

Gemini: una herramienta eficaz para la búsqueda de información científica

Gemini: an efficient tool for scientific information search

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Resumen

En este trabajo, se aborda el desafío que enfrentan los investigadores al buscar y gestionar la amplia variedad de fuentes relevantes para sus proyectos de investigación. Se destaca la importancia de contar con sistemas de búsqueda de información eficientes, que permita a los investigadores acceder a la información más significativa y actualizada en su campo de estudio. El objetivo principal es explorar cómo Gemini, una herramienta avanzada de búsqueda y gestión de información científica, puede facilitar el proceso de investigación. Antes de la llegada de herramientas avanzadas como Gemini, los investigadores se enfrentaban a desafíos considerables en la búsqueda y gestión de información para sus proyectos académicos, y dependían en gran medida de sistemas bibliográficos tradicionales que, si bien proporcionaban acceso a una variedad de fuentes, carecían de la capacidad de integrar múltiples bases de datos y filtrar los resultados de manera eficiente.

Palabras clave: Gemini; Gestión de información científica; Investigación académica; Herramientas avanzadas; Proyectos académicos.

Abstract

This paper addresses the challenge faced by researchers in searching and managing the wide variety of sources relevant to their research projects. It highlights the importance of having efficient information search systems that allow researchers to access the most significant and up-to-date information in their field of study. The main objective is to explore how Gemini, an advanced scientific information search and management tool, can facilitate the research process. Prior to the advent of advanced tools such as

Gemini, researchers faced considerable challenges in searching and managing information for their scholarly projects, and relied heavily on traditional bibliographic systems that, while providing access to a variety of sources, lacked the ability to integrate multiple databases and filter results efficiently.

Keywords: Gemini; Scientific information management; Academic research; Advanced tools; Academic projects.

Introduction

In the early days of the Internet, searching for information was a tedious and manual process. People relied on encyclopedias, books, libraries and experts to find what they needed.

In the mid-1990s, the first search engines, such as Archie and WAIS, emerged, simplifying the search for information online. These basic search engines indexed web pages and displayed them based on keywords.

Over time, search algorithms have become more sophisticated, using techniques such as link analysis and Google's PageRank to rank results and provide greater relevance.

Google is the dominant search engine, followed by Bing, Yahoo! and DuckDuckGo. Each offers different features and functionalities, adapting to users' needs and preferences.

According to Curiosaweb (2024), search engines have revolutionized the way we access information on the Internet, making it more accessible and efficient. Constant innovation in search algorithms and the emergence of new specialized search engines demonstrate the importance of these tools in the digital era.

In this context, Gemini, a platform designed to facilitate collaboration between researchers, as well as the collection, organization and analysis of data in research projects in any disciplinary field, has emerged.

Gemini is more than just a tool; it represents an innovative approach to address contemporary research challenges. Its origins can be traced back to the need to overcome traditional limitations in data management and collaboration between geographically dispersed teams. Throughout its development, Gemini has evolved to provide a robust and adaptable platform that adapts to the changing needs of the research community.

In this paper, we will explore in detail what Gemini is and how it has evolved from its beginnings to become an indispensable tool for researchers in a variety of disciplines. We will analyze its impact on the way research is conducted, highlighting its advantages and possibilities in terms of collaboration, data management and analysis.

The main objective of this paper is to explore how Gemini, an advanced scientific information search and management tool, can facilitate the research process; to provide an overview of Gemini and its role in contemporary research; to provide researchers with practical guidance on how to use Gemini in their own research projects; and to encourage wider adoption of this platform as an integral part of the research process in various disciplines.

Development

I. Gemini: A Big Language Model for Research Collaboration

I.1 What is Gemini and how does it work?

Google's Gemini, formerly known as Bard, is an artificial intelligence tool designed to drive creativity and productivity. It works as an interactive chatbot that allows you to chat with Google's AI to perform various tasks, such as writing, planning, and learning (Wikipedia, 2023). It is based on machine learning that has been trained on a large amount of data. As such, it can make mistakes and is not always able to understand the context of a situation (Magma Digital, 2024).

Gemini is a large language model (LLM) developed by Google AI, trained on a massive dataset of text and code. LLMs are a type of artificial intelligence (AI) that can generate text, translate languages, write different types of creative content, and answer your questions in an informative way. Gemini is specifically trained to facilitate collaboration between researchers, providing tools and capabilities that make the research process more efficient and effective.

For Chovet SAS (2024), it is a Natural Language Processing (NLP) Artificial Intelligence trained on an extensive variety of scientific texts, including academic journal articles, books and doctoral dissertations. This training allows him to understand the structures and patterns of scientific language, as well as the subtleties of communication in this field.

Xataka Basics (2024), for its part, considers Gemini to be a multimodal model, which will be able to understand various types of information, both text and images, and will also be able to understand audio and programming code. This will make it an extremely flexible model.

I.2 Main features of Gemini

- Information access and processing: Gemini can access and process information from a variety of sources, including scientific articles, databases, and code repositories. This allows researchers to quickly find the information they need for their work.
- Text generation: It can generate different creative text formats, such as abstracts of scientific articles, research proposals, and even code. This can save researchers time and help them be more productive.

- Language translation: Translate text from one language to another, allowing researchers to collaborate with colleagues around the world.
- Answering questions: Responding to questions in an informative way, even if they are open-ended, challenging, or strange. This can help researchers gain new perspectives on their work and generate new ideas.

1.3 How Does Gemini Access and Process Information from Various Sources?

- Gemini, as a large language model (LLM) created by Google AI, has the ability to access and process information from a wide range of sources, including academic databases, research repositories, and scientific websites. This process is carried out as follows:

1. Accessing information

- Web search: uses powerful search engines to crawl and access a large amount of information available on the Internet. This includes websites, articles, scientific papers and other resources relevant to academic research.

2. Information processing

- Natural Language Understanding: Uses advanced natural language processing (NLP) techniques to understand the meaning of the text it encounters. This includes identifying concepts, entities, relationships, and the overall context of the information.
- Information analysis: Once Gemini understands the meaning of the text, it proceeds to analyze it in depth. This involves identifying patterns, extracting key information, and generating concise summaries.
- Machine learning: It uses machine learning algorithms to continuously improve its ability to access, process and understand information. This means that over time, it becomes more accurate and efficient at finding and retrieving valuable information for the user's needs.

3. Specific information sources

- Academic databases: You can access popular academic databases such as Google Scholar, PubMed, ScienceDirect and JSTOR. This allows you to find scientific articles, scholarly books and other publications crucial for research.
- Research repositories: You can access open research repositories such as arXiv and HAL. These repositories contain pre-prints, doctoral dissertations and other research materials that have not yet been published in academic journals.
- Scientific websites: It can process information from scientific websites of research organizations, academic institutions and specialized journals.

4. Presentation of information

- Relevant results: Presents the user with the results of their search in an organized and relevant manner, prioritizing those that best fit their needs.
- Concise summaries: Generates concise summaries of scientific articles, papers and other information resources, allowing the user to get a quick idea of the content without the need to read it in its entirety.
- Data visualizations: Can create data visualizations to present complex information in a clear and understandable way.
- Gemini 1.0's sophisticated multimodal reasoning capabilities can help make sense of complex written and visual information. Thus, it is exceptionally adept at extracting hard-to-identify insights from vast amounts of data.

Its remarkable ability to draw conclusions from hundreds of thousands of documents by reading, filtering, and understanding information can help achieve new breakthroughs at digital speeds in many fields, from science to finance. (Pichai and Hassabis, 2023)

II. Benefits of using Gemini for scientific information search

Gemini offers a number of benefits that make it a powerful tool for scientific information search in academic research. Among them we can mention the following:

1. Access to a large amount of information

- Google Search: Gemini is integrated with Google Search, which allows you to access a vast amount of scientific information available on the web.
- Massive dataset: Gemini is trained on a massive dataset of text and code that includes scientific articles, books, journals and other relevant sources.
- Public APIs: Gemini can access information from public APIs, such as scientific databases and government datasets, further extending its reach.

2. Efficient and accurate search

- Natural language understanding: It can understand complex natural language queries, enabling it to accurately identify information.
- Filtering and sorting: You can filter and sort search results by date, author, source, publication type and other relevant criteria, saving researchers time and effort.
- Identification of key information: It can identify key information within long texts, such as concepts, methods, results and conclusions, facilitating quick understanding of the information.

3. Generation of useful resources

- Summaries of scientific articles: It can generate accurate and concise summaries of scientific articles, allowing researchers to gain a quick understanding of key findings without having to read the entire article.
- Citations and bibliographic references: Gemini can extract citations and bibliographic references from scientific articles, making it easy to create reference lists and organize information.
- Teaching materials and presentations: It can generate teaching materials and presentations on scientific topics, helping educators create engaging, high-quality content.

4. Save time and effort

- Task automation: You can automate repetitive information search tasks, such as identifying important articles or extracting data, freeing up time for researchers to focus on more complex tasks.
- Improved productivity: Gemini's efficiency and accuracy in searching for scientific information can significantly increase researchers' productivity.
- Quick access to information: enables researchers to quickly access the information they need, reducing the time spent manually searching for sources.

5. Improved research quality

- Complete and accurate information: Provides researchers with complete and accurate information, enabling them to conduct more robust and reliable research.
- Identification of new perspectives: Helps researchers identify new perspectives and approaches to their research by suggesting sources that might have gone unnoticed.
- Collaboration and communication: Facilitates collaboration-allowing researchers to easily share information and resources.

Overall, Gemini offers a number of benefits that make it a valuable tool for scientific information seeking in academic research. Its ability to access a-rific amount of information, perform efficient and accurate searches, generate-useful resources, and save time and-effort can significantly contribute to the improvement of productivity and quality of research.

Google Gemini is primarily a research assistant that users can use to query data drawn from across the web. In this sense, it can be considered an alternative to a search engine that also has the ability to create content (Keary, 2024).

It is important to keep in mind that Gemini is a complementary tool and does not replace the critical judgment of the researcher. Researchers should carefully evaluate the information obtained through Gemini and verify its reliability with other sources.

III. How to perform a literature search in Gemini?

Gemini is an open source search engine that indexes a large amount of scholarly content, such as journal articles, books, and theses. It is a valuable tool for researchers and students seeking information on a variety of topics.

1. Access the Gemini website

Start by opening your web browser and going to the Gemini website:

2. Enter your search query

In the search or chat bar, type in the keyword or phrase related to the topic of your research. You can use Boolean operators, such as AND, OR and NOT, to refine your search. For example, education AND technology NOT physics.

3. Explore the search results

Gemini will show you a list of results relevant to your query. Each result will include the document title, author, source, and publication date.

4. Filter your results

You can filter by document type (article, book, thesis, etc.), publication date, author, source, and other criteria.

5. Read and save documents

To read a document, click on its title in the results list. A new window will open with the full text of the document. You can save the document to your computer by clicking the "Save" button.

IV. Use cases of Gemini in Academic Research

Example of a search in repositories of educational research results on Virtual Learning Objects (VLOs) at university level (last 5 years).

Table 1 Educational research results on Virtual Learning Objects (VLOs), at university level (last 5 years)

Tipo de documento	Título	Autores	Repositorio	Enlace
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Thesis	Design and implementation of a Virtual Learning Object (VLO) for the teaching-learning of ecosystems in higher education students (2021).	Rodríguez-Hernández, M. A., & González-González, M. I.	Ibero-American Repository of Educational Materials (RIMIE)	[https://www.rie.org/] (search by title or authors)
Thesis	Analysis of the effectiveness of a Virtual Learning Object (VLO) for the development of research competencies in Higher Education (2020).	García-Robelo, O., Cáceres-Mesa, M., Veytia-Bucheli, M., Cisneros-Herrera, J., & León-González, J.	Dialnet	[https://dialnet.unirioja.es/] ((search by title or authors)
Magazine article	Strategies for the effective design of Virtual Learning Objects (VLOs) (2021)	Collado-Rodríguez, J. L., & Jorba-Jorba, M.	Redalyc	[https://www.redalyc.org/] ((search by title or authors)
Magazine article	Virtual Learning Objects (VLOs): A systematic review of their use in higher education (2020).	Ramírez-Santesteban, C., & Fernández-Morales, A.	Google Scholar	[https://scholar.google.com/] (search by title or authors)

Source: Own elaboration

Additional resources:

- Repository of Virtual Learning Objects <https://www.red.es/es/actualidad/noticias/redes-completa-la-entrega-de-mas-de-430000-equipos-informaticos-con>
- Iberoamerican Journal of Distance Education <https://revistas.uned.es/index.php/ried/issue/archive>
- Spanish Association of Distance Education [<https://igualtat.easse.cat/es/>] (<https://igualtat.easse.cat/es/>)

Additional tips

1. Use specific keywords:

- "virtual learning object" (VLO).
- "higher education"
- "thesis"
- "journal article"
- "last 5 years"

2. Combine keywords with Boolean operators:

- "OVA AND higher education NOT primary NOT secondary NOT secondary."

3. Use filters in the databases:

- Publication date
- Type of document
- Language

This is just a small sample of the results you can find in the repositories mentioned above. It is recommended that you spend time exploring different repositories and use the advanced search tools to find the most important documents for your research.

Globally available data can be compiled and presented to the researcher in a way that makes them reliable and consequently usable in the research (Vaishnav, 2023).

General tips for conducting your search

- Use specific keywords: The more specific your keywords are, the more accurate your search results will be. In this case, you can use keywords such as "Virtual Learning Object", "VLO", "education", "learning", "thesis", "article", "last 5 years"
- Combine keywords with Boolean operators: Boolean operators allow you to combine keywords and refine your search. For example, you can search for "OVA AND education NOT physics" to find papers on OVAs in education that are not related to physics.
- Use filters to narrow your results: Most academic databases offer filters by publication date, document type, author, language, and other criteria.
- Read document abstracts: Before opening a full paper, read the abstract to make sure it is relevant to your research.
- Use citation tools: When using information from academic papers, be sure to cite sources correctly using a citation tool such as APA, MLA or Chicago.

V. Benefits of using Gemini for scientific research.

Gemini has an unprecedented ability to process and understand natural language. It can analyze millions of research articles in seconds, extracting key insights, identifying hidden patterns and generating novel hypotheses. A recent Deep Mind study showed that Gemini could read and synthesize the information contained in 200,000 scientific articles in a time span comparable to the time a human researcher would spend reading a single article (Specht, 2024).

Concrete benefits for researchers

This language processing skill translates into multiple benefits for scientists across disciplines. For example:

- Speed up literature review: Gemini can help researchers quickly identify relevant articles within a sea of publications. This saves significant time and ensures that their research is based on the most up-to-date knowledge.
- Discover new knowledge: Gemini's ability to identify subtle connections between different research areas can lead to new discoveries. It can help researchers formulate innovative questions and explore lines of inquiry not previously contemplated.
- More efficient scientific writing: Gemini can generate informative summaries of research articles, helping scientists quickly understand key findings. It can also help in writing research proposals and scientific papers, improving the clarity and precision of the language used.
- Limitations of using Google Gemini include several aspects that users should be aware of:
 1. Potential Biases: Gemini may inherit biases from the data it was trained on, meaning that its responses could reflect biases present in that data, affecting the neutrality and accuracy of the information provided.
 2. Lack of Cited Sources: Often, Gemini does not mention the sources of information used to generate responses. This makes it difficult to verify the credibility and accuracy of the information presented.
 3. Dependence on Initial Context: The quality and relevance of Gemini's responses depend heavily on the clarity and accuracy of the questions asked by the user. Ambiguous or poorly structured questions may result in unsatisfactory answers.
 4. Legal and Ethical Restrictions: The Terms of Service prohibit the use of Gemini for illegal activities or activities that promote violence, hatred or discrimination. This limits the scope of application of the model in certain contexts.

5. Technical Limitations: Although Gemini is an advanced model, you may have difficulty with completely original concepts that you have not encountered in your training data, which may affect your creative ability.

These limitations are important to consider in order maximizing the effectiveness and reliability of using Google Gemini in research and other contexts (Pavitra, 2024).VI. Considerations and challenges in using Gemini for academic research.

Considerations

- Gemini is a tool under constant development: It is important to keep in mind that Gemini is a relatively new tool. As it develops, it is possible that new features will be added and existing features will be improved.
- Gemini is not a substitute for human judgment: It is a tool that can help you find information and perform tasks more efficiently. It is important that you use your own knowledge and experience to evaluate the quality and reliability of the information you find and to make informed decisions about your research.
- Gemini may have biases: It is critical to be aware of these biases and take steps to mitigate them.

Challenges

- Learning to use Gemini: It is a complex tool that requires some time and effort to learn to use. It is important to read the documentation and watch the tutorials available to familiarize yourself with the tool.
- Evaluate the quality of the information: Gemini provides you with a wealth of information, but it is crucial that you learn to evaluate the quality of the information you find. Not all the information you find will be reliable or relevant to your research.
- Manage the volume of information: Gemini can provide you with a large amount of results, which can be overwhelming. It is important to develop strategies to manage the volume of information and to quickly identify the most valuable results for your research.
- Incorporate Gemini into your workflow: It is a new tool that may need to be incorporated into your existing research workflow. You may need to adjust your research methods to take full advantage of its capabilities.

Despite these considerations and challenges, Gemini is a valuable tool for academic researchers. By being aware of the tool's limitations and using it responsibly, you can leverage its capabilities to improve the efficiency and productivity of your research.

Conclusions

This paper has addressed the challenge faced by researchers when searching and managing scientific information for their research projects; in this regard, Gemini has been presented as an advanced scientific information search and management tool, which can significantly facilitate the research process, offers several advantages over traditional bibliographic systems, such as the ability to integrate multiple databases. It allows researchers to access a wide range of information from a single platform, avoiding the need to consult different sources individually, filtering results efficiently. It offers advanced filtering options that allow researchers to quickly find the most relevant information for their specific needs, organize and manage information: It provides tools to organize and manage the information collected, facilitating its analysis and subsequent use. The arrival of Gemini as an AI tool represents a significant advance in the field of scientific research by offering faster and more efficient access to information; these tools allow researchers to devote more time to conducting their research and generating new knowledge.

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