave this variable open, without defining categories that could predetermine it.**

**Source: prepared by the authors**

The third phase is exploratory, and the intention is, once the selected fake news have been analyzed and the common patterns analyzed, the design of a prototype AI tool that includes all the mechanisms to identify these patterns, in order to detect them in later news articles and to determine if they are fake or not, with a sufficient sensitivity and specificity.

The sensitivity refers to the rate of true positives, and the specificity to the rate of false positives, so that for a binary model of classification, as the one proposed (false information, true information), the greater the sensitivity (more positives) and the lower the specificity (less mistakes), the closer we are to a perfect classifier.

For each of these patterns, a series of algorithms would be proposed that will be fitted by with hyperparameters. A hyperparameter is a configuration that is adjusted externally, that is not learned from the data, but instead is established before the training process of the model, that is a set of parameters outside of the algorithm itself, that can improve or adapt its performance (Simanjuntak et al., 2024) with respect to the problem proposed.

Likewise, given the myriad of combinations and adjustments, the selection of the performance metrics related with sensitivity and specificity in a binary classification model (false information-fake news, true information-not fake news) is especially relevant.

Lastly, to address the problem of classification of fake news, and to understand why certain decisions are made, the explanatory (or interpretable) models are crucial. These models must not only be precise, but must also provide a clear justification for their predictions. Therefore, the system must have the capacity to explain the decision taken (Hashmi et al., 2024).

### 3. Results

#### 3.1. The main fake news *s* in *X* with respect to the regional elections of Catalonia

We begin the presentation of the first stage of the results by showing a table with the identification data that are closely related with the content of the fourteen main hoaxes detected, as shown in Table 2.

**Table 2. Identification sheet of the main hoaxes in the Catalan elections (date, topic, party)**

Denomination	Description of the hoax	Date	Topic	Political party <sup>4</sup>
Casa Tarradellas	False statements by the company's founder explaining that he only hires Catalans	02/04/2024	Catalonia/Brand	None
Jordi Évole joins the ERC	Fake news about the journalist joining the ERC	09/04/2024	Party memberships	ERC/ Government
Grandfather Puigdemont	Misattributed photograph of Falangist Gregorio Martín Mariscal	17/04/2024	Candidates	Junts+ Puigdemont
COVID Vaccination Illa	Distorted statements about his vaccination	22/04/2024	Candidates/ Health	PSC
Ringworm epidemic	False health alert due to ringworm epidemic	24/04/2024	Health	None
"Islamic emirate" posters	False image of welcome signs placed at the entrance to various towns	25/04/2024	Immigration	Frente Obrero
Illa's flag event	Real image taken out of context of a march for Spanish unity with different political parties present	26/04/2024	Candidates	PSC

<sup>4</sup> ERC: Esquerra Republicana de Catalunya; PSC: Partido Socialista de Catalunya, part of the PSOE: Partido Socialista Obrero Español; Junts: Junts per Catalunya.

Social assistance to Moroccans	Fake news claims that Moroccan families in Catalonia are living solely on aid.	26/04/2024	Subsidies/ Immigration	ERC / Government
Guaranteed Income	False information about aid to Moroccan families from the former PIRMI (	03/05/2024	Subsidies / Immigration	ERC / Government
Implementation of Arabic in schools	False subsidy from the Generalitat to implement the language	03/05/2024	Education/ Immigration	ERC / Government
Buying of votes by PSOE advisor	Alleged vote buying via the advisor's WhatsApp	10/05/2024	Corruption	PSOE and PSC
Private swimming pools expropriated	False news about the expropriation of private swimming pools due to the drought	10/05/2024	Drought	ERC / Government
PIRMI (Minimum Insertion Income) Aid	Social aid to families of any nationality, which no longer exists in Catalonia	10/05/2024	Subsidies /Education / Immigration	ERC / Government
Rodalies Sabotage <sup>5</sup>	Alleged theft of copper cables from the Rodalies (local trains) paralyzes the service	12/05/2024	Transport / Corruption	PSOE

Source: prepared by the authors

As the table shows, fake news were observed spread out from April 2<sup>nd</sup>, 2024, to May 12<sup>th</sup>, 2024, although not evenly, given that they were not published every day. Only the hoaxes found in Table 2 were found, with April 10<sup>th</sup> being the date with the most fake news. The period encompasses the period from pre-campaign to election day, as the confrontational tone in recent years has amplified the partisan diatribe over time. It is striking that the climate of tension intensifies on election day itself.

It was observed that the most recurrent thematic areas were related to social themes, and the most predominant issue was immigration, which was behind five contents related with subsidies/financial aid, and education. Within the social topic, we also find health, but only the case of the false ringworm epidemic is treated as such, without it being used as an excuse for other issues. We also found allusions to candidates and new members from different parties (four). Likewise, we found hoaxes that are apparently recurrent in matters outside of politics, such as a brand (Casa Tarradellas), or the problem of drought, to launch contents related to Catalanian nationalism or economic policies against private property, all of which to discredit the central government. With the same purpose, we found discussions about buying votes via WhatsApp, or incidences local transport during election day.

<sup>5</sup> Rodalies is the public service of commuter and medium-distance regional trains in Catalonia. It was transferred by the Ministry of Public Works to the Catalan autonomous region in 2010 and 2011.

As Table 2 shows, only two hoaxes were found that did not directly correspond to a specific political party. Of the remaining twelve: six alluded to the ERC party (which governed Catalonia when the research took place), three to the PSC (one of them shared with the PSOE), one to the PSOE, one to Junts, and another one to Frente Obrero. All of this seemed to also obey a strategy of wearing down the institutions, when trying to erode the parties that lead the regional and central executive branches.

Within the sample analyzed, the most utilized format was the combination of text and photos, with a total of ten cases (the image was not edited and it did not have any superimposed text). It must be clarified that in two, plus the body of the tweet, there was only a photograph (without text), and it appeared with encrusted text.

We found another two formats in the fourteen hoaxes analyzed, which were: audio accompanied by text, which showed the spoken testimony of an immigrant from the Maghreb, who received social aid (PIRMI) in an illegal manner; and video accompanied by text, in the tweet about the rejection of Salvador Illa, a socialist candidate, to become vaccinated against COVID-19.

It must be pointed out that some formats also existed for which no results were found, such as only text or only video. In any case, none of the publications seemed to be associated to a user with a high level of digital skills.

In general, the texts tended to be sensationalist, using upper case text, and excessive use of punctuation marks, and spelling mistakes in some cases. In most of them, these texts can help to capture more attention from the spectator, as they use bright colors such as red. Therefore, it can be said that this simple aesthetic and based on visual aspects achieves a very effective message that is easily assimilated by the audience, which contributes to the deception. Likewise, no hoaxes were found that were written indirectly, but instead all of them were written in a direct manner, based on simplistic arguments to capture the attention of the spectator. No explanations were included, as the strategy is that of simplification and the presentation of maximalist arguments.

When considering the X profiles that published the hoaxes analyzed, an almost complete coincidence was observed, as most (eleven) originated in this social network from unknown users in the public sphere. Three cases did not fit this pattern: the first, created by the leader of Frente Obrero; the second, created by political spokespersons of the VOX party; and the third by political spokespersons of the Partido Popular. In these three cases, the member of these political parties did not have any public positions during the dissemination of these hoaxes.

Within the three hoaxes published by political officials of the indicated parties, the first, published by Roberto Vaquero, shows welcome signs at road entrances to the Autonomous Community of Catalonia that read "Islamic Emirate of Catalonia". It came from the X profile of this Frente Obrero leader (extreme right party). At the same time, citizens that agree with this information disseminate it in their personal accounts.

The second is focused on the boycott to Catalan local trains by the PSOE, to prevent citizens from travelling and exercising their right to vote. PP leaders launch accusations in this sense, which are re-tweeted by members of the ERC, Junts, and Frente Obrero.

The last hoax refers to a supposed investment of the Catalan regional government to implement the study of the Arabic language at schools. Publications of this fake news have been found in X profiles belonging to VOX spokespersons and followers of this party (not identified as members).

With respect to the publications of the fake news analyzed in other communication media, in general terms, the media did not echoed them in their official X profiles; but two exceptions were found to this pattern.

The first was the fake news about Salvador Illa and the supposed fact of not having gone to a health center to be vaccinated against COVID-19. In this case, it was a Honduran television medium, “Girasol TV”, which included it in its X profile.

The second was related to the alleged sabotage of the Rodalies local trains. The traditional media (indicated in the pattern of analysis), as well as the regional television of Catalonia (TV3) resorted to the clickbait, publishing in X headlines with the terms “alleged sabotage” or “election sabotage”. Then they refer to the theft of copper suffered by the commuter rail network, but in no way do they reproduce the core of the hoax, that is, that the Partido Socialist is behind the regional train (Rodalies) travel problems during election day.

In order to quantify the different variables analyzed, a summary is shown in Table 3:

**Table 3. Quantification of results in analysis variables (not directly related to: topic, date, party)**

Variable	Description	Number of hoaxes
Format	Text	0
	Text and photograph	10
	Edited photograph	2
	Text and video	1
	Text and audio	1

Writing of the hoax	Direct	14
	Indirect	0
	Explanatory	0
	Sensationalist	14*
Type of profile that created the hoax	Political spokesperson	3**
	Communication media	0
	Unknown use	11
Dissemination of the hoax by the media	Yes, they disseminate	12
	Do not disseminate	2

\* All hoaxes fall into both categories: direct and sensationalist

\*\* None of these political leaders hold public office

Source: prepared by the authors

To provide a greater clarity about the repercussion of the hoaxes analyzed in the sample, the related data can be consulted in the following table:

**Table 4. Impact of hoaxes in X**

Denomination	Profile that originates the hoax	Dissemination of the hoax by the media	Number of retweets	Comments
Casa Tarradellas	Unknown users	n/a*	134,000	875
Jordi Évole joins the ERC	Unknown users	n/a	42	3
Grandfather Puigdemont	Unknown users	n/a	84,000	28

COVID Vaccination Illa	Unknown users	Girasol TV	145,000	1,714
Ringworm epidemic	Unknown users	n/a	458	54
“Islamic emirate” posters	Roberto Vaquero (Frente Nacional)	n/a	10	0
Illa’s flag event	Unknown users	n/a	2,600	369
Social assistance to Moroccans	Unknown users	n/a	2,698	8
Guaranteed Income	Unknown users	n/a	1,293	83
Implementation of Arabic in schools	Political spokespersons of VOX	n/a	1,258	25
Buying of votes by PSOE advisor	Unknown users	n/a	1,000	256
Private swimming pools expropriated	Unknown users	n/a	1,455	6
PIRMI (Minimum Insertion Income) Aid	Unknown users	n/a	987	18
Rodalies Sabotage	Political spokespersons of the Partido Popular	<i>TV3, El País, ABC, La 1, AT3, Telecinco, La Sexta and TV3</i>	162,000	493

**\* Not applicable**

**Source: prepared by the authors**

As observed on the table, there are three publications that are clearly notable due to their expansion as compared to the rest, and that allude to topics related with Catalonia, trying to discredit a businessman and a politician of that community, and thereby fueling the anti-Catalan sentiment. The one with the greatest reach attacks the local Catalan commuter trains, but in this case the objective is the Government of Spain and the creator of the hoax is the Partido Popular.

### 3.2. Algorithms and features for developing a tool to detect hoaxes in regional elections in Spain

The patterns detected in the analysis of the previous phase serve as the basis for the third stage, which centered on the design of an AI resource, concatenating different algorithms so that it is able to identify this type of hoaxes selected. Given that the sample suffers from a numerical limitation, the proposed tool is considered to be in an initial stage of development.

In this way, and based on the hoaxes analyzed *a posteriori* in the context of some regional elections in Spain, a detection system will be outlined based on the patterns identified, for which the use of AI paradigms will be needed, through algorithms and features (an individual characteristic or property of the input data that help the model recognize patterns and make predictions) that are able to:

- To analyze the dissemination of media, to detect the origin of the information that will be processed (anonymous or by political spokespersons without a public office).
- To detect formats and styles in the information and to analyze the sentiment (multi-format information with a direct and sensationalist style, that seeks to provoke polarization).
- Fact-checking.

These concepts will be broken down in more detail below.

#### 3.2.1. Media dissemination

Within the analysis of media dissemination, the use of the algorithm PageRank, which is based on the concept of eigenvector centrality, is proposed<sup>6</sup>, to identify influencing accounts and patterns of dissemination of hoaxes.

As the main feature, we opted for the analysis of graphics, to model the relationship between these accounts and the dissemination patterns, given that the generation of hoaxes took place through the X network, and we seek anonymous accounts or accounts from political spokespersons that do not have any public office.

#### 3.2.2. Formats and styles

Given that the format pattern identified in the hoaxes in phase 2 combine text and another element, such as photographs (edited or not), videos or audio (which will be later transformed to text), the following algorithms are proposed:

- For the text, a transforming model will be used, that is, a type of neural network architecture for natural language processing, due to its capacity to effectively manage text sequences and establish complex relationships between the words in a sentence. Both BERT (Bidirectional Encoder Representations from Transformers) and RoBERTa (A Robustly Optimized BERT Approach) can be adapted to detect disinformation (Zhang et al., 2024). Pre-trained models will also be utilized (Hu-

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6 PageRank is a sophisticated measurement of centrality that combines the idea of node importance with a probabilistic navigation model. It simulates the behavior of a user randomly browsing the web and uses that simulation to calculate the importance of each node, based on the quantity and quality of the links pointing to it. Eigenvector centrality means that the importance of a node depends not only on how many other nodes connect to it, but also on the relevance of those nodes.

gginFace, FakeBERT, or FakeNewsBERT) along with the built-in *embeddings*<sup>7</sup> for hoax analysis to improve their detection (Yang et al., 2018). In this way, we will have hybrid models focused to the context of Spanish regional elections. This is what is known as RAG architecture<sup>8</sup>.

- For images and videos, EfficientNet will be used, a family of convolutional neural networks (CNN) that have been shown to be very effective in the classification of these contents, with the ability to capture fine details, to be very critical for the detection of manipulations (edited photos), and which can be easily integrated with transforming models, to create a robust multi-modal detection system. Likewise, the EfficientNet B4 model has shown to have a detection precision of 92%, of faces manipulated in videos, as it analyzes many parameters, such as facial expressions and irregularities in the images, to differentiate between real and fake videos (Priyaa et al., 2024).
- For the audio, the Whispers model will be used, which is well known for its cutting-edge performance in audio to text conversion, achieving a high precision in the transcription (Haz et al., 2023), and afterwards, once the text has been obtained, it will be processed just as the text from the hoax.
- As described in phase two of the study, the hoaxes are written in a non-neutral manner (direct and sensationalist language). Currently, the most effective algorithms for the analysis of style and sentiment, due to the ability to capture the bi-directional context of the words in a sentence, are BERT and RoBERTa. For this, classifiers will be added. For example, for the proposed study the sensationalist classifier can be used, so that: 0 = non-sensationalist and 1 = sensationalist, creating different classifiers to indicate a direct study and to verify if they create a sentiment of polarization or not.

### 3.2.3. Fact-checking

Due to the speed with which hoaxes are spread, and the short period of time in which elections take place (in the hoax identification sheet, we can observe that they even exist on the same day as the elections), it will be necessary for the chosen system to work in real-time, and to be integrated with different communication media, and that it contains alert systems for human verifiers. Therefore, ClaimBuster and Full Fact will be used (the latter, in addition, provides the verification of political discourses and specific communication media, and it has a database of contrasted statements). At the same time, the BERT-QA will be used to extract facts, with the most adequate feature being contextualization, which is defined as the verification process against said databases.

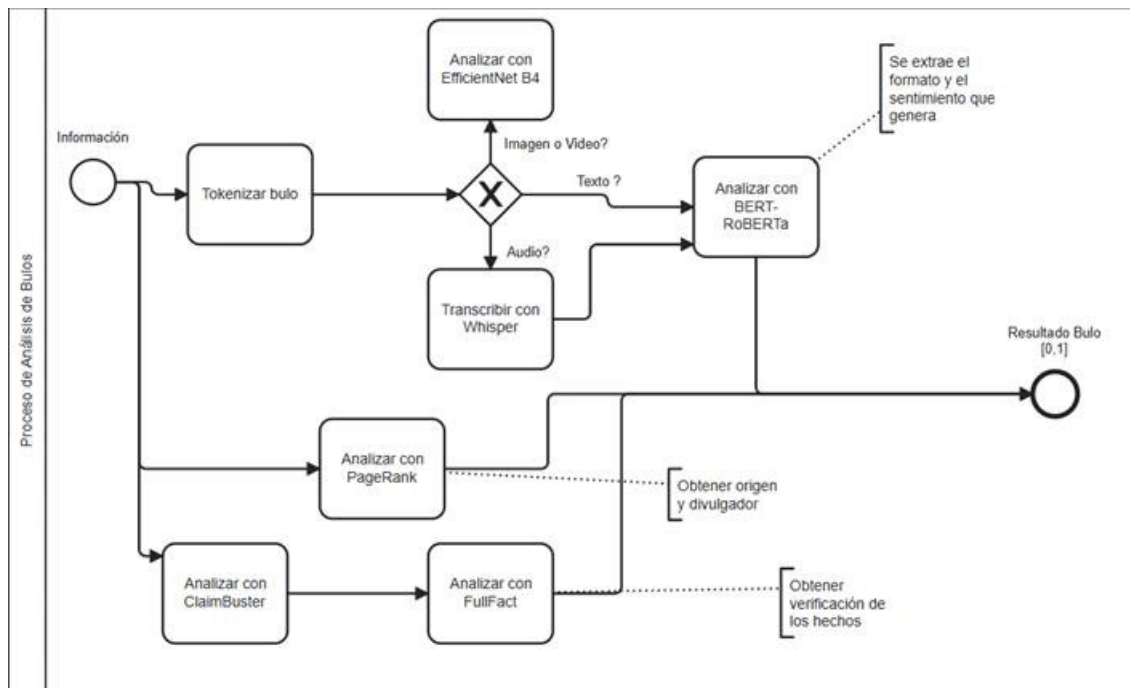
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7 Natural language processing technique that converts human language into mathematical vectors and is the basis of generative AI models, whose answer with the highest number is closest to the question.

8 Retrieval-Augmented Generation (RAG) architecture is a hybrid model that combines information retrieval and text generation approaches. In this type of architecture, the system first retrieves relevant information from a database or external source and then uses that information as context to generate more coherent and accurate responses or content. This integration allows the model to generate responses not only from its internal knowledge but also from its own internal knowledge.

### 3.3. Process

Figure 1. Analysis process diagram



Source: prepared by the authors

The design of the proposed system can be observed in Figure 1, which shows the process described below, so that once the hoax has been received, it will be tokenized<sup>9</sup>, to become the input in the following sub-processes.

- An inquiry will be made about the type of format, so that:
  - If it is text, it will be analyzed with BERT-RoBERTa.
  - If it is an audio, it will be transcribed with Whisper and posteriorly analyzed with BERT-RoBERTa.
  - If it is a video, it will be analyzed with EfficientNet B4.
- Format and sentiment will be extracted

<sup>9</sup> A token is a basic unit of text that the aforementioned algorithms use to process and analyze information. It can be a word, a subword, etc. Tokenization is the process of dividing text into these basic units.

- Dissemination will be analyzed with PageRank to obtain source and disseminator.
- The facts will be verified with ClaimBuster, and will be confirmed with Full Fact.

Lastly, all the information from each sub-process will be unified to provide a final binary response [0,1] to decide if it is a hoax or not.

Given the above, two fundamental aspects remain to validate the system proposed: the analysis of sensitivity and specificity, and the assessment of explainability.

### 3.4. Sensitivity and specificity analysis

The True Positive Rate (TPR) and False Positive Rate (FPR) are key metrics used in the evaluation of classification models, especially in binary classification problems. Our system intends to perform the binary classification (“hoax”, “not hoax”) of each of the input pieces of information (Jeni et al., 2013). Thus:

- TPR is also known as sensitivity. It measures the ratio of positive examples that are correctly identified by the model. It is a measure of how well the model captures positive cases. TPR is calculated as  $TP / (TP+FN)$ , where TP (True positives) is the number of hoaxed correctly classified as hoaxes, and FN (False Positives) is the number of hoaxes incorrectly classified as “not hoaxes”. Thus, the closer to 1 (all the hoaxes are detected) the better the sensitivity.
- FPR, also known as specificity, measures the ratio of negative examples that are incorrectly classified as positives. It is a measurement of the mistakes committed with respect to the negative examples. The FPR is calculated as  $FP / (FP+TN)$ , where FP (False Positives) is the number of “not hoaxes” erroneously classified as “hoaxes” and TN (True Negative) is the number of “not hoaxes” correctly classified as “not hoaxes”. Therefore, the closer to a 0 value (no truths are detected as a hoax), the higher the specificity.

### 3.5. Explainability

Although not part of the system itself, explainability, that is, the way in which the system explains how it arrived to the conclusion that a piece of information is a hoax or not, it an important component to grant it with reliability.

For this, SHAP (*SHapley Additive exPlanations*) will be used, which is based on game theory and provides consistent and additive explanations. This means that the sum of the contributions of all the characteristics provides the prediction of the model as a result, which is intuitive and easy to understand. SHAP can be applied to any type of model, for local interpretations (individual prediction), as well as global ones (throughout the entire set of data), which is crucial for understanding both specific cases and general trends in the context of fake news with political content, as the SHAP explanations can manage complex interactions between characteristics. The latter is relevant in the analysis of fake news, where multiple factors (such as the text content, the topic, the author, the source, and the date) can interact in non-trivial manners.

#### 4. Discussion and conclusions

After the presentation of the results, and the previous analysis, it can be said that AI has a great potential in the area of journalism, but it shown to be a double-edged sword. In the past few years, its high capacity to generate fake content has been shown, which have been used profusely to manipulate public opinion, especially in electoral contexts. The damaging consequences of disinformation for the correct functioning of democracies have led to a reflection on the need to use this same technology to more efficiently combat the proliferation of hoaxes.

The study starts from a specific situation, such as the pre-campaign and campaign periods in the last regional elections in Catalonia, to analyze the patterns followed in the creation and dissemination of fake news. In line with what other works such as those by González-Quintero and Cardona-Restrepo (2023) have corroborated, the focus was placed on social networks as the main way to propagate them, specifically in the X network.

The analysis of the fourteen hoaxes detected by Maldito Bulo (2024) which were used as our sample, and which we consider them to be representative of a broader set of this type of content, did not find any cases of deepfakes, in spite it being a growing trend worldwide, as stated in the report by Home Security Heroes (2024), a predominance was observed of supposedly 100% fake news (ten out of fourteen), so that our results do not correspond to the scheme of distortion based on partially-true information described by Alandete-Ballester (2019) (so common, on the other hand, in this type of phenomena).

The most recurring topics were social in nature, and in most of the cases connected with immigration, although they are presented as news about diverse areas, among which we find education, or social aids. In this aspect, we find sensationalism and the desire to discredit the institutions, as referred to by Arrieta-Castillo & Rubio-Jordán (2023). The attacks mainly directed to ERC and the Partido Socialista (through its Catalanian division), at the helm of the Catalanian and Spanish governments, respectively, demonstrate this purpose, which was intensified on the same day as election day, with the hoax about the sabotage of the Rodalies local trains. For this, the aggressive tone shown by our data is believed to contribute to this aim, with a predominance of exclamation marks or upper case letters in the published texts. All of this incites tension and mistrust, and increases the risk for democratic stability, thereby illustrating one of the risks pointed out in the White paper against Disinformation (Gobierno de España, 2022).

The disinformation came, in eleven of the fourteen samples studied, from profiles that did not belong to someone recognizable (such as a politician or a public servant), and which corresponded, apparently, from any citizen. In fact, the formatting was simple (text plus a photograph in most the cases), and a minimum level of skill was needed only for the edited images. However, it is possible that hidden beneath these seemingly innocuous profiles, we may find activists serving one party or another, with those affiliated with VOX being the most active. Outside of this pattern, we find the far-right leaders (VOX and Partido Obrero), who created some of these hoaxes (two) in our sample. The PP, on its part, added a third, the already-mentioned one about the malfunctioning of the local trains during election day, which is the most widespread of the observed set.

The media contributes to this as they do not share any of the fake news collected, but in this case, they resort to clickbaits, and also echo the disruptions to commuter trains with alarmist headlines. Far from being a positive conclusion, as only one case was detected, this data indicates a harmful practice, which adds to the noise and confusion promoted in the X network.

After evaluating these results, we moved on to developing an AI tool that, based on the dynamics detected in the fabrication and spread of hoaxes, may be able to identify attempts at disinformation related to an election.

We share with Ruffo et al. (2023) the premise that there is no single “best” algorithm, so that the algorithms and features most appropriate to the focus of our analysis were combined. The proposed AI system is specifically adapted to the typology of fake content so that, once the different components of the same have been determined (Table 3 and Table 4), a system is designed that combines different techniques, algorithms and features, adapted to the selected sample. The dissemination patterns were analyzed with PageRank (on the X network) and, in accordance with the conclusions of Zhang et al. (2004), we adapted the treatment of images with EfficientNet and the text information with a model of Transformers (BERT and RoBERTa) to our interests, which also served for conducting a sentiment analysis (such as for example, sensationalism). Once the information was tokenized, this must be verified with fact-checking tools, such as Claimbuster or Full Fact, which must have real-time responses.

The proposed AI system aims to perform a binary classification (“hoax”, “not hoax”) of each of the information inputs, through the process described in Image 1, so it will be crucial to measure sensitivity (ratio of positive examples correctly identified) and specificity (ratio of negative examples incorrectly classified as positive).

In turn, and because the algorithms used in this system allow it, SHAP will be used to perform the explainability of the system’s binary decision, where multiple factors (such as text content, topic, format, author, and date), can interact in non-trivial ways.

Among the limitations of this research, we find the sample size, as the fourteen hoaxes selected by Maldita, while presenting patterns that could be extrapolated to a larger set, do not constitute a large group. As we noted in the Methodology section, the sample is a set of hoaxes intentionally chosen in a specific political context, without it being statistically or theoretically representative.

Likewise, the design and development of the AI resource require refining the features detected in the patterns of the analyzed hoaxes, which were used as external properties of each algorithm employed in the process. It is also necessary to perform parameter adjustments on specific data from a broader set of hoaxes related to other Spanish regional elections, in order to train the model and test the metrics applied for specificity and sensitivity on a larger sample over time.

The proposed AI resource is tailored to the specific characteristics of this type of content (false information in electoral processes in Spain), which may be similar to other examples of disinformation from diverse situations and locations. Therefore, we consider the application of the model’s accuracy to new national electoral events and its suitability for such events held outside our country to be the subject of the subsequent study phases, through the measurement of the proposed quality parameters and the system’s ability to self-explain the results.

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## 6. Specific contributions of each author

	Name and Surname
Conception and design of the work	Mercedes Herrero de la Fuente, Celia Sancho Belinchón and Jorge Sedeño López
Methodology	Mercedes Herrero de la Fuente, Celia Sancho Belinchón and Jorge Sedeño López
Data collection and analysis	Celia Sancho Belinchón
Discussion and conclusions	Mercedes Herrero de la Fuente, Celia Sancho Belinchón and Jorge Sedeño López
Drafting, formatting, version review and approval	Mercedes Herrero de la Fuente

## 7. Conflict of interests

The authors declare that there is no conflict of interest contained in this article.

## 8. Bibliographical references

AIMC (2024). *Marco General de los Medios en España 2024*. <https://cutt.ly/Kw2ghBxA>

Alandete-Ballester, D. (2019) *Fake news: la nueva arma de destrucción masiva: Cómo se utilizan las noticias falsas y los hechos alternativos para desestabilizar la democracia*. Deusto.

Arrieta-Castillo, C., y Rubio-Jordán, A. V. (2023). Periodismo de verificación en formato vertical: narrativas multimedia de los verificadores en TikTok. *Ámbitos. Revista Internacional De Comunicación*, 60, 13-32. <https://doi.org/10.12795/Ambitos.2023.i60.01>

Badgamia, N. (1 mayo 2023). Explained. AI journalism: Can artificial intelligence replace journalists? *WioNews*. <https://cutt.ly/Rw2gWt3x>

Blanco-Marañón, N. (noviembre 2023). Qué diría Aristóteles de la inteligencia artificial. *Telos*, 123, 35-39. <https://cutt.ly/6rWQCBxr>

Boletín Oficial del Estado (BOE) (12 julio 2024). *Reglamento (UE) 2024/1689 del Parlamento Europeo y del Consejo, de 13 de junio de 2024, por el que se establecen normas armonizadas en materia de inteligencia artificial*. <https://www.boe.es/buscar/doc.php?id=DOUE-L-2024-81079>

Cerezo-Guillarranz, P.(2024). Tendencias 2024. Hacia el final de la web abierta. *Programmatic Spain*. <https://cutt.ly/Sw2gWQTs>

Comisión Europea (2018). *A multi-dimensional approach to disinformation*. <https://cutt.ly/Srjh4cNL>

- Criado-Grande, J.I. (2021). Inteligencia Artificial (y Administración Pública). *Eunomía. Revista en Cultura de la Legalidad*, 20, 348-372. <https://doi.org/10.20318/eunomia.2021.6097>
- Deeptrace (2019). *The state of deepfakes. Landscape, threats and impact*. <https://sensity.ai/reports/>
- Devlin, J., Chang, M.W., Lee, K., & Toutanova, K. (2018). Bert: Pre-training of deep bidirectional transformers for language understanding. *arXiv*, 1810.04805. <https://doi.org/10.48550/arXiv.1810.04805>
- Díez-Garrido, M., Renedo-Farpón, C., y Cano-Orón, L. (2021). La desinformación en las redes de mensajería instantánea. Estudio de las fake news en los canales relacionados con la ultraderecha española en Telegram. *Miguel Hernández Communication Journal*, 12(2), 467-489. <https://doi.org/10.21134/mhjournal.v12i.1292>
- Flores-Vivar, J. M. (2019). Inteligencia artificial y periodismo: diluyendo el impacto de la desinformación y las noticias falsas a través de los bots. *Doxa Comunicación*, 29, 197-212. <https://doi.org/10.31921/doxacom.n29a10>
- García-Marín, D. (2021). Las fake news y los periodistas de la generación z. Soluciones post-millennial contra la desinformación. *Vivat Academia. Revista de Comunicación*, 154, 37-63. <http://doi.org/10.15178/va.2021.154.e1324>
- Gobierno de España (2022). *Lucha contra las campañas de desinformación en el ámbito de la seguridad nacional. Propuestas de la sociedad civil*. <https://cutt.ly/VrWQOXJc>
- González-Quintero, J. I., y Cardona-Restrepo, P.(2023). Post-truth and Social Networks as Challenges for Journalism in the Digital. *Ánfora*, 30(55), 332-359. <https://doi.org/10.30854/anf.v30.n55.2023.977>
- Hashmi, E., Yayilgan, S.Y., Yamin, M.M., Ali, S., & Abomhara, M. (2024). Advancing Fake News Detection: Hybrid Deep Learning with FastText and Explainable AI. *IEEE Access*, 12, 44462-44480. <https://doi.org/10.1109/ACCESS.2024.3381038>
- Haz, L., Fajrianti, E.D., Funabiki, N., & Sukaridhoto, S. (14-15 octubre 2023). *A Study of Audio-to-Text Conversion Software Using Whispers Model*. Sixth International Conference on Vocational Education and Electrical Engineering (ICVEE), Surabaya (Indonesia). <https://doi.org/10.1109/ICVEE59738.2023.10348186>
- Herrero-De-la-Fuente, M., y Ríos-Calvo, C. Construcción de un escenario para la posverdad: redes sociales y desinformación (2022). En A. Pérez-Escoda y J. Rubio-Romero (eds.). *Redes sociales, ¿el quinto poder? Una aproximación por ámbitos al fenómeno que ha transformado la comunicación pública y privada* (pp.79-97). Tirant lo Blanch.
- Home Security Heroes (2024). *2023 State of Deepfakes*. <https://cutt.ly/QrWQP1Cu>
- Jacobsen, B.N., & Simpson, J. (2023). The tensions of deepfakes. *Information, Communication Society*, 27(6), 1095-109. <https://doi.org/10.1080/1369118X.2023.2234980>
- Jeni, L. A., Cohn, J.F., & De La Torre, F. (12 diciembre 2013). *Facing Imbalanced Data Recommendations for the Use of Performance Metrics*. Humaine Association Conference on Affective Computing and Intelligent Interaction, Ginebra (Suiza). <https://doi.org/10.1109/ACII.2013.47>
- López-López, P.C., Lagares-Díez, N., y Puentes-Rivera, I. (2021). *Razón y Palabra*, 24(111), 5-11. <https://razonypalabra.net/index.php/ryp/article/view/1891/1681>

Lopezosa-García, C., Pérez-Montoro, M., y Rey-Martín, C. (2024). El uso de la inteligencia artificial en las redacciones: propuestas y limitaciones. *Revista de Comunicación*, 23(1), 279-293. <https://doi.org/10.26441/RC23.1-2024-3309>

Luengo-Cruz, M., y García-Marín, D. (2020). The performance of truth: politicians, fact-checking journalism, and the struggle to tackle COVID-19 misinformation. *American Journal of Cultural Sociology*, 8, 405-427. <https://doi.org/10.1057/s41290-020-00115-w>

Maldito Bulo (17 mayo 2024). *14 bulos y desinformaciones sobre las elecciones autonómicas Cataluña del 12 de mayo de 2024*. <https://cutt.ly/uenhODjL>

Moreno-Espinosa, P., Abdulsalam-Alsarayreh, R. A., y Figuereo-Benítez, J. C. (2024). El Big Data y la inteligencia artificial como soluciones a la desinformación. *Doxa Comunicación*, 38, 437-451. <https://doi.org/10.31921/doxacom.n38a2029>

Newman, N., Fletcher, R., Eddy, K., Robertson, C.T., & Nielsen, R.K. (2024). *Reuters Institute Digital News Report 2023*. Reuters Institute, University of Oxford. <https://cutt.ly/6rWQSU6x>

Peña-Fernández, S., Meso-Ayerdi, K., Larrondo-Ureta, A, y Díaz-Noci, J. (2023). Sin periodistas, no hay periodismo. La dimensión social de la inteligencia artificial generativa en los medios de comunicación. *Profesional de la información*, 32(2), e320227. <https://doi.org/10.3145/epi.2023.mar.27>

Priyaa, V. G., Harrish, M. J., Udhayakumar, M., Jothieswaran, N., & Suresh, S. (12-14 abril 2024). *EfficientNet-Based Deep Learning Approach for Video Forgery Detection and Authentication*. 10th International Conference on Communication and Signal Processing (ICCSP), Melmaruvathur (India). <https://doi.org/10.1109/ICCSP60870.2024.10544113>

Reinsel, J., Gantz, J., & Rydning, D., (2018). *The digitization of the world from edge to core*. International Data Corporation. <https://cutt.ly/frWQDLdu>

Rodríguez-Martelo, T., Rúas-Araújo, J., y Maroto-González, I. (2023). Innovation, digitization, and disinformation management in European regional television stations in the Circom network. *Profesional de la información*, 32(1). <https://doi.org/10.3145/epi.2023.ene.12>

Ruffo, G., Semeraro, A., Giachanou, A., & Rosso P. (2023) Studying fake news spreading, polarisation dynamics, and manipulation by bots: A tale of networks and language. *Computer Science Review*, 47. <https://doi.org/10.1016/j.cosrev.2022.100531>

Sádaba, C., y Salaverriá, R. (2023). Combatir la desinformación con alfabetización mediática: análisis de las tendencias en la Unión Europea. *Revista Latina de Comunicación Social*, 81, 17-33. <https://www.doi.org/10.4185/RLCS-2023-1552>

Simanjuntak, A., Lumbantoruan, R., Sianipar, K., Gultom, R., Simaremare, M., Situmeang, S., & Panggabean, E. (2024). Research and Analysis of IndoBERT Hyperparameter Tuning in Fake News Detection. *Jurnal Nasional Teknik Elektro Dan Teknologi Informatika*, 13(1), 60-67. <https://doi.org/10.22146/jnteti.v13i1.8532>

Telefónica Tech (26 enero 2018). *Machine Learning contra “fake news”*. <https://cutt.ly/RrWQLvLr>

UNESCO (2021). *TVETipedia Glossary*. UNESCO International Centre for Technical and actional Education and Training. <https://cutt.ly/Ew2grz3A>

Yang, Y., Zheng, L., Zhang, J., Cui, Q., Li, Z., & Yu, P.S. (2018). TI-CNN: Convolutional neural networks for fake news detection. *arXiv*,1806.00749. <https://doi.org/10.48550/arXiv.1806.00749>

Zhang, Z., Lv, Q., Jia, X., Yun, W., Miao, G., Mao, Z., & Wu, G. (2024). GBCA: Graph Convolution Network and BERT combined with Co-Attention for fake news detection. *Pattern Recognition Letters*,180, 26-32. <https://doi.org/10.1016/j.patrec.2024.02.014>