

# Optimizing the Research Process: The Role of AI Tools in Scientific Literature Searches

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**Abstract**— Finding relevant literature in scientific research is both fundamental and challenging, especially with the surge in publications. Traditional search methods often yield incomplete results, but the rise of artificial intelligence (AI) is transforming this process. This paper examines how AI tools enhance the efficiency and accuracy of literature searches through advanced techniques. This systematic literature review (SLR) utilizes papers from the Web of Science database to highlight key trends and authors at the intersection of AI and scientific research. For this purpose, documents within the Web of Science scientific database were used to gather information on the research topic showing the main trends, findings, affiliations, and authors that focused on the intersection of AI tools in scientific literature search. This article conducts a comprehensive bibliometric analysis of 398 articles dealing with the application of AI tools in scientific issues in the period 2021–2025, with the application of the keywords “AI tools” and “Scientific literature Search” The findings suggest that AI-driven tools streamline study identification and mitigate the limitations of traditional methods. Despite challenges like data bias and interpretability, the review highlights AI's potential to revolutionize literature research, leading to deeper insights and more impactful scientific contributions.

**Keywords**— *optimization of the research process, scientific literature search, artificial intelligence (AI), machine learning, natural language processing (NLP), AI tools, automatic information synthesis*

## I. INTRODUCTION

Today, we can no longer talk about the possibility of using AI tools, we should be aware that AI tools are included in all segments of human activity, and the scientific research process is no exception. AI tools change, even revolutionize the literature search process, and are included in all segments of the research process [1]. When we look at how AI tools are used in research, we see that there is a big advantage in automating and speeding up the process of searching for sources, apart from the fact that there are numerous search tools, there are more and more tools that speed up the process of reading, analyzing and synthesizing scientific papers [2]. Even though in the last few years research focused on new tools that help in the research process, AI tools have been present in literature for the last 15 years and are not a new element in science [4]. If we compare traditional search methods and new methods with the support of AI, traditional methods still inspire more confidence and greater certainty in their accuracy, new methods serve to support traditional search methods [3]. The large number of available sources, the complexity of studying many sources, and the focus on

saving time have led to the fact that if we implement AI tools for searching scientific information in traditional approaches, we open new insights and accelerate scientific progress across various fields. [1], [2]. The main goal and focus of this research are to find and analyze relevant papers, using the citation database Web of Science, intending to raise awareness of the great potential of including the tools in the scientific research process of searching relevant literature. By reviewing and analyzing selected papers, the goal is to identify key trends in papers and research dealing with this topic. Detect the most cited works, authors, and countries with the highest production of works. Categorize the types of papers that are most often from this topic

The structure of the study is as follows: Section 2 offers a detailed description and theoretical background on AI tools for literature search. Section 3 outlines the research methodology and framework. Section 4 presents the study's findings. Section 5 discusses the key results comprehensively, concluding with significant scientific and practical implications and outlining potential avenues for future research in this domain.

## II. LITERATURE REVIEW

Each research begins with a review of the available literature and a review of previous research, and if we observe the speed of incorporating different AI tools into processes of a systematic review of the literature, we conclude that it is a logical development of things.

Systematic literature review (SLR) is a comprehensive method used to identify, evaluate, and synthesize all available research related to a specific research question [5]. The reviews of all available research is a complex process that requires good organization and includes different stages of the process. The studies that are tendered and the databases that are used must meet both qualitative and quantitative criteria [5]. The key to such complex searches of relevant databases and sources is to determine the current situation related to the area of research, identify obstacles or deficiencies in available sources and determine the future direction of research.[5], [6].

In this complex process, of searching for many available sources, AI technologies have found their niche to automate this entire process [7]. The reason why the implementation of the tools went quickly is that the time previously spent on search and selection can be used to focus on critical thinking and creative problem-solving [8]. AI-powered tools can assist in developing search strategies, screening titles and abstracts, extracting data, and summarizing findings [1].

If we start from the beginning of using AI tools in the research process, the first use goes back to 2006. The year when a neural network began to be used for the automatic selection of primary studies. The process is based on information extracted by text mining [9]. The constant increase of sources and new research and the rapid publication of papers create great challenges in the process of identification and selection, and precisely mining with the help of AI strikes the first foundations of the use of tools in this process. A large number of authors are beginning to study the mining process and techniques and deal with the automation of the search process [10], [11].

After the mining process, various techniques of machine learning and natural language processing are included in the information search.

NLP is a branch of artificial intelligence that deals with the analysis of natural language, in textual form, and its understanding. This automation process has proven to be extremely useful in all segments and areas, especially in the research process. It is used to automate repetitive data as it helps in searching, classifying and summarizing or synthesizing. [12], [13].

The second step in the development involves the use of Large Language Models that represent a major step forward in the development of the research process. Large Language Models (LLMs) represent a significant advancement in Natural Language Processing (NLP), evolving from rule-based systems to complex architectures capable of understanding and generating human-like text [14], [15], [16].

The inclusion of artificial intelligence in the research process, including different tools at different stages of the research process, has prompted several debates about academic integrity and questions concerning the reliability of sources generated by certain tools [8]. Despite these concerns, the integration of artificial intelligence into literature reviews has the potential to revolutionize the acquisition of scientific knowledge by improving efficiency, accuracy, and literature coverage [2].

Today, many AI tools are available that for all phases of the research process. Recent advancements include the use of large language models for literature searching and academic writing assistance[17]. AI techniques, such as knowledge representation, text manipulation, and machine learning, are particularly useful for handling the vast amounts of scientific literature involved in SLRs[4]. While AI shows great potential in improving the efficiency and quality of research synthesis, researchers must report all AI tools used to ensure replicability[1]. This is crucial for transparency in the scientific process and ethical considerations, which must be prioritized above all.

### III. METODOLOGY

This systematic literature review (SLR) utilizes papers from the Web of Science database to highlight key trends and authors at the intersection of AI and scientific research. For this purpose, papers within the Web of Science scientific database were used to gather information on the research topic showing the main trends, findings, affiliations, and authors that focused on the intersection of AI tools in

scientific literature search. In turn, the findings have important practical and academic implications and reveal the hotspots and trends in using Artificial Intelligence in searching literature. Through the first stage of search using the keywords “AI tools” and “Scientific literature Search” in the period 2021–2025 we detected 398 articles.

The analysis of the abstracts removed papers that did not pertain to the topic. After elimination, 168 papers remained for analysis. The paper was considered relevant if it fits the criterion of covering the area of applying AI tools in scientific literature research. The primary research question for this study and its application are:

**RQ1:** What are the current trends in publications about AI tools used for scientific literature research?

**Application:** Bibliometric analysis by analyzing publications over a set period (e.g., 2021–2025) to identify key trends. Classify papers based on publication year, and number of publications per year, and identify growth patterns in AI-related topics.

**RQ2:** What are the most relevant sources/ journals, and what is the most published type of study in this area?

**Application:** Analyze the journals and conferences where most of the significant studies are being published. This can be achieved by ranking journals and identifying high-impact journals within AI, machine learning, data science, and information retrieval fields. Analyze the type of studies published (theoretical vs. applied research, case studies, empirical research, surveys, etc.).

**RQ3:** What are the predominant topics and trends in this research area?

**Application:** This question focuses on understanding the key research themes and topics being investigated. By using text mining techniques such as keyword co-occurrence analysis, topic modeling, and clustering, we can uncover major research topics.

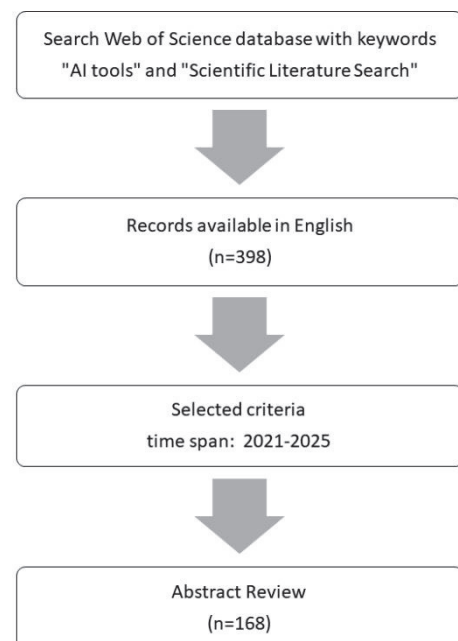


Figure 1. Search strategy (Source: Authors work)

Descriptive analysis was performed using the Biblmetrix web application based on R studio. The tool allows identifying keywords, annual production, citations, and countries in which certain topics are written. VOSviewer 1.6.19 software was used to visualize keywords.

#### IV. RESULTS

The document types include a variety of articles, reviews, editorials, and papers, with a particular focus on reviews (91 out of 168). The annual growth rate is negative at -8.53%, indicating a decrease in publication activity over this period. The document's average age is 1.68 years, suggesting relatively recent publications. The average citations per document (6.92) indicate that these papers are being cited, but not extremely frequently. There's a moderate level of international collaboration at 39.88%. The majority of documents are articles, with 54 in total, and 91 reviews, which may indicate a focus on summarizing or synthesizing research findings. These results are answering RQ2. Through thematic analysis of the literature we answer on first research question (RQ1), we conclude that the works can be categorized into three main themes. The paper which explores the integration of Artificial Intelligence (AI) into systematic literature reviews (SLRs) to address the challenges associated with the manual review process. SLRs are a vital component of scholarly research, but they can often be time-consuming and prone to errors. In response, this study examines the application of AI techniques, including Natural Language Processing (NLP), machine learning, data mining, and text analytics, to automate various stages of the SLR process[7]. Second thematic category research papers that explore the implementation of various artificial intelligence tools in scientific studies. These papers examine how specific AI technologies are utilized to enhance data analysis, improve predictive modeling, and facilitate experimental design across different scientific disciplines[18]. For example, the SciSpace platform is very popular in the research community[19]. Many study aims to explore the potential of ChatGPT as a real-time literature search tool for systematic reviews and clinical decision support systems, to improve their efficiency and accuracy in healthcare settings[20]. Studies that explore the integration of reference managers and artificial intelligence (AI) tools to optimize scientific information management. The goal is to show how this integration increases efficiency in searching, organizing, and analyzing scientific data[21].

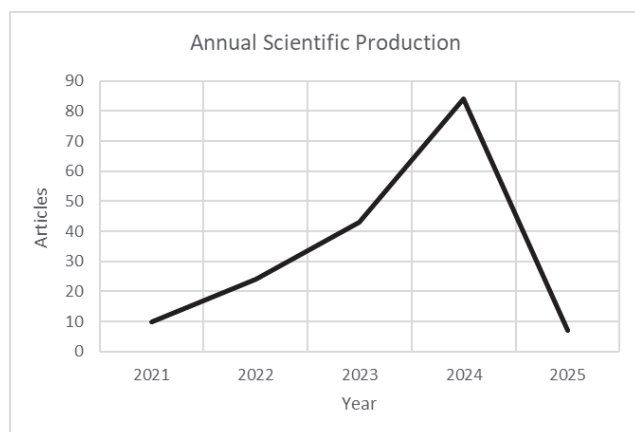


Figure 2. Annual Scientific Production (Source: Authors work with Biblmetrix software)

Figure 2 presents the results of the number of articles related to the subject of AI tools and scientific literature searches. We examine the interest in this topic over the years, we see a clear trend: in 2021, only 10 papers were published, while in 2022, that number rose to 24. In 2023, it increased further to 43, and projections for 2024 show a total of 84 papers. This significant growth in interest can be attributed to the rising influence and utilization of AI. Tools in writing scientific papers.

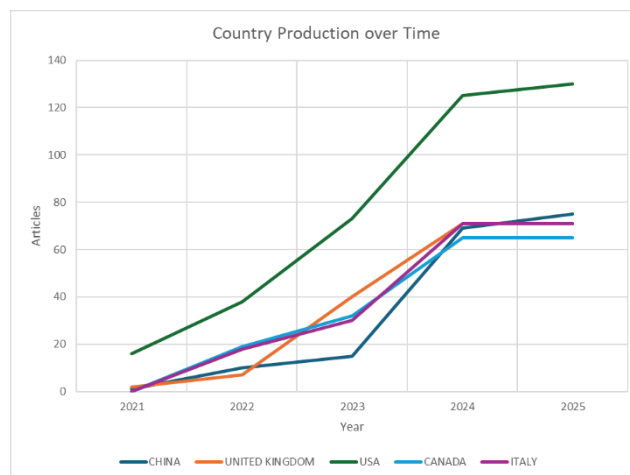


Figure 3. Country Production over time (Source: Authors work with Biblmetrix software)

Figure 3. tracks the number of articles published per country each year, from 2021 to 2025. This section examines the publication output by country, highlighting key trends, growth rates, and shifts in research activity over the five years.

The USA has the highest number of articles published each year, with a notable upward trend from 2021 to 2025: 2021: 16 articles, 2022: 38 articles, 2023: 73 articles, 2024: 125 articles, 2025: 130 articles. The increase in publication output is substantial, especially in 2024 and 2025, suggesting that the USA remains a major contributor to global academic research and is experiencing significant growth in its research activities. China also shows a rapid rise in publication output over the period: 2021: 1 article, 2022: 10 articles, 2023: 15 articles, 2024: 69 articles, 2025: 75 articles. While starting with a lower number in 2021, China's academic output will grow significantly from 2023 onward, aligning with the country's growing global research presence. The UK follows a similar trajectory to that of the USA, with steady growth over the five years: 2021: 2 articles, 2022: 7 articles, 2023: 40 articles, 2024: 71 articles, 2025: 71 articles.

The UK shows notable growth, particularly in 2023 and 2024, reflecting increased research productivity. Canada's research output began to rise sharply in 2022, 2021: 0 articles, 2022: 19 articles, 2023: 32 articles, 2024: 65 articles, 2025: 65 articles. The surge in Canada's publication output from 2022 onwards indicates a significant ramp-up in academic research activity. Italy shows a similar growth pattern to Canada: 2021: 0 articles, 2022: 18 articles, 2023: 30 articles, 2024: 71 articles, 2025: 71 articles. Like Canada,

Italy has significantly increased its academic publishing output from 2022 onwards, particularly in 2024 and 2025.

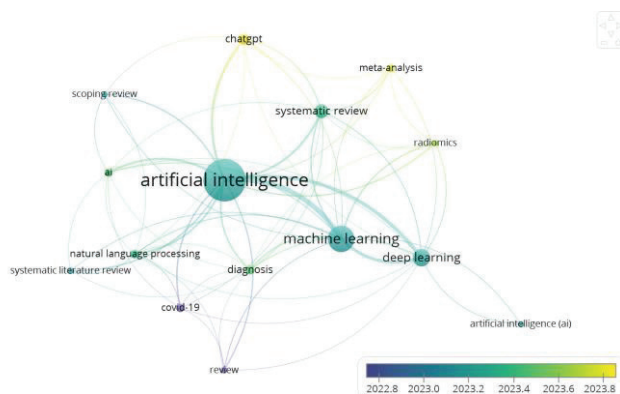


Figure 4. Scientific map of keywords co-occurrence 2021-2025 (Source: Author, using VOSviewer software)

Figure 4. shows the scientific mapping of keywords based on co-occurrence, a minimum of three words was set as a criterion, and 587 keywords were identified of which 27 met in threshold. The terms showing the highest node magnitude are „artificial intelligence“ (89 times), followed by „machine learning“ (39), „chat GPT “ (16), „deep learning“ (13), and „natural language processing“ (12).

"Artificial intelligence" has the highest frequency (88), with mentions extending across 2023 and 2024.

The term "machine learning" is mentioned 39 times, with references spanning from 2023 to 2024. In contrast, "ChatGPT" and "deep learning" have lower frequencies, with 16 and 13 mentions, respectively. The terms "artificial" and "learning" are also frequently encountered, but they mainly appear as part of other phrases or terms.

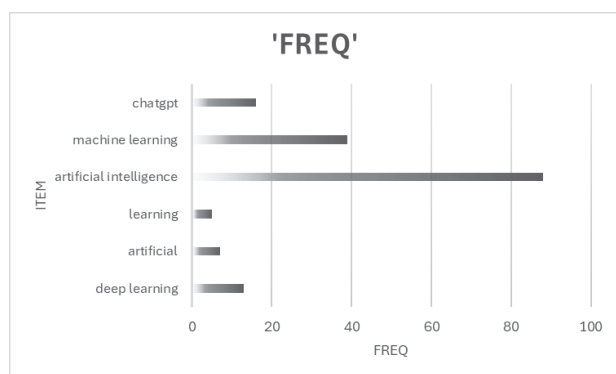


Figure 5 Trend Topics (Source: Authors work with Bibliometrix software)

Figure 5 shows answers to research question 3 (RQ3) that "Artificial intelligence" is the most dominant term in this dataset, reflecting the widespread and growing interest in AI technologies. This trend is further supported by the rapid development of AI applications across various fields, from healthcare to entertainment. The term "machine learning" remains significant, highlighting its importance in the technical discussions and development of AI systems. Emerging but Growing Terms.

While terms like "ChatGPT" and "deep learning" have lower frequencies, they are becoming increasingly important in specific domains. Their mention frequency is

likely to rise as their applications expand. The terms "artificial" and "learning" are frequently used, often as part of more complex phrases, but they carry less impact when considered as standalone terms.

Overall, the trends in this dataset indicate a growing focus on AI technologies in general, with particular attention to emerging technologies like ChatGPT and deep learning in certain niches. The frequency and relevance of these terms may change as technologies evolve and AI becomes even more integrated into various industries. Recent research highlights the dominance of artificial intelligence (AI) in current technological discourse. AI, particularly machine learning and deep learning is rapidly evolving and impacting various fields[22]. Large Language Models (LLMs) and ChatGPT have gained significant attention, dominating research topics in the first half of 2023[23]. However, mainstream media coverage of ChatGPT and AI tends to focus predominantly on Big Tech issues, with limited representation of topics like ethics and diversity[24]. The field of Natural Language Processing (NLP) remains influential, although its dominance is declining in favor of computer vision and general machine learning. Interestingly, top-cited papers show fewer indicators of AI-generated content compared to random samples, suggesting a complex relationship between AI adoption and academic writing. These findings underscore the rapid evolution and widespread impact of AI technologies across various domains.

## V. CONCLUSION

AI tools greatly help in the process of searching, finding sources, synthesizing, and analyzing them. With the development of different tools, in addition to making it possible to search a large number of relevant databases much faster, the development of tools with progress provides different methods that help in bibliometric analyses. This research aimed to analyze sources that deal with tools that help in the process of searching sources and relevant databases. The Web of Science citation database was searched for this research. The analysis determined that the works that were found fall into different categories of research negative annual growth rate indicates a decline in publication activity in this field. The average citation per document is 6.92, with moderate international collaboration at 39.88%. Thematic analysis categorizes works into three main themes related to AI in SLRs. AI techniques like NLP and machine learning are explored for automating SLR processes. Research papers examine AI tools' implementation in enhancing data analysis and experimental design. The study identifies 587 keywords, with "artificial intelligence" being the most frequently mentioned. Emerging terms like "ChatGPT" and "deep learning" are gaining importance in specific domains.

The findings highlight AI's growing influence across various fields, including healthcare and education.

The relationship between AI adoption and academic writing is complex, with top-cited papers showing fewer AI-generated content indicators.

We can conclude that AI tools have transformed systematic literature reviews (SLRs) in scientific research.

SLRs involve identifying, evaluating, and synthesizing research related to specific questions. AI technologies automate tasks like paper identification and data synthesis, enhancing efficiency. Ethical debates arise regarding academic integrity and the reliability of AI-generated sources. Despite concerns, AI integration can improve knowledge acquisition in research. This work has opened several questions and topics for future research, because tools will inevitably be increasingly used in scientific and research work, especially in literature searches. Future studies should focus on the use of specific tools at various stages of the research process. Given the wide array of available tools, this will undoubtedly remain an area of interest for the scientific community moving forward.

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