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Research Article

# Overview of Misinformation and Disinformation Research from 1971 to 2022

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## ABSTRACT

**Background:** As social media has developed, it has become much easier for individuals to disseminate information with less effort, expense and filtration. Because of the damage it does to communities, this long-standing issue of fake news has become increasingly worrying. **Objectives:** The study's goal is to create a comprehensive map of the existing literature on misinformation and disinformation by analyzing its structure, tracking its evolution through time and discovering emerging trends. **Materials and Methods:** Several databases, including Web of Science and Scopus, were searched for appropriate keywords to pull up the articles published between 1971 and 2022. After removing duplicates and performing normalization, a total of 21,407 articles were analyzed using R software. **Results:** Journals reported a total of 21,407 articles, 13829 author keywords and 9394 keywords plus. In addition, only 1852 of the 12852 authors that contributed to these works were sole authors, giving a total collaboration coefficient of 3.06. Journal of Chemical Information and Modelling, Sustainability and Library Philosophy and Practice have all been cited as major venues for misinformation and outright lies. **Conclusion:** This study is one of the first to use scientometric methods to the analysis of disinformation and fake news from a strategic perspective. The data showed an increasing trend in articles from 1971 to 2022, with a sudden peak in 2021, which may imply an increase in the dissemination of disinformation and deceit. In addition, different time periods (1971-2020) revealed novel strategic themes. Based on the results of the cluster analysis, it is clear that scholars have paid the most attention to the factors that contribute to the proliferation of misinformation. Further data analysis reveals that digital media literacy and artificial intelligence are the primary study foci areas. Misinformation and disinformation were also linked to social media, AI and open access on the thematic map. This study's findings added new information that aided in answering some of the most pressing academic questions about the evolution of misinformation and deception. They can be utilized as a roadmap for further study in this area.

**Keywords:** Misinformation, Disinformation, Scientometrics, Thematic map.

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## INTRODUCTION

One of the greatest satirists of all time, Johnathan Swift, famously remarked, "a lie can travel halfway around the world while the truth is still putting on its shoes." More than three hundred years ago, in the year 1710, Addison acknowledged this to be the case. (p. 15). The quote provides valuable insight into the circumstances surrounding the spread of the misinformation. As a first step, it opens our eyes to the ease with which misinformation can spread in comparison to the truth, which is itself often extremely biased and can be more enticing since it fits with our preconceived notions. Our over-reliance on our biased judgement to distinguish between the truth and deception, which in most cases would lead to our failure and the ease with which biased people can spread false information on online platforms due to the lack of serious scientific investigation and reasoning may both contribute to the rapid spread of false information.[1]

Many different approaches have been used in the many research conducted on the topic of incorrect and misleading data. Research on the topic has focused mostly on three areas: (1) identifying false content categories; (2) the dynamics of distribution, especially on social networks; and (3) the effect on public opinion, despite the fact that the very nature of false information makes it difficult to examine and analyze.[2]

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After Donald Trump's victory in the 2016 U.S. presidential election, fake news and disinformation became major topics of conversation. In response, librarians overwhelmingly agreed that they play a crucial role in countering all types of false information. It's been called the "long-running information war of librarians," and many people have imagined themselves or their colleagues on the front lines, as[3] explains. In addition to being used by those outside the library (for example, Large, 2017),[4] the phrase "a critical resource for teaching the skills required to navigate the digital ecosystem" has been used to describe libraries.

Building credibility is essential for libraries to successfully resist misinformation. People have lost faith in traditional journalism and other institutional arbiters of truth, leaving them unsure of where to turn for reliable information. According to Wardle and Derakshan (2017),[5] however, "Libraries are one of the few institutions where trust has not declined." According to the Pew Research Centre, a large majority (78%) of U.S. people believe libraries are an excellent resource for locating credible information. Therefore, some scholars and professionals in the field of Library and Information Science (LIS) have urged libraries to build on that trust in order to provide the public with high-quality information and education[6] or to aid in reestablishing trust in traditional journalism and other reliable sources.

Misinformation, or false information that is widely disseminated through social media, has recently come to the attention of the general public and many in the library field have suggested that libraries may and should play an important role in educating the public about the issue.[3,7-11] They argue that librarians have been fighting disinformation for decades by helping the public stay informed, educating the public about information and media literacy and curating information sources. Practitioners argue that librarians may and should update current tactics to handle new kinds of misinformation, despite the fact that frameworks for information and media literacy haven't typically directly addressed disinformation.

The worrying thing is that the quantity of misinformation and disinformation flowing online doesn't seem to be reducing, despite the fact that there are many options for members of the community to limit the spread of misinformation and disinformation (for example, social media platforms and journals). Researchers' ability to simulate the numerous scenarios of misinformation and disinformation cascades has the potential to greatly raise the difficulty of countering these phenomena. There has to be in-depth study of both the elements that aid in the spread of misinformation and disinformation and those that seek to counteract them.

In this essay, we look at the factors that contribute to the propagation of false information. The authors' understanding of the dynamics at play in the fight against misinformation and deception has been enhanced by the findings. Benefits of mapping a theme area's structural structure include the capacity to describe and map particular thematic areas and subareas, as well as the identification of issues that have gotten less attention from scholars. This study intends to demonstrate the usefulness of the co-word approach in mapping the structure of studies on misinformation and disinformation in libraries, to investigate the topic's subareas and to disclose the correlations between these variables through careful observation. In co-word analysis, it is thought that keywords extracted from articles may stand in for a certain study path, research topic, or issue in a field. Two relevant study subjects can be identified in a manuscript by the co-occurrence of two topic-specific terms. Stronger correlations between keyword pairs emerge as co-word frequency rises, suggesting that the two terms are related to one another in some way.

Many researchers have found that using co-word analysis and topic clustering to better understand how networks function in different fields. Its other goals include detailing the roles of authors and researchers across the various scientific disciplines, outlining the specific contributions made to various subjects and issues and predicting future research priorities. This field's many subfields and specializations will inform the selection of subjects, themes, fields, issues and dialogues to be covered.

The purpose of this research, as outlined above, is to use co-word analysis, network analysis and scientific visualization tools to identify misinformation and disinformation research areas and reveal the intellectual structure of knowledge in misinformation and disinformation and library fields from 1971 to 2022 on web of science and Scopus.

## LITERATURE REVIEW

Kyza *et al.* (2020)[12] identify the following four critical aspects to aid in the formulation of policies to prevent misinformation: Data visualizations at different levels of granularity should be made available, a reliable network of specialists and collaborators should be developed and identified erroneous content should be made clearer and more understandable. These recommendations have implications for thinking about how revised social media policies could encourage sound decision making.

James (2020)[13] argues that it is crucial to educate both customers and librarians on the dangers of false information. He suggests that a hybrid offline/online librarian communication network could serve this purpose. Librarians are the only ones who should be passing on knowledge.

According to Leo n, Mart nez-Costa, Salaverra and Lopez-Goi (2022),[14] the widespread availability and rampant dissemination of misinformation emphasize the need to promote media and scientific literacy among the general public and to heighten awareness of the significance of the timing and substantiation of scientific research Pan, Liu and Fang (2021)[15] found that there

was a significant relationship between demographic characteristics and the uptake of health misinformation. When compared to males, women were more prone to trust false health claims. There was a negative correlation between age and the willingness to believe false information about health. Participants' income and education level were inversely associated to their acceptance of health misinformation..

Keselman, Arnott, Leroy and Kaufman (2021)[16] argue that people are both receptive to and motivated to propagate misinformation when using the internet. Better scientific and informational literacy is associated with less propensity to spread misinformation and greater resistance to its effects. In terms of intervention potential, information literacy clearly stands out as the winner. More research is needed to fully understand the role that different forms of trust play in the transfer of knowledge.

Given the discrepancies in librarians' access to information services, James (2020)[13] argues that they may act as both reliable and unreliable sources for their readers.

If a librarian finds an inaccuracy in a peer-reviewed source, they should read the relevant literature, evaluate the credibility of the source and correct it, as recommended by Anunobi (2020).[17] If a link is provided to the original source, it is extremely important to double-check and reconsider the material before reposting it. It is crucial to give great consideration before sending any data.

Amusan (2020)[18] claims that, with the proper skills, spotting bogus information is a breeze. He mentioned that sometimes they come packaged in a way that necessitates additional checks to determine their true identity. Background checks entail, among other things, treating all online content with suspicion and familiarity with credible sources in the field.

Oyelude (2020)[19] claims that librarians have a responsibility to evaluate every information before it is disseminated, forged, or published. Librarians, please think carefully about the necessity of posting the content you intend to place on a platform. Is that acceptable Self-restraint requires them to avoid intentionally misinforming the public. When these conditions are met, the spread of false information or infodemics will be halted. If you stop sharing false or partial information, it will stop happening on its own.

In 2020, Cuan-Baltazar and co-authors[20] Librarians and library staff should work to increase the number of ways that mentioned materials can be accessed. It cannot be stressed enough that people using the internet must take personal responsibility for the accuracy of the information they gather online. Librarians should verify the credibility of information sources before making them available to the public, as suggested by Pelemo, Horsfall, Osedo and Onyinye (2021).[21] Counselling the public on how to avoid false information, underlining the significance of social distance and disseminating knowledge through traditional and new media platforms are all part of a librarian's job description, according to Joel and Camble (2021).[22]

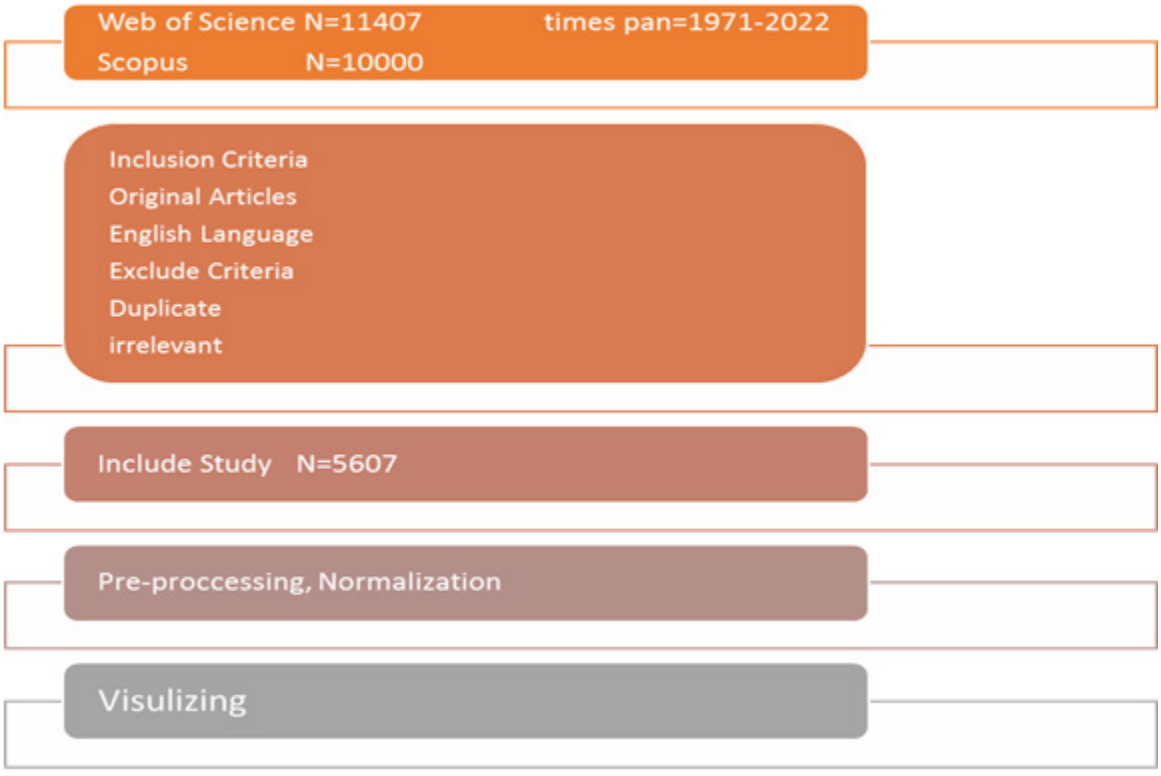


**Figure 1:** A Flowchart the combined research on misinformation and disinformation.

That's why librarians have to be so cautious with client data. Information professionals like librarians have a responsibility to inform the public rather than mislead them. The goals of this research are to provide a structural analysis of the literature on misinformation and disinformation in libraries, track the field's historical development and spot emerging patterns.

## MATERIALS AND METHODS

### Data collection

This work presents a descriptive and analytic study of mis information and dis information. This investigation is an applied study using a Scientometrics strategy based on a co-word analysis. For data analysis, "co-word analysis has proven to be a fairly reliable method," (Hsu & Li, 2019)[23] and it is still used frequently. The information was retrieved from the databases Scopus and the Web of Science. Articles published between 1971 and 2022 were retrieved by searching Web of Science and Scopus with appropriate keywords.

A search technique was developed using an integrated search of misinformation-related titles, abstracts and keywords. In order to make the most of the database's search features, we made use of Boolean operators, proximity operators, abbreviations, phrase searches and so on. The dataset was further refined by excluding conference abstracts, books and unimportant papers. After the bibliographic data had been normalized, a plain text file containing author names, publication dates, journals, affiliations, countries, funding agencies, keywords, etc. had been extracted from the database. There was no need for moral verification of the evidence. In addition, the scope of every search method was narrowed to exclude everything but the arts and humanities and the social sciences (Figure 1). The time period covered by this tactic is 1971-2022. The keywords were:

(misinformation and library) or (disinformation and library) or (false information and library) or (fake information and library) or (fake news and library) or (mal-information and library) AND (LIMIT-TO (DOCTYPE,"ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SUBJAREA,"SOCI") OR LIMIT-TO (SUBJAREA,"ARTS"))

After collecting all 21,407 articles, we merged and removed duplicates to end up with 5607 records to evaluate in R. The bibliometric evaluation was executed with the help of the Bibliometric R-Tool. The bibliometric information was analyzed with the R-package Biblioshiny from Bibliometrix (https://bibliometrix.org/Biblioshiny.html). The free software package R simplifies the process of analyzing and visualizing scientific maps. It's often considered the most powerful and versatile free statistics software available today. annual scientific output and publication year 1. Records and resources used to compile field reports Authors and groups working in this area: 4. the countries whose citizens helped get these studies published. 5. Related terms, concepts, or ideas.[24]

1) Finding research themes: By collecting keywords from documents from each relevant time period, a complete network based on co-occurrences and the normalized index is created.

2) Strategic diagrams and thematic networks built from a graphic map of the topic are used to depict research themes and thematic networks, respectively. Centrality and density measures are plotted in a two-dimensional space and categorized to help identify each subject.[25]

Connections between clusters and interactions within a cluster can be depicted using a strategic diagram. Strategic diagrams, which account for centrality and density measurements, can be utilized to gain insight into the interplay between different topics of study.[26]

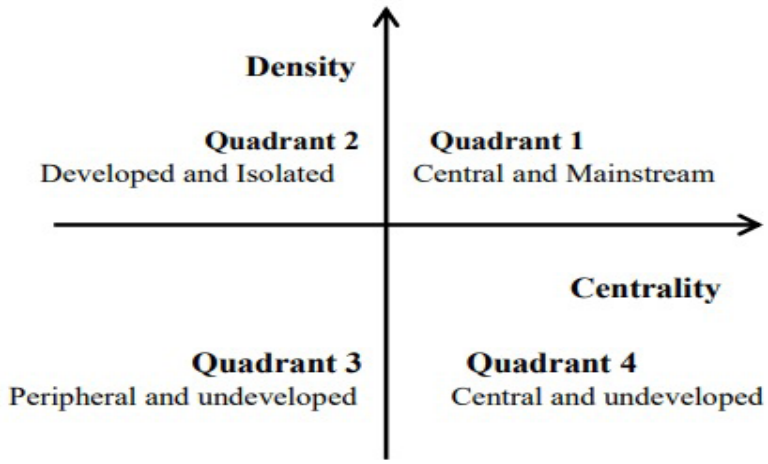


**Figure 2:** Strategic Diagram.[27]

A strategic diagram based on centrality and density can be used to examine the degree to which network clusters are developed and cohesive.[26] Centrality and density can be plotted on a two-dimensional diagram to produce a strategic illustration of the composition of any given area or field. The midpoint of each axis is where the graph begins, with the horizontal axis representing centrality and the vertical axis representing density. Each of the four quadrants presents the participants' condition in a different light due to the differing centralities and densities used. Quadrant 1 is characterized by cohesion and predominance of clusters. Clusters in the second quadrant are widely dissimilar to one another yet share certain commonalities (high centrality, low density). The groups in the third quadrant are concentrated in a small area, yet they all study somewhat different things. Those in the middle, or quadrant 4, are considered to be immature or not fully formed (Figure 2). (ibid.) A tactical map is drawn up based on the importance and density of several topic clusters in the realm of fake news and disinformation.

R is a free piece of software that streamlines the process of analyzing and creating scientific maps. Aria and Cuccurullo (2017)[24] recommend the following open-source statistical tools as the most powerful and flexible options available: The total number of scientific papers published per year The authors and organizations working in this topic; 2. topic reports and sources; 3. 4. the countries whose citizens helped get these publications published words, ideas and concepts exclusive to the field.

## RESULTS

In this study, we looked at data from 5607 different articles. The original publications published in the misinformation and disinformation literature are described in Table 1. Journals provided 9394 keywords and 13829 author keywords for this descriptive study. Additionally, 12852 authors (1852 unique) contributed to these publications, with the CC of 3.06 indicating a high degree of collaboration. It was reported that each author averaged 0.4 documents.

Figure 3 displays the annual output of the scientific literature that spreads disinformation and falsehoods. From 1971 through 2022, there is an increasing trend of publications, with a high in 2021 suggesting a rise in the dissemination of false information. The cause of this is the recent COVID-19 epidemic. Misinformation

**Table 1: Descriptive characteristics of the misinformation and disinformation literature.**

| Description | Results |
|---|---|
| MAIN INFORMATION ABOUT DATA | |
| Timespan. | 1971:2022 |
| Sources (Journals, Books, etc.,). | 2083 |
| Documents. | 5607 |
| Average years from publication. | 4/92 |
| Average citations per documents. | 12/53 |
| Average citations per year per doc. | 2/028 |
| References. | 462139 |
| DOCUMENT TYPES | |
| Article | 5607 |
| DOCUMENT CONTENTS | |
| Keywords Plus (ID) | 9394 |
| Author's Keywords (DE) | 13829 |
| AUTHORS | |
| Authors | 12852 |
| Author Appearances. | 14709 |
| Authors of single-authored documents. | 1852 |
| Authors of multi-authored documents. | 11000 |
| AUTHORS COLLABORATION | |
| Single-authored documents. | 2011 |
| Documents per Author. | 0/436 |
| Authors per Document. | 2/29 |
| Co-Authors per Documents. | 2/62 |
| Collaboration Index. | 3/06 |

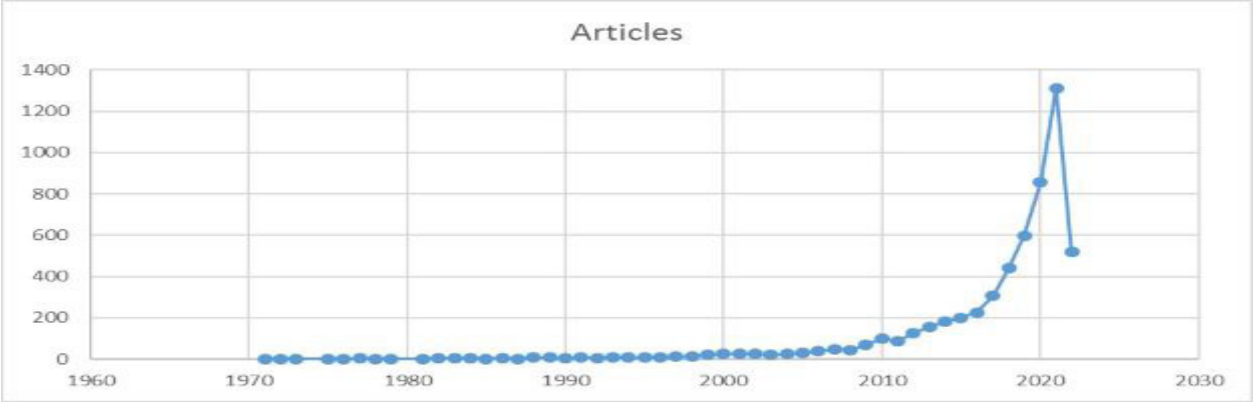


**Figure 3:** Annual scientific production.

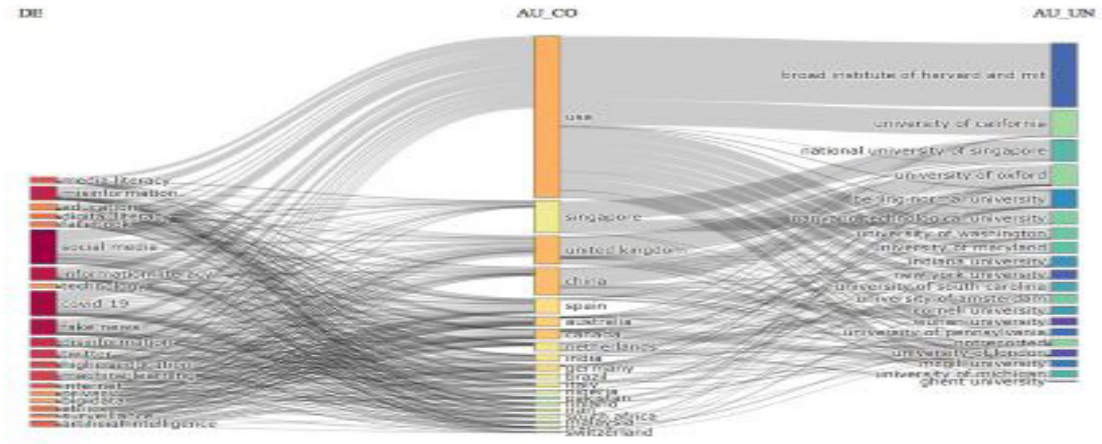


**Figure 4:** Three filed plot of Misinformation and Disinformation literature.

regarding COVID-19 is widespread, according to international studies.[28]

Figure 4 displays a keyword plus country and affiliation study of disinformation and fake news articles. Most of the groups and topics involve the United States in some way. Most nations and organizations have given some thought to issues of misinformation and deception, including media literacy, digital literacy, social media literacy, information literacy, COVID-19 and artificial intelligence. The University of California, together with the broad institute of Harvard and MIT, has produced the most literature on the topic of misinformation and disinformation.

Bradford's Law, h and g indexes highlight the pioneering publications that spread falsehoods and distortions to the public. Sustainability, Library Philosophy and Practice and the Journal of Chemical Information and Modelling are among the top journals in this area (Figure 5).

Bradford's law (shown in Table 2) classifies journals into three categories, with one "core" journal serving as the field's premier publication. Zone 1 contains a total of 50 periodicals.

From 1971 to 2022, as shown in Figure 6, a growing number of articles about deception and false information were published in academic journals. The most influential authors in the topic of misinformation and disinformation are included in Table 3 below. These authors include Thelwall M, Teixeird DA Silva JA, Chen Y, Wang L and others.

The University of California is the most prominent institution dedicated to studying and combating false information and deception.

## The most influential articles in the literature on misinformation and disinformation

The most influential works in the field of misinformation and disinformation have discussed the importance of using cognitive exploratory methods to assess the veracity of internet and informational resources.[29-31] In addition, recent academic work has explored how people might expand their spheres of influence by making use of the Internet and various forms of new media to sell a wide variety of consumer goods to a global audience. Researchers in the field of the Internet and web-based information

agree that Internet users need information literacy skills in order to successfully find credible resources online.[32]

Keywords plus, author keywords, title keywords and abstract keywords are the four groups in Table 4 and Abstract Keywords Table 5. Social media, social networking, COVID-19 and AI are mentioned most frequently in the following tables. Keywords like "social media", "COVID-19", "fake news", "information literacy", "misinformation" and "disinformation" appear most often in author's work. Social, media, news, COVID, literacy, fake and critical are frequent occurrences in titles. The terms "social", "media", "digital", "political" and "literacy" appear more often in abstracts than any others. Most authors have used the same phrases in abstracts, titles and keywords, which is reflected in the prevalence of the same words in both misleading and disinformation keywords. However, the highly correlated

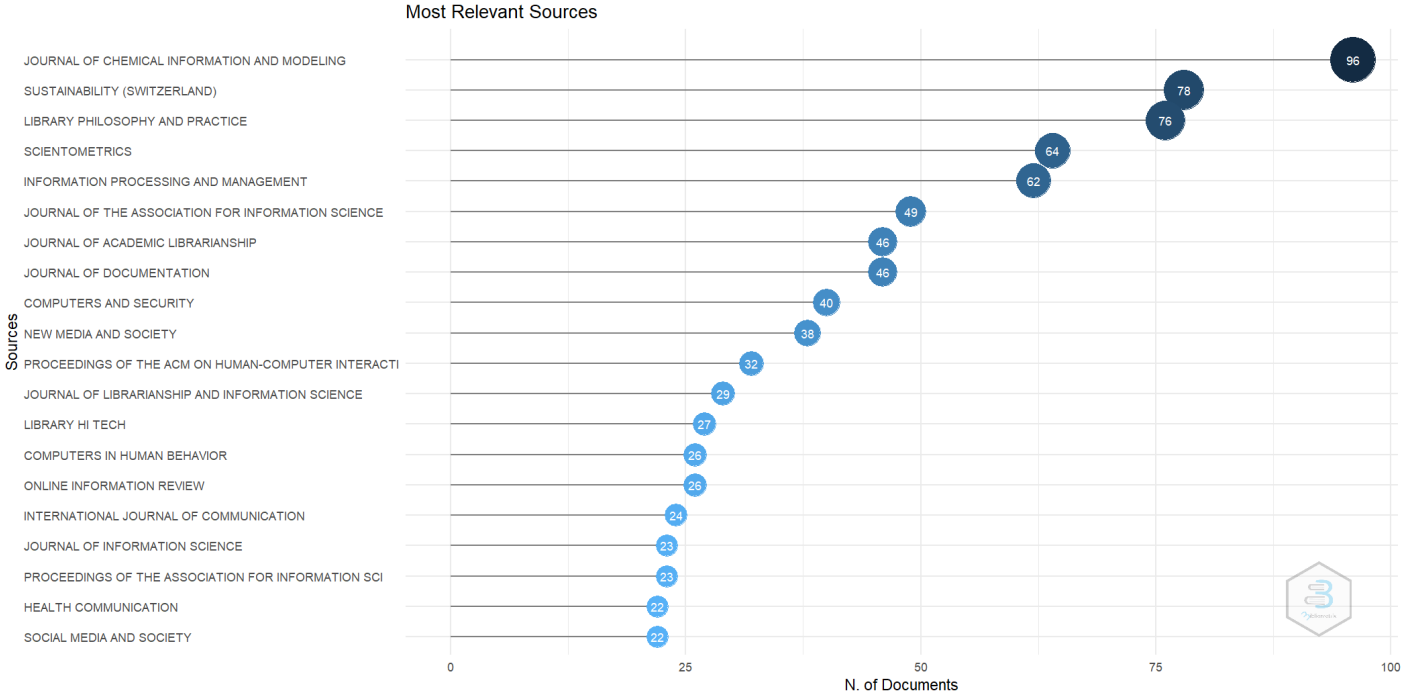


**Figure 5:** The important journals in misinformation and disinformation based on G index.

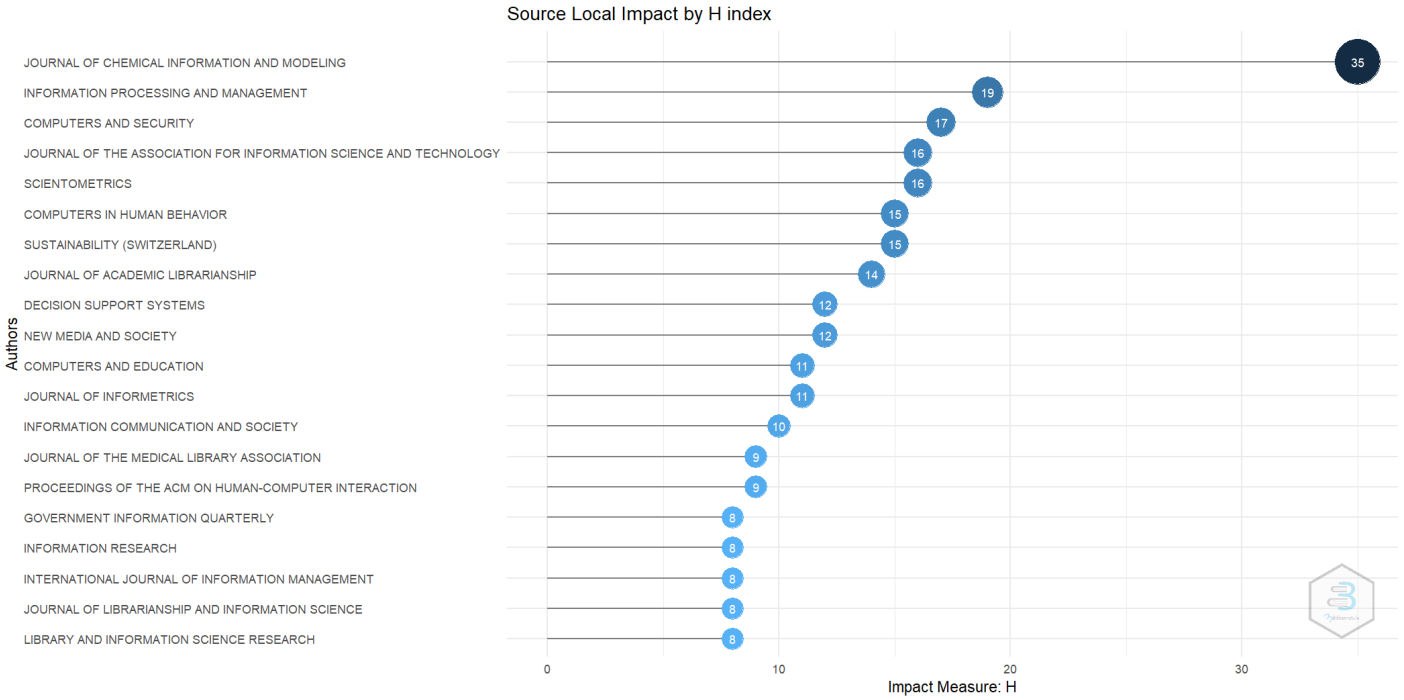


**Figure 6:** The important journals in misinformation and disinformation based on H index.

**Table 2: The important journals in misinformation and disinformation based on Bradford's law.**

| Journal | Rank | Freq | cumFreq | Zone |
|---|---|---|---|---|
| Journal of chemical information and modeling. | 1 | 96 | 96 | Zone 1 |
| Sustainability (Switzerland). | 2 | 78 | 174 | Zone 1 |
| Library philosophy and practice. | 3 | 76 | 250 | Zone 1 |
| Scientometrics | 4 | 64 | 314 | Zone 1 |
| Information processing and management. | 5 | 62 | 376 | Zone 1 |
| Journal of the association for information science and technology. | 6 | 49 | 425 | Zone 1 |
| Journal of academic librarianship. | 7 | 46 | 471 | Zone 1 |
| Journal of documentation. | 8 | 46 | 517 | Zone 1 |
| Computers and security. | 9 | 40 | 557 | Zone 1 |
| New media and society. | 10 | 38 | 595 | Zone 1 |
| Proceedings of the acm on human-computer interaction. | 11 | 32 | 627 | Zone 1 |
| Journal of librarianship and information science. | 12 | 29 | 656 | Zone 1 |
| Library hi tech. | 13 | 27 | 683 | Zone 1 |
| Computers in human behavior. | 14 | 26 | 709 | Zone 1 |
| Online information review. | 15 | 26 | 735 | Zone 1 |
| International journal of communication. | 16 | 24 | 759 | Zone 1 |
| Journal of information science. | 17 | 23 | 782 | Zone 1 |
| Proceedings of the association for information science and technology. | 18 | 23 | 805 | Zone 1 |
| Health communication. | 19 | 22 | 827 | Zone 1 |
| Social media and society. | 20 | 22 | 849 | Zone 1 |
| Surveillance and society. | 21 | 22 | 871 | Zone 1 |
| Information communication and society. | 22 | 21 | 892 | Zone 1 |
| Technology in society. | 23 | 21 | 913 | Zone 1 |
| Information research. | 24 | 19 | 932 | Zone 1 |
| Library trends. | 25 | 19 | 951 | Zone 1 |
| College and research libraries. | 26 | 18 | 969 | Zone 1 |
| Digital journalism. | 27 | 18 | 987 | Zone 1 |
| Electronic library. | 28 | 18 | 1005 | Zone 1 |
| Health information and libraries journal. | 29 | 18 | 1023 | Zone 1 |
| International information and library review. | 30 | 18 | 1041 | Zone 1 |
| Learned publishing. | 31 | 18 | 1059 | Zone 1 |
| Library quarterly. | 32 | 18 | 1077 | Zone 1 |
| Media and communication. | 33 | 18 | 1095 | Zone 1 |
| Reference librarian. | 34 | 18 | 1113 | Zone 1 |
| Aslib journal of information management. | 35 | 17 | 1130 | Zone 1 |
| Decision support systems. | 36 | 17 | 1147 | Zone 1 |
| International journal of information management. | 37 | 17 | 1164 | Zone 1 |
| Portal | 38 | 17 | 1181 | Zone 1 |
| Publications | 39 | 17 | 1198 | Zone 1 |
| Social sciences | 40 | 17 | 1215 | Zone 1 |
| Internet policy review. | 41 | 16 | 1231 | Zone 1 |
| Journal of informetrics. | 42 | 16 | 1247 | Zone 1 |

| | | | | |
|---|---|---|---|---|
| Reference and user services quarterly. | 43 | 16 | 1263 | Zone 1 |
| Reference services review. | 44 | 16 | 1279 | Zone 1 |
| Artificial intelligence review. | 45 | 15 | 1294 | Zone 1 |
| Computers and education. | 46 | 15 | 1309 | Zone 1 |
| Global knowledge, memory and communication. | 47 | 15 | 1324 | Zone 1 |
| Government information quarterly. | 48 | 15 | 1339 | Zone 1 |
| Journal of library administration. | 49 | 15 | 1354 | Zone 1 |
| Social network analysis and mining. | 50 | 15 | 1369 | Zone 1 |

**Table 3: Important authors based on indicators.**

| Authors | H_index | G_index | M_index | Tc | Np | Py_start |
|---|---|---|---|---|---|---|
| Thelwall M | 14 | 20 | 1.750 | 962 | 20 | 2015 |
| Kousha K | 9 | 9 | 1.125 | 363 | 9 | 2015 |
| Teixeira da silva Ja | 8 | 13 | 1.333 | 188 | 20 | 2017 |
| Tsigaris P | 7 | 9 | 1.400 | 135 | 9 | 2018 |
| Al-khatib A | 6 | 8 | 0.857 | 98 | 8 | 2016 |
| Chen Y | 6 | 12 | 0.545 | 446 | 12 | 2012 |
| Chiu MM | 6 | 7 | 0.600 | 101 | 7 | 2013 |
| Chua AYK | 6 | 6 | 0.500 | 107 | 6 | 2011 |
| Smith M | 6 | 6 | 0.857 | 267 | 6 | 2016 |
| Buschman J | 5 | 8 | 0.294 | 74 | 10 | 2006 |
| DELGADO lópez-cózar E | 5 | 5 | 0.833 | 650 | 5 | 2017 |
| Fallis D | 5 | 6 | 0.357 | 149 | 6 | 2009 |
| Jr | 5 | 7 | 0.143 | 118 | 7 | 1988 |
| Li J | 5 | 7 | 0.385 | 56 | 8 | 2010 |
| Liu X | 5 | 7 | 0.357 | 181 | 7 | 2009 |
| Martín-martín A | 5 | 5 | 0.556 | 594 | 5 | 2014 |
| Orduna-malea E | 5 | 5 | 0.833 | 650 | 5 | 2017 |
| Vraga EK | 5 | 6 | 0.833 | 100 | 6 | 2017 |
| Wang J | 5 | 7 | 0.455 | 137 | 7 | 2012 |
| Wang L | 5 | 9 | 0.500 | 156 | 9 | 2013 |

keywords reveal a gap between the frequency of words and the significance of topics discussed in these abstracts. The lack of specificity in the study on these topics is reflected in the usage of umbrella terms in titles, abstracts and keywords (Tables 4 and 5).

The author's most frequently used terms were used to create a word cloud, which is displayed in Figure 7. It's clear that COVID-19, social media and misinformation are the most discussed issues. Also, related research in the misinformation and disinformation literature tend to focus on topics such as fake news, information literacy, media literacy, machine learning, artificial intelligence and digital literacy.

Figure 8 shows the organizational principles of the keywords used in this assessment of the literature. A vast dataset depicted in a multidimensional space including several variables. The proximity of these keywords to the focus indicates that they have been heavily studied in recent times. There are two clusters of topics that are particularly relevant to fake news and disinformation. The first group discusses the media and associated topics, whereas the blue group consists of medically relevant misinformation generators like coronaviruses and pandemics.

The co-occurrence matrix was subjected to MCA-based hierarchical clustering in this investigation. Consequently, it employs the MCA technique and employs a dendogram map, just like the thematic map, but with many different items explained as illustrated in Figure 9. Keywords are segregated by applying a minimum frequency threshold of 3, with 53 words meeting the threshold. Analysis revealed (Figure 9 and Table 6) that extensive work has been carried out since 1971 in the domain of "COVID-19", "pandemic", "coronavirus", "fake news"

**Table 4: Most frequent words.**

| Keyword plus | Occurrences | Authors keyword | Occurrences |
|---|---|---|---|
| Social media | 183 | Social media | 335 |
| Social networking (online) | 139 | COVID-19 | 239 |
| COVID-19 | 77 | Fake news | 194 |
| Artificial intelligence | 64 | Information literacy | 163 |
| | | Misinformation | 158 |
| | | Disinformation | 122 |
| | | Twitter | 79 |
| | | Media literacy | 57 |
| | | Artificial intelligence | 55 |
| | | Ethics | 55 |
| | | Digital literacy | 53 |
| | | Open access | 40 |
| | | Coronavirus | 37 |
| | | Predatory journals | 33 |
| | | Social networks | 32 |
| | | Critical thinking | 27 |

**Table 5: Most frequent words.**

| Title | Occurrences | Abstract | Occurrences |
|---|---|---|---|
| Social | 454 | Social | 3437 |
| Media | 425 | Media | 3010 |
| News | 307 | Digital | 1414 |
| COVID_ | 296 | Political | 1126 |
| Literacy | 240 | Literacy | 1102 |
| Fake | 187 | COVID_ | 990 |
| Critical | 118 | Fake | 912 |
| Political | 113 | Critical | 813 |
| Misinformation | 100 | | |

and "communication". The graphical network has been further divided into small clusters and assessed individually (Table 6).

Cluster 1: Keywords in this linkage include "COVID-19", "pandemic" and "coronavirus". Tedros Adhanom Ghebreyesus, Director-General of the World Health Organization (2020),[33] officially declared the COVID-19 outbreak a pandemic at a media briefing on 11 March 2020.

Cluster 2: Keywords in this linkage include "Fake news", "disinformation", "post truth", "misinformation" and "fact checking". The first definition of the term fake news was provided by Allcott and Gentzkow (2017)[34] as news articles that are intentionally and verifiably false and could mislead read. Hage *et al.* (2021)[35] it is crucial to note that fake news, misinformation and disinformation are indeed parts of the larger landscape of online deception.

Cluster 3: Keywords in this linkage include "Media literacy", "digital literacy", "information literacy", "critical thinking". Jones-Jang, Mortensen, & Liu (2021)[36] support the idea that we need a comprehensive framework of media or information literacies in a changing media environment. Ideally, an overarching framework should decrease theoretical discrepancies, connect practical applications and strengthen central lifelong learning goals across different literacy types. For example, Mackey and Jacobson (2011)[37] presented a metaliteracy as a unified construct that supports the acquisition, production and sharing of knowledge in collaborative online communities.

Cluster 4: Keywords in this linkage include "Surveillance", "security, privacy", "artificial intelligence", "sustainability", "deep learning", "transparency", "big data", "machine earning" and "ethics". Noémi & Yves (2021)[38] AI systems trained to detect false, inaccurate, or misleading information are prone to false positives and false negatives. False positives, namely the wrongful detection of false,

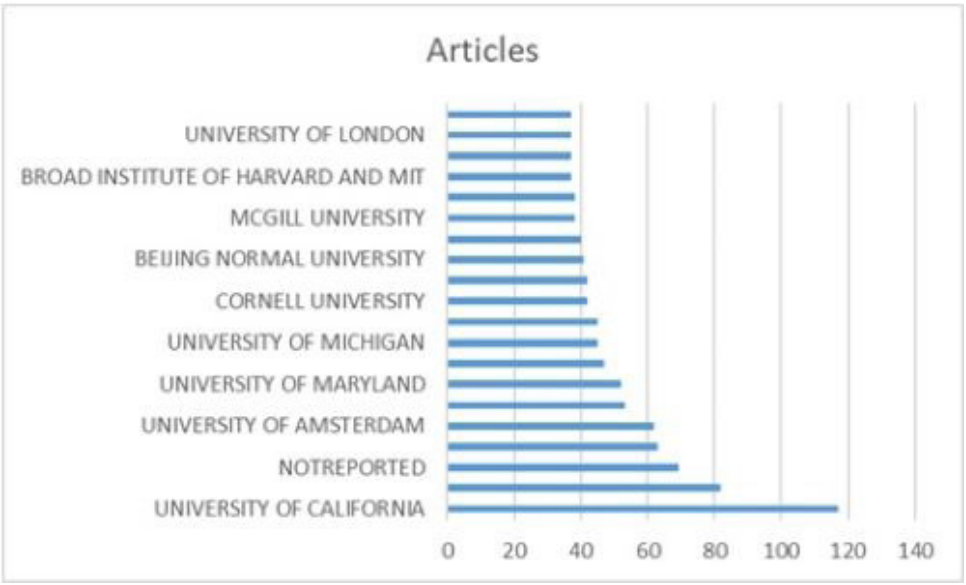


**Figure 7:** The most relevant affiliation.


**Figure 8:** Word cloud.

inaccurate, or misleading content, affect freedom of expression. Indeed, they "could lead to over-censorship of legitimate content that is machine-labeled incorrectly as disinformation".[39] On the other hand, false positives and false negatives would both generate discriminations, therefore impacting equality and nondiscrimination. These can begenerated by bias in the algorithms.

Cluster 5: Keywords in this linkage include "Politics", "social network", "media", "information", "libraries", "information seeking", "education", "bibliometrics", "internet", "climate change", "trust", "identity", "predatory journal", "Canada", "technology", "open access", "gender", "democracy", "high education" and "journalism,". Vázquez Luna (2021)[40] librarians must work on designing practices that allow people to develop skills so

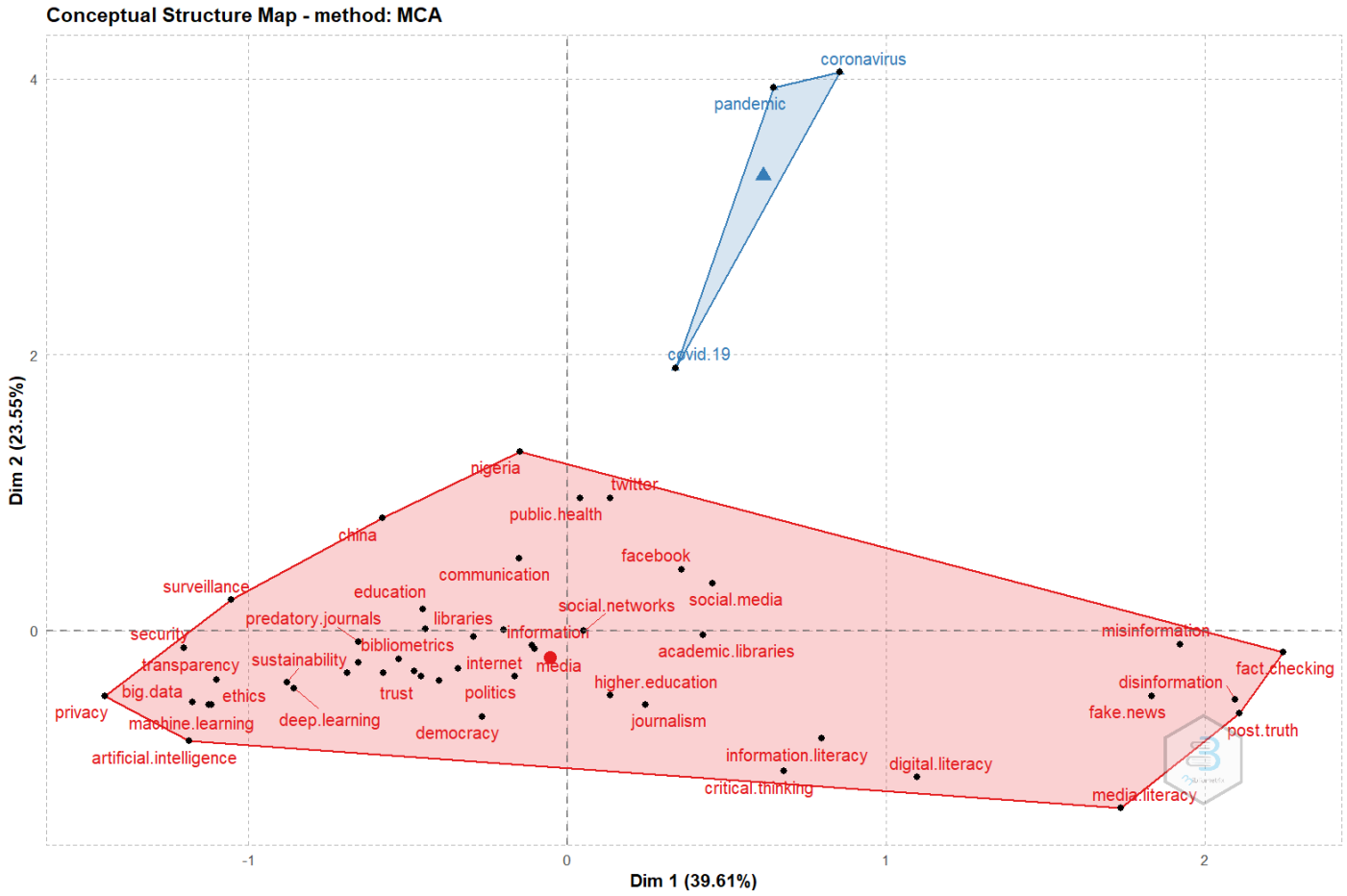


**Figure 9:** Thematic map.

**Table 6: Clusters of misinformation and dis information field.**

| Group | Cluster | keywords | Cluster name |
|---|---|---|---|
| 1st | C1 | COVID-19, pandemic, coronavirus. | COVID-19. |
| 2nd | C2 | Fake news, disinformation, post truth, misinformation, fact checking. | Misinformation and dis information. |
| | C3 | Media literacy, digital literacy, information literacy, critical thinking. | Digital media literacy |
| | C4 | Surveillance, security, privacy, artificial intelligence, sustainability, deep learning, transparency, big data, machine earning, ethics. | Artificial intelligence. |
| | C5 | Politics, social network, media, information, libraries, information seeking, education, bibliometrics, internet, climate change, trust, identity, predatory journal, Canada, technology, open access, gender, democracy, high education, journalism. | Factors affecting misinformation and dis information dissemination. |
| | C6 | academic libraries, social media, Facebook, Nigeria, twitter, public health, china, communication. | Social media. |

that they themselves can identify false information, critically evaluate sources and find sources of reliable and authoritative information.[41]

Cluster 6: Keywords in this linkage include "academic libraries", "social media", "Facebook", "Nigeria", "twitter", "public health", "china" and "communication". Shu *et al.* (2020)[42] attempted to understand the propagation of disinformation and fake news

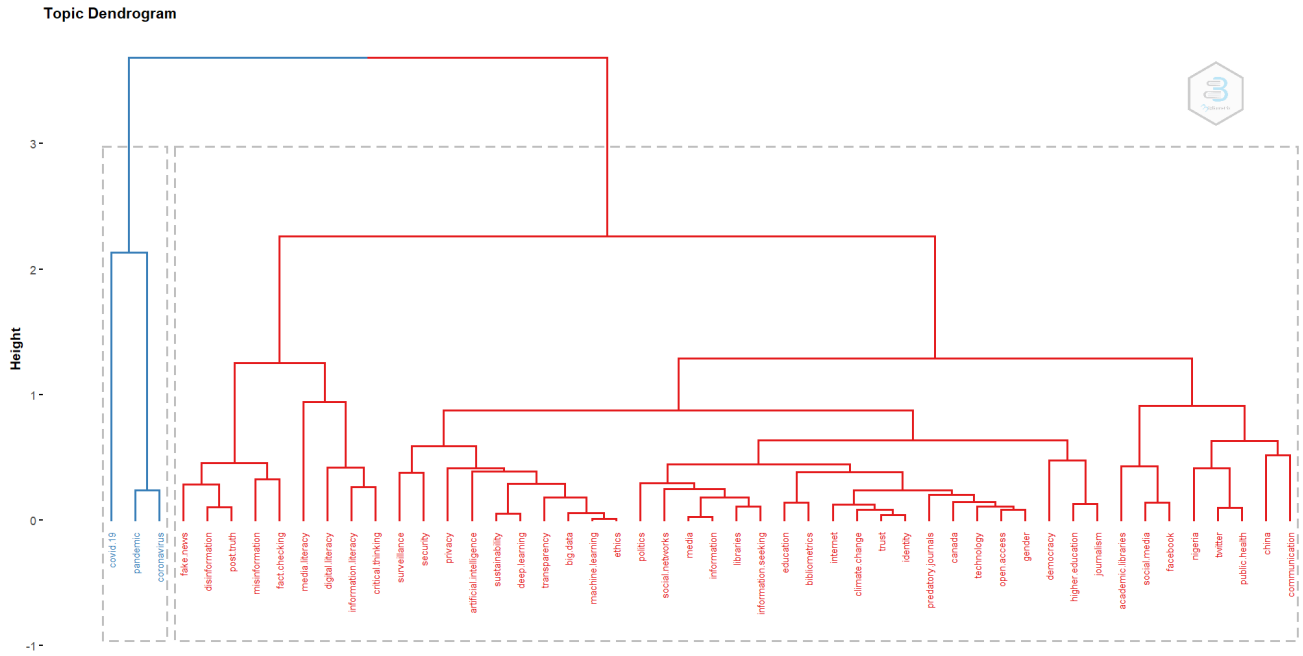


**Figure 10:** Result of Hierarchical group analysis.

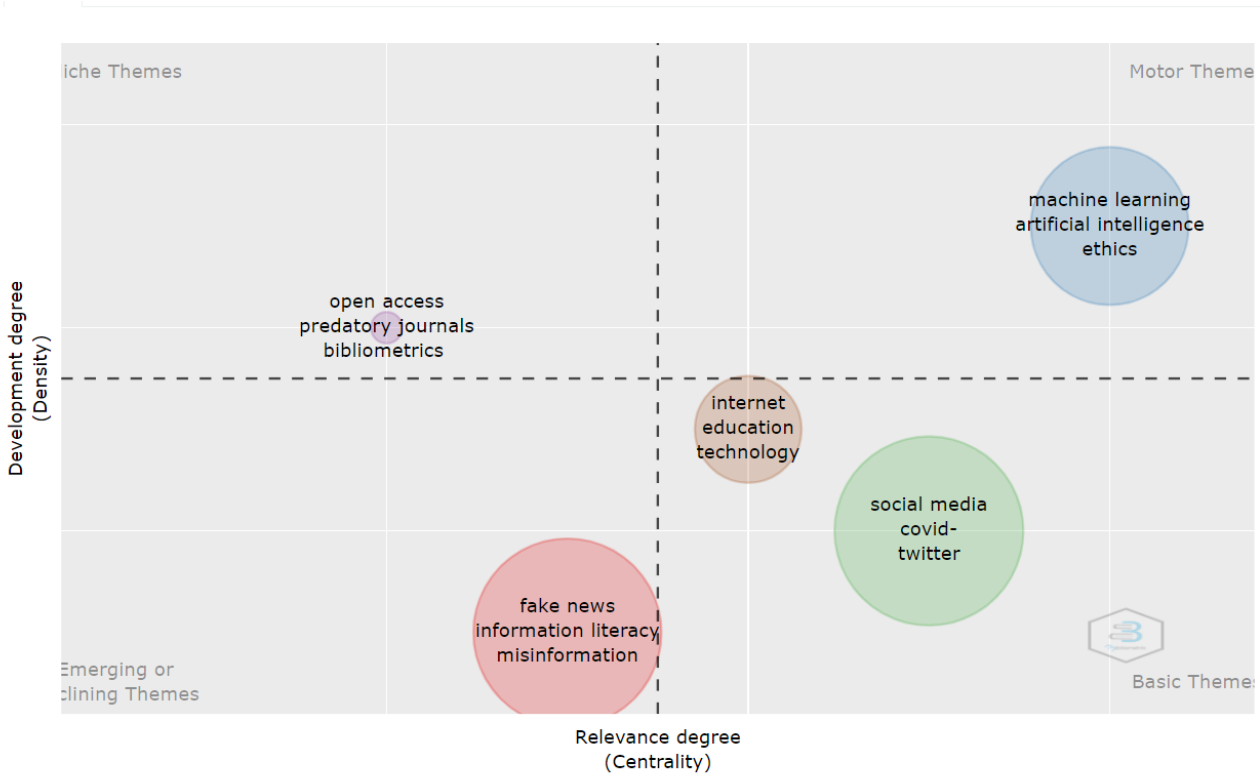


**Figure 11:** Thematic evolution.

in social media and found that such content is produced and disseminated faster and easier through social media because of the low barriers that prevent doing so.

R software was used to create a strategic diagram to examine the relevance and scope of the topics. In Figure 10, density is depicted along the x-axis and subject focus along the y-axis to illustrate the strategic diagram of misinformation and disinformation. The diagram has been cut into four parts. The subjects that are either on the rise or the decline can be seen in the bottom left area. Here, a topic may gain or lose prominence. The topics in the bottom right corner are low-density and very central, indicating

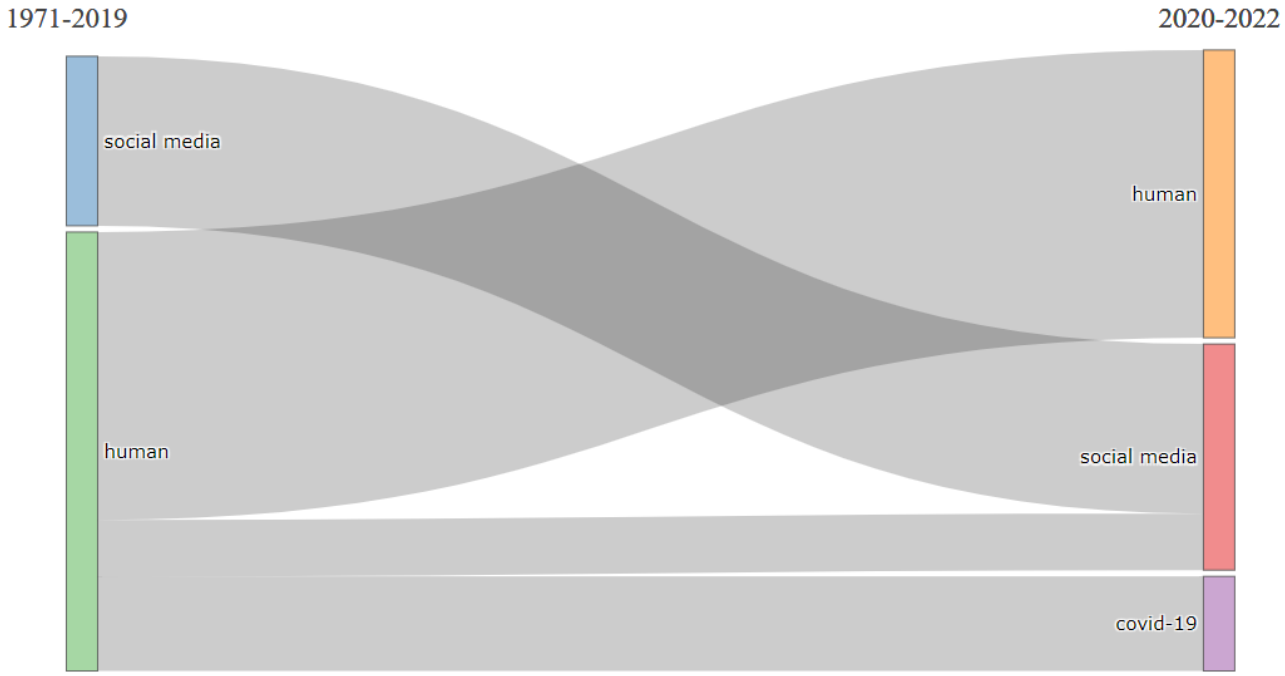


**Figure 12:** The thematic evolution of misinformation and disinformation.

**Table 7: Evolution themes in misinformation and disinformation.**

| From | To | Words | Weighted Inclusion Index | Inclusion Index | Occurrences | Stability Index |
|---|---|---|---|---|---|---|
| Human--1971-2019 | COVID-19--2020-2022 | United states; risk assessment; china; public health. | 0/31 | 0/08 | 79 | 0/02 |
| Human--1971-2019 | Human--2020-2022 | Human; humans; article; female; male; adult; young adult; adolescent; human experiment; psychology; publishing; education; ethics; learning; teaching; aged; perception; questionnaire; child; attitude to health; major clinical study; controlled study. | 0/93 | 0/04 | 297 | 0/01 |
| Human--1971-2019 | Social media--2020-2022 | Internet; decision making; information dissemination; students; crime; semantics; student. | 0/18 | 0/03 | 58 | 0/01 |
| Social media--1971-2019 | Social media--2020-2022 | Social media; social networking (online); artificial intelligence; behavioral research; information retrieval; learning systems; classification (of information); surveys. | 0/55 | 0/07 | 43 | 0/02 |

that many studies have focused on them. Also, less central but high-density topics are located on the upper left. These are two distinct but equally developed areas of study. The most dense and significant topics are clustered in the upper right. The topics discussed here have received extensive treatment and are fundamental ideas in the canon. Most of the topics have emerged in the theme engine and the emerging section and the map was constructed over a single period to reflect this. There are five different types of false information represented by nodes in this network diagram: Machine learning, A.I. and ethics are only some of the topics covered in the motor theme chapter. Social media, COVID, Twitter, the internet, education and technology

are all expanding and emerging themes that may be found in the theme engine's basic and transversal theme categories. Topics including open access, predatory journals and bibliometrics will be occasionally covered in the isolated theme section. Finally, topics like fake news, information literacy and disinformation are discussed in the section on emerging or fading themes.

The thematic evolution map shows how disinformation and false claims have spread throughout time. The results of the thematic evolution were displayed in two-time sections generated using the Biblioshiny R-package. Articles published between 1971 and 2019 are collected in the first section. Chemistry, social media and people were common article topics within this time frame. Humans, social media and the 2020 pandemic influenza virus (COVID-19) are only few of the topics covered in the published publications. Some topics discussed between 1971 and 2022 have merged into others. The topics that have been discussed and altered throughout the era of disinformation are listed in Table 7.

## DISCUSSION

In this study, we conducted a scientometric analysis to identify trends in research on misinformation and disinformation research domains and identify the intellectual structure of knowledge in misinformation and disinformation from 1971 to 2022 on the Web of Science and Scopus. This paper represents the first attempt to examine research trends on misinformation and disinformation using the bibliometric R-Tool. The ability to examine large amounts of data based on subject populations rather than samples was one benefit of using scientometric analysis in the misinformation field. This suggests that the results of scientometric analysis may be more reliable and accurate than those from systematic analysis. However, it should be highlighted that although the bibliometric R-Tool employed in this work is helpful on.

In contrast, after 2021 there was a gradual decrease in the quantity of articles pertaining to misinformation and deception. This finding shows that lengthy investigations on misinformation and deception have only been carried out by interested research groups. The proportion of misinformation and disinformation-related articles among the misinformation and disinformation-related articles over the period of 2020 to 2021 was higher than the other periods, despite the overall downward trend (Figure 3). This is related to the current COVID-19 pandemic. Online communities and messaging apps are particularly common places to find this misinformation.[43] A global study (Kim *et al.*) found that misinformation about the COVID-19 pandemic enhanced information avoidance and decreased systematic processing of information.

Since 1971, a great number of journals have begun to publish articles about misinformation and disinformation. 50 journals published papers on misinformation between 1971 and 2022, with the "core" journal acting as the leading publication in the field (Table 2). This suggests that misinformation may be a topic of interest beyond information science.

The majority of the articles in these journals were published by the Journal of Chemical Information and Modeling, Sustainability (Switzerland) and Library Philosophy and Practice (Table 2). This finding seems to have a strong connection to the United States, the most illustrious organization devoted to researching and combatting misinformation and deception. Figure 12 illustrates the majority of misinformation and fake news pieces that the University of California published between 1971 and 2022. Journals that concentrate on the use of technology, information and the humanities (social science) have published numerous articles connected to misinformation and disinformation, according to the publication titles. This result appears to be closely linked to the locations of the contributing authors of the articles. researchers in China, the UK, Singapore, the USA and Singapore all contributed significantly to the development of articles in misinformation and disinformation.

In the plus keywords, author keywords, title keywords and abstract keywords of the articles, social media and COVID-19 were mentioned more frequently than the other key terms selected in this study, regardless of the period examined. The spread of misinformation on social media is correlated (Tables 4 and 5). Social media platforms are well known for the spread of misinformation and denial of scientific literature.[44]

Quantitative and qualitative exploratory analysis reveals existing conundrums in research distribution, keywords and adoption within the global scientific community.[45]

The spread of false information on social media is correlated. Due to differences in interaction patterns and the uniqueness of the audience on each platform, the volume of misinformation distributed varies throughout social media. Informal person or group accounts on Twitter had a higher rate of disinformation than other types of accounts.[46] According to a global study on COVID-19 misinformation and disinformation conducted by the Reuters Institute for the Study of Journalism, most social media posts about the virus originated with "ordinary people," although false information shared by politicians and celebrities received more attention.[47]

Malik *et al* (2023)[48] in systematic review showed relation between social media, pregnancy, COVID-19 vaccines and misinformation. One study noted that social media can spread misinformation and that pregnant patients should discuss their concerns with their pregnancy care providers instead,[49] while the other two studies suggested using social media to engage with pregnant patients and disseminate accurate health information.[50,51] Furthermore, there is substantial evidence in the literature regarding the use of social media by physicians to disseminate health information.[52] Due to the overflow of information, practical steps should be taken when dealing with

the social media infodemic. Information from reliable sources should be trusted.

Keyword analysis of the articles allowed for the organization of seemingly dispersed data into two main categories and seven subcategories (Figure 9; Table 6). "COVID-19," "misinformation and disinformation," "digital media literacy," "artificial intelligence," "misinformation and disinformation tools," and "social media" are the themes that make up these groups. Each group's shared characteristics help form a cluster and these clusters in turn reflect the focus of future study. In the second set of clusters, "media literacy," "artificial intelligence," and "factors of misinformation and disinformation dissemination" were the prominent themes.

Cluster analysis revealed that scholars have paid close attention to the factors that contribute to the spread of disinformation and falsehoods. Further data analysis shows that AI and digital media literacy are the primary foci of academic inquiry. In other words, the theoretical components of false information and disinformation are given less attention. The results line up with what has been found before.

The proliferation and pervasiveness of disinformation has been attributed in large part to the advent of the internet and social media platforms. This has diverted our collective attitudes from the published scientific consensus, which has impeded and diminished the impact of scientific achievements. By fanning the flames of dogmatism and biased negativity, the mass circulation of false information has the potential to undermine democracy.[53]

Misinformation and open access were linked in the theme generator (Figure 10). As a result of Open Access (OA), the general public has ready access to the latest scientific findings, which can be used to verify or refute unsubstantiated claims made on social media and other unreliable online sources. It basically gives knowledge-hungry users quicker access to scholarly works, increasing their risk of coming across false information and conspiracies. Although OA still faces many obstacles, it does have several opportunities and benefits that may help shape its future. At the outset, it improves the discoverability, accessibility and visibility of journal articles, leading to a greater research impact, as measured by citations across many different fields of study.[54-56] The greater online dissemination of open access journal articles compared to their subscription-only counterparts increases the likelihood of their coverage in the mainstream media. Media attention is correlated with increased citations, according to the literature.[57]

In the area devoted to the theme engine, misinformation was linked to methods of artificial intelligence (Figure 10). advances in ICT have changed the way information can be produced and disseminated. What must be noted is the decisive role of AI techniques used in this field. Not only do they facilitate the creation and dissemination of disinformation by malicious stakeholders, they are also used contrariwise to tackle disinformation online. In this regard, AI techniques are explored both to detect false, inaccurate or misleading content and to regulate such content online. An important point to consider from the outset is the inability, or inappropriateness, of AI systems to differentiate misinformation from disinformation, which is particularly problematic regarding freedom of expression and information.[38]

In two ways, AI helps spread fake news online. To begin with, advances in AI are opening up fresh possibilities for the production and manipulation of written, visual, auditory and moving-image media. Second, Artificial Intelligence (AI) algorithms created and used by online platforms to increase user interaction considerably contribute to the efficient and rapid spread of misinformation online. The most significant component in the issue is the use of these more recent methods. There are a number of ethical considerations that need to be considered here. Despite the fact that the spread of false information is nothing new, the presence of AI techniques in the digital ecosystem has raised a number of ethical concerns because it opens up new opportunities to mislead individuals at scale. You need to give serious thought to these.[38]

Human dignity is the first ethical ideal that the contemporary digital ecosystem threatens to undermine. In accordance with this guiding principle, "human beings are to be understood as ends in themselves and never as a means alone" (EDPS Ethics Advisory Group, 2018).[58] AI techniques present in the digital ecosystem change reality in most cases unbeknownst to the individuals, expanding opportunities for effective manipulation of their opinion. Indeed, targeted individuals are rarely aware of the current digital ecosystem and they usually think that the (dis) information they see online is objective and universally encountered by other users.[38]

Second, people's independence is severely compromised by the widespread availability of disinformation and the difficulty of gaining access to reliable sources of information online.[59] Information provides individuals with the capacity to make informed decisions by enabling them to acquaint themselves with facts and societal challenges and understand those.[60] It is therefore a key element of individuals' autonomy. Yet, when individuals encounter realistic fake content, when they are enclosed unconsciously or consciously in filter bubbles and "echo chambers," and when they are the target of disinformation campaigns that leverage the current digital ecosystem to effectively manipulate their opinion, their access to information is definitely made harder, which impedes or at least limits their right to information.The decrease of the average level of trust in the news worldwide, to which the invasiveness of disinformation online has participated, also contributes to the lack of information that individuals have to deal with.[38]

I argue that the current AI boom coincides with the emergence of a post-privacy society.

The growth of disinformation across the time periods covered (1971-2019 and 2022-2022) may be traced back to two factors: the human factor and the influence of social networks (Figure 11; Table 7). Users on social media have different ideologies and each user perceives information differently based on their own education, personal background, political stance, religious inclination and demographics,[61] making human subjects and social networks a common occurrence in the field of false information. As a result, information might be skewed multiple times before it reaches the public.[62] Users with nefarious intent are spreading misinformation using multimedia posts on social media. Although technology progress is meant to improve people's lives, it can have unintended consequences, such as in the form of fake news.[63]

At the end of this study, in order to preserve freedom of expression and the access of people to the correct information, it suggests solutions that include:

- Improving the media and digital literacy skills of people in the community through mass media;
- Benefiting from the skills of librarians in order to improve critical thinking and information literacy skills;
- Encouraging engineers to build artificial intelligence technologies based on algorithms capable of recognizing and adapting published information to authentic documents on the Internet and social media.

## CONCLUSION

In conclusion, our analysis's findings revealed that, between 1971 and 2022, 5607 publications dealing with misinformation and deception were published. Researchers from the USA, Singapore, the UK and China contributed to the works, which are mostly published by the journals of chemical information and modeling, sustainability (Switzerland) and library philosophy and practice. Regardless of the time period looked at, "social media" and "COVID-19" were referenced more frequently in the paper titles and abstracts than the other key phrases chosen for this study. We can see how the study definition of misinformation and disinformation has changed over the previous few decades through these patterns in misinformation and disinformation research.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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