AI-POWERED SEARCH ENGINES

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ABSTRACT

Search tools are a fundamental pillar in the journey of a scientific researcher, representing the gateway to accessing the knowledge and information necessary to enrich and develop their research. These tools encompass a variety of tangible or material resources that researchers use throughout their studies, including electronic tools, mechanisms, and research websites. This paper will focus on digital search tools (search engines), which are the main instruments available for online research, and the choice of tool depends on the researcher's needs.

Significance of the Study: AI-powered search engines are among the most significant stages of the technological revolution in our world today. These engines contribute to enhancing the quality of search and user experience by providing more accurate and faster results. The study discusses the importance of using AI technologies to improve search engines' ability to understand user queries better and deliver customized content tailored to their needs.

Scope of the Study: The study is limited to search engines that rely on specific AI technologies such as machine learning and natural language processing. It also focuses on a specific set of practical applications in defined areas, introducing some of these engines, explaining how they work, and their usage mechanisms.

Research Problem: The research problem lies in how to improve the effectiveness and efficiency of traditional search engines with the assistance of AI technologies. The study raises questions about the challenges these engines face in meeting users' growing expectations regarding accuracy, speed, and personalization.

Previous Studies: Our study relies on a range of scientific research discussing the importance and mechanisms of intelligent search engines, notably:

1- Bukhor, S. (2019). Analisis Perbandingan Fitur Search Engine.

2- Karanjia, Meherzad (2023). Importance of Search Engines – Benefits for Businesses and Students.

3- Jairam, Prabhat (2023). What is the Importance of Educational Search Engines?

Keywords: Search Engines, Artificial Intelligence, Scientific Research, Technological Revolution, Data Analysis, Traditional Search

1. INTRODUCTION

1.1. THE NATURE OF SEARCH ENGINES AND HOW THEY WORK

The importance of search tools for researchers is evident in many aspects, such as saving time and effort, ensuring result accuracy and comprehensiveness, facilitating the documentation process, developing research skills, and discovering new horizons. In today's world, most search tools are websites on the internet that provide search services and perform two main functions: the first is to explore the internet for information, and the second is to compile this information into a database that users can query.

The first search engine, Archie, was developed in 1990 by Alan Emtage, a student at McGill University in Montreal. Archie was essentially a collection of computer files stored on unknown FTP sites on the network. In 1991, Mark McCahill, a student at the University of Minnesota, created the Gopher search engine using a hypertext model that also searched for plain text references in files. These early engines did not have the capability to use keywords like modern search engines. Thus, in 1993, Hans enhanced the Gopher text-based interface with a graphical interface using Mosaic. Around the same time, Matthew Gray developed Wandex, the first search engine resembling modern ones. Wandex was the first to use web crawling technology, searching a catalog of indexed web pages. A significant advancement came in 1994 with the launch of WebCrawler, which indexed the full text of websites, not just the titles of web pages. From there, many search engines were rapidly developed, establishing their brands in the search engine market Bukhor (2019).

1.2. WHAT IS A SEARCH ENGINE?

A search engine is a type of program designed to help you find specific information online. It does this by systematically searching web content based on the keywords entered by the user into the search box. The search results typically appear on what is commonly known as search engine results pages (SERPs). These pages may display a variety of content, including web pages, images, videos, and other file types. Some search engines also extract information from databases or open directories.

Some define a search engine as a direct computer program designed to systematically explore the internet for specific information based on written search tags. Search results can be found in a summary known as SERPs. Search engines work by crawling, indexing, and ranking to find exact words or phrases entered by the user.

Search engines typically consist of page repositories, indexing units, query units, and ranking units. Search engines do not operate independently; they are supported by a web browser, which enhances the search engine's functionality. A browser is a program that runs on the user's computer, displaying web documents or information retrieved from a web server Bukhor (2019).

Crawling: In this step, search engines crawl and move meticulously across millions of new web pages daily, transitioning from older pages to new ones to explore their content, whether it is text, images, videos, graphics, or links. The process is conducted by entities known as "Spiderbots" or spiders and robots. Once these bots discover content, they pass it on for data processing and then continue to search for new pages. This content then moves to the next step, which is indexing.

Indexing: The step following crawling involves indexing the content within a massive database located in the search engine's library, which holds a vast number of pages. This is crucial so that these pages and their content appear in users' search results. Any website must undergo both crawling and indexing processes to have its content displayed on a search engine.

Ranking: The final step is ranking the discovered, verified, and indexed web pages. These pages are arranged according to specific criteria rather than randomly. Search engines select the best and most relevant results and display them in a ranked format within search results pages Abu (2022).
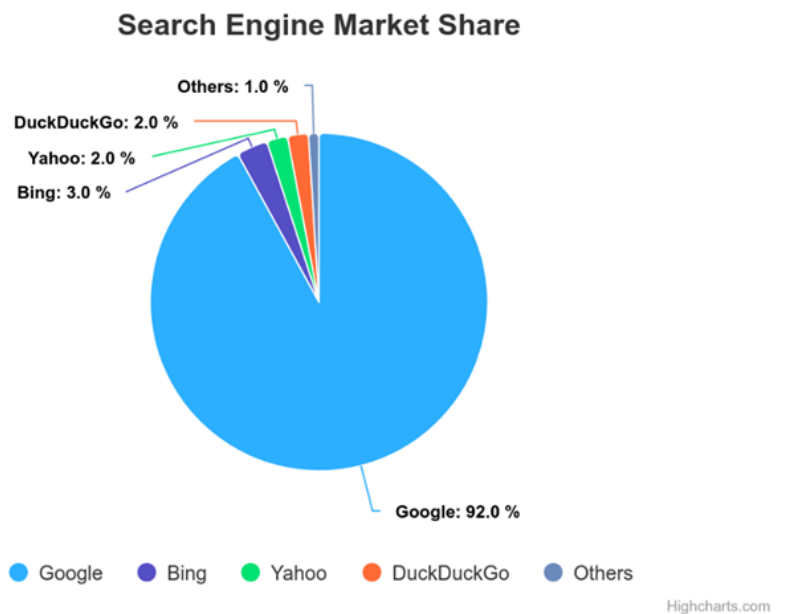
Search engines look for the exact words or phrases entered by the user, and some engines feature an advanced function called "proximity search," allowing

users to specify the separation between terms Satish & Ali (2022). Additionally, there is concept-based searching, which involves performing statistical analyses on web pages that contain the searched keywords or phrases. Terms related to Search Engine Optimization (SEO) are also used to increase website traffic through search engine results Rani & Sahithi (2020), helping websites perform better on search result pages Daruka & Damle (2023).

Search engines are essential for retrieving information from the vast and unstructured data on the web. They consist of page repositories, indexing units, signaling units, and ranking units, working in conjunction with web browsers to enhance user experience.

Among the most prominent and important search engines are: Google, Bing, Yahoo, Yandex, Baidu, and DuckDuckGo. The way each of these search engines operates may vary depending on the associated databases or the nature of the algorithms they use. This results in significant differences in user and researcher behavior for each engine.

According to the latest statistical data, Google has shown dominance over other search engines, with a usage rate of 91.62% Balasubramanian & Sabarish, (2016), Panayotov (2024).

Search Engine Market Share

Others: 1.0 %
DuckDuckGo: 2.0 %
Yahoo: 2.0 %
Bing: 3.0 %
Google: 92.0 %

● Google   ● Bing   ● Yahoo   ● DuckDuckGo   ● Others

Highcharts.com

2. THE IMPORTANCE OF SEARCH ENGINES IN SCIENTIFIC RESEARCH

1) Search engines facilitate the transfer of essential ideas about learning and teaching in a way that can be implemented in the classroom.

2) Educational search engines contain a wealth of information accessible with a simple scroll. They enable students to target specific information and access relevant academic databases, journal articles, citations, and educational resources Chauhan (2022).

3) Search engines assist researchers by providing accurate and prominent information and valuable results.

4) Researchers can benefit from various educational resources related to complex topics, enhancing their preparedness.

5) Keeping up with scientific advancements is facilitated by search engines, as individuals can acquire any type of knowledge from anywhere in the world. This has become essential for students to stay updated with scientific and technological developments around them Karanjia (2023).

6) Search engines are used in educational settings to support the overall development of students, including learning how to use the internet. They provide students with opportunities to delve into a world of resources, fostering greater self-awareness through exploring new courses Karanjia (2023).

7) The use of educational search engines is convenient and can save students time that would otherwise be spent searching for unrelated information.

8) They have reduced the need to browse encyclopedias, making it easier for learners to access information and find the solutions they need Jairam (2023).

3. TYPES OF SMART SEARCH ENGINES AND THEIR ROLE IN ORGANIZING RESEARCH TOOLS

In the era of digital and AI revolutions, a range of enhanced search tools has emerged, vital for researchers in their academic pursuits.

3.1. FEATURES OF SMART SEARCH ENGINES

AI-powered search engines go beyond traditional methods. While they still use basic search structures, they strive to answer your question directly rather than just displaying a list of pages. The information collected is processed through an AI model, summarizing it into brief paragraphs, usually citing its sources. The AI's ability to understand natural language allows it to interpret questions accurately, even if specific keywords aren't used (though many traditional search engines now incorporate such AI capabilities as well) Shubham (2024).

1) Perplexity Search Engine

Founded in 2022 by Andy Konwinski, Aravind Srinivas, Denis Yarats, and Johnny Ho, Perplexity AI emerged from the founders' work at Google AI, where they contributed to developing large language models. Frustrated by the lack of efficient ways to access and leverage existing knowledge within these models, they established their own company to address the issue. The name "Perplexity" reflects the company's aim to provide accurate and insightful answers to complex questions. Perplexity AI developed a powerful search engine capable of understanding question context and providing relevant responses from various sources. The company also works on additional features like generating code, creating spreadsheets, and solving mathematical problems. Headquartered in the San Francisco Bay Area, Perplexity AI is funded by several venture capital firms. Its talented team and robust financial backing position it well for success in the rapidly growing market of AI-powered search engines, poised to significantly impact how people learn and explore new information Entrustech (2023).

Perplexity replaces conventional blue links with an interactive chatbot-like interface, allowing users to engage with search results conversationally. It enables

users to review past search topics and save collections of pages for more organized research.

The user interface is intuitive and straightforward. After navigating to Perplexity AI's website, users need to log in with a personal email. The main search interface then becomes accessible, offering a seamless user experience.

3.2. AMONG THE PROMINENT FEATURES OF PERPLEXITY SEARCH ENGINE

1) **Cites authentic scientific sources**, enabling users to verify the credibility of the information generated.
2) **Utilizes Natural Language Processing (NLP)** to interpret and understand the intent of a query, scanning the web for the most relevant information and structuring a response.
3) **Summarizes information and references** used, presenting them clearly.
4) **Conducts real-time searches online** to retrieve information upon request.
5) The tool **scans websites, forums, social media, and news articles** to provide the latest information on any query, regularly surveying these sources to ensure up-to-date and accurate results.
6) Does not rely on a single source; instead, **it searches academic journals, research papers, social media platforms, news articles, and forums** to gather information, enabling users to correctly cite all sources provided Pavitra (2024).
7) **Offers two types of searches:** quick search for simple, fast answers, and professional search for more detailed responses that may include follow-up questions.
8) **Aggregates information from various sources**, summarizing it into a simplified answer with references for further exploration.
9) **Indexes the web continuously**, ensuring access to up-to-date information. This feature allows users to inquire about recent events, live results, and timely topics with reliable accuracy.
10) **Remembers the context of ongoing conversations**, allowing users to ask follow-up questions within the same context, ensuring responses remain relevant and informed by previous interactions.
11) **Supports document and image uploads**, which Perplexity AI can analyze to enhance the accuracy and relevance of the search, making it a versatile tool for research and information gathering WPS (2024).

3.3. ELICIT SEARCH ENGINE

Elicit.org, developed by Ought, emerged as one of the earliest partner applications incorporated by OpenAI in December 2021. Utilizing the GPT-3 API models, it was aimed at enhancing literature review searches and was among the first tools to integrate OpenAI's GPT-3. Users began testing Elicit from December 2021 and providing feedback, which helped shape its capabilities. Beyond serving as an academic search engine, Elicit includes additional functions such as a question-and-answer system to create comparison tables of papers (literature review matrices) for quick inquiries into individual study details Aaron (2023).

Elicit's primary function is to identify "key articles" and mine keywords or topic titles. When a question is entered, it returns alternative queries that can lead to more foundational articles. Elicit can find relevant research papers without perfect keyword matches, summarize main points of papers related to a query, and extract key information from research papers. While answering questions through search is its main focus, Elicit also assists with brainstorming, summarizing, and classifying text. Users can save their work and export it to citation management tools such as Zotero LibGuides. (n.d.).

Elicit's search engine focuses on building blocks of cognitive work (e.g., searching, extraction, classification, summarization). It identifies and integrates these blocks and presents them to users so they can piece them together and automate cognitive workflows over time. Its architecture emphasizes supervised reasoning processes rather than mere results. While this structure is built in the context of a research assistant, Ought aims for Elicit to expand the utility of machine learning for open-ended questions on a broader scale (differential capabilities). In the long term, process-based architectures may mitigate alignment risks associated with overall optimization (alignment challenges) Ought. (n.d.).

Elicit offers a free plan for researchers, with options for paid usage as well. The tool supports nearly all global languages, including Arabic. The user interface is straightforward, requiring users to create an account using their personal email. You can access the tool at: https://elicit.org.

This is the interface of the engine. Once you enter the phrase you want to search for, dropdown lists appear on both the right and left sides, providing you with the names and titles of peer-reviewed research studies related to your topic. For example, when I entered the phrase "The importance of e-learning," the search results section displayed dozens or sometimes hundreds of results, including research studies and scholarly articles, along with the author's name, the name of the journal in which the study was published, and the DOI of the research paper. By clicking on any research paper, you are directed to the original site where it was published.

Moreover, the engine provides a summary of all the articles relevant to your research, allowing you to review it and check the sources and references used to create the summary.

On the right side, there is a list of options to facilitate your research and explore related studies. These options include: (Summary, Methodology, Introduction Summary, Main Findings, Study Objectives, Number of Participants, Region, etc.). By clicking on any option, the engine provides you with the result within seconds.

The engine also offers a very important feature called "Add New Step," which presents a list of additional options that enhance the search and simplify the research process for researchers. These options include:

1) **Extract Data from Uploaded Papers:** The task is to upload a specific file and ask the tool to extract the data from it. The engine easily retrieves the data from the uploaded document.

2) **Get a List of Concepts You're Searching For:** This option allows you to request the tool to search for the key concepts related to a specific topic.

3) **Create a Table from Selected Papers:** Once you upload or specify certain research papers, the engine creates a table of data from the provided documents.

4) **Summarize Research Papers:** This option allows the engine to provide summaries of the research papers you upload.

5) **Chat with Research Papers:** In this feature, you select a specific research paper and engage in a conversation with it, where it answers all your questions.

Additionally, the engine provides a personal library that gathers all the papers and files you've uploaded, with the option to delete or modify them later. It also offers a notebook that collects all the topics and their results that you have searched for within the engine.

3.4. SEARCH ENGINE (TYPESET.IO)

Typeset.io is an innovative platform designed to simplify the process of writing, collaborating, and publishing academic documents for researchers. With a focus on enhancing productivity and efficiency in academic writing, it offers over 40,000 templates from major publishers such as IEEE, Wiley, and Springer, which can easily be imported into Word files. The platform also features SciSpace, an AI-powered tool that helps in understanding and explaining complex academic texts in a simpler way, making research more accessible and manageable.

To use the engine, you need to sign in with your personal email after accessing the platform via the link: https://typeset.io/

3.5. MAIN FEATURES AND BENEFITS OF TYPESET.IO

Typeset.io is a comprehensive tool designed to facilitate the process of academic writing, collaboration, and publication. Its main advantages include:

- **Simplified Academic Writing:** It automates formatting and provides ready-to-use templates for submission.
- **AI and NLP Integration:** The platform uses artificial intelligence and natural language processing to improve writing quality, check grammar, assist with literature reviews, and analyze data.
- **Increased Visibility and Accessibility:** Typeset.io enhances research visibility, helping increase citations and improving research ranking on search engines.
- **Personalized Research Recommendations:** The tool offers personalized suggestions and citation assistance to ensure accuracy and integrity in your work.
- **Collaboration and Peer Review:** It simplifies collaboration, peer review, and provides a comprehensive reference library for research management. Durable. (n.d.)

3.6. KEY FEATURES OF TYPESET.IO

1) **Search in Academic Texts:** After you enter a topic, the tool quickly retrieves numerous research studies related to your topic, providing details such as the author, article title, DOI, and the journal where the study was published.
2) **Summarizing Research Papers:** It provides summaries of academic papers, highlighting their key points and ideas.
3) **Citation Generation:** It offers over 100 citation styles (e.g., APA, Chicago, MLA). You can search for articles by title, conference, book, URL, or DOI, and the tool will generate citations in the chosen format.

For example, by searching a study using its DOI, the tool will return the study's title, journal, DOI, publication date, pages, and a ready-to-use citation.

4) **AI Text Detection:** The tool can determine whether a text was generated by AI. By pasting or uploading any text, it analyzes the content to determine whether it's human-written or AI-generated.

5) **Chat with PDF Files:** You can upload PDF files, and the tool allows you to "chat" with the document, extracting answers to specific questions you ask about the file.

6) **Personal Library:** You can store all the files you've uploaded to the platform in your personal library for future access and management.

7) **Text Rewriting:** The platform allows you to rephrase previously written texts or any content you wish to rewrite in a scientifically rigorous style.

8) **Data Extraction:** The tool enables you to extract data from files you've uploaded and presents the information in a format you need.

9) **Convert PDF to Video:** You can upload any document with information, and the platform can convert it into a video.

This website also allows for 'filtering results,' meaning the researcher can specify the type of results they want. These results can be directly related to their study topic, similar topics, file type (PDF), open access to studies or restricted access, the year of publication, the type of study, articles published in journals, books, conference abstracts, etc. Additionally, the site provides the researcher with a set of scientific and intellectual questions related to their topic, should they wish to obtain answers to all of those questions.

3.7. SEARCH ENGINE (BING)

Bing is a search engine owned and operated by Microsoft. The service's roots trace back to Microsoft's previous search engines, including MSN Search, Windows Live Search, and Live Search. Bing offers a wide range of search services, including web, video, image, and map searches, all developed using ASP.NET. Microsoft's CEO, Steve Ballmer, announced the transition from Live Search to Bing on May 28, 2009, at the All Things Digital conference in San Diego, California. This was followed by an official release on June 3, 2009. Bing introduced several notable features at its inception, such as search suggestions while entering a query and a related searches list, known as the 'exploration pane.' These features leveraged semantic technology from Powerset, a company Microsoft acquired in 2008 Gregersen (2024). Microsoft also made a deal with Yahoo! that led to Bing powering Yahoo! Search. On February 7, 2023, Microsoft began rolling out a comprehensive update to Bing, called New Bing. The new Bing featured a chatbot, known at the time as Bing Chat, based on OpenAI's GPT-4. According to Microsoft, one million people joined the waitlist within 48 hours. Bing Chat was initially available only to users of Microsoft Edge and the Bing mobile app. Microsoft stated that users on the waitlist would be given priority if they set Edge and Bing as their default settings and installed the Bing mobile app Wikipedia. (n.d.).

Table 1

Table 1 A Table that Compares Bing and Google Search Engines, According To the Chat GPT Model:		
Feature	**Bing Search Engine**	**Google Search Engine**
Owner	Microsoft (Microsoft)	Google (Google)
Launch Year	2009	1998
Search Results	Provides accurate results but sometimes with lower ranking compared to Google	Provides more comprehensive and detailed results due to algorithms
Algorithms	Relies on Microsoft's own algorithms	Relies on PageRank and advanced AI algorithms
AI and Machine Learning	Uses AI to improve search results and page ranking	Uses expansive AI to enhance quality and user experience
Local Results Ranking	Good results, but sometimes less accurate	Extremely fast results, part of Google Maps data
Compatibility with Other Products	Works well with Microsoft products like Office and Windows	Integrates seamlessly with Google products like Gmail, YouTube, and Google Drive
Continuous Search Results	Good search results but can be less accurate compared to Google	Extremely accurate search results thanks to advanced AI algorithms
User Interface	Simple interface, may seem less organized compared to Google	Clean, easy-to-use interface with exclusive features
Predictive Results	Reasonable predictive results but less accurate at anticipating user needs	Advanced predictive results that are highly accurate
Marketing and Ads	Ads visible through Bing Ads Network	Ads displayed through Google Ads with professional features
Translation	Good Bing Translator but may struggle in some languages	Very accurate Google Translate covering more languages
Visual Search	Offers image search but sometimes less effective	Highly advanced image search using Google Lens
Privacy	Reduced privacy but less transparency compared to Google	Offers good privacy options, but Google collects expanded user data
Academic Search	Includes academic services like Microsoft Academic (but not as prominent as Google Scholar)	Provides Google Scholar, a well-known tool for academic research
Partnerships	Partnerships with various platforms (like LinkedIn)	Partnerships with a wide array of major platforms across the internet
Maps	Bing Maps is good but less refined than Google Maps	Google Maps is the preferred choice for navigation and directions
Search Technology	Relies on Microsoft technologies like Azure AI	Uses AI, Deep Learning, and specialized data requirements

3.8. CONNECTED PAPERS SEARCH ENGINE

Connected Papers is one of the most prominent smart search engines that offers a wide range of unique options for researchers. Using Connected Papers, you can explore research papers in your field through visual graphs. You may discover more research papers than traditional literature searches. Connected Papers presents works in graphical form; however, the graphs

are not citation maps but are based on connections using similarity scales. This means it can uncover related papers that you might not find through keywords or citation searches Gabi, (n.d.).

After visiting the tool's website via the provided link, you will need to log in and create a personal account using your email.

https://www.connectedpapers.com/

The tool offers a wide range of features, including:

1) Searching for research papers related to your topic by typing in the text box in the center of the search engine's interface.
2) Displaying details of the papers you have searched for.
3) Linking old and new papers available through global search engines.
4) Providing summaries of research papers easily and conveniently.
5) Creating a graph for all research papers, making it easier to find and view them.

The feature of this tool is that you can search using keywords or key terms related to your research topic, specific terms, the Digital Object Identifier (DOI) of a book or article, or by entering the author's name. For example, when I searched for sources on the topic of "History of Iraqi-British Relations," I was provided with a large set of the most important and relevant sources related to the topic.

You can click on any topic to either download or read it directly. The tool also allows you to access the original website where the topic was published. Additionally, you can filter your search results by selecting options such as (PDF format, open access, or code) or classify the papers by the years they were published.

3.9. SCINITO SEARCH ENGINE

SCiNiTO is one of the AI-powered tools that provides access to modern sources. The platform offers easy access to millions of academic resources such as articles, books, conference papers, and dissertations, with a total of 250 million information sources, including 50 million open-access sources. It also provides a range of useful features and tools to enhance your search experience. You can also save articles for later reference and download citations in formats such as Bibtex and Endnote. Additionally, you can create and save your own scientific notes in an organized manner.

The platform offers "search filtering" through a variety of amazing features to refine your search results. For example, you can specify the years of research, meaning you can narrow your search to specific years, or search by the institutions that produced those studies, the country, the field of study and its specialization, article type (book, article, data, conference abstracts, etc.). Furthermore, the tool provides a summary of the study, its year of completion, its digital identifier, the language it was written in, and the author's name.

In the image above, I searched for "The History of the Student Movement in Egypt" and received relevant results.

https://www.scinito.ai/

What is great about this platform is that when you click on any of the displayed studies, it provides a list of related research with titles similar to your search topic, the number of citations the research has, and its sources. For example, I selected the research titled "The Student Movement and National Politics in Egypt: 1923–1973,"

and the result showed that it had 160 citations, along with a feature that allows me to view the studies that cited this title. It also provided 20 related articles and studies on the same topic.

Some of the key features of this search engine include:

1) A research ecosystem supported by OpenAlex, powered by AI, making it one of the largest scientific data repositories ever.

2) SCiNiTO adds value by providing an intuitive user experience that meets the expectations of researchers.

3) Access to the full text of millions of open-access articles. You can add your own private or shared content list to access the full text of all resources.

4) The AI Chat application acts as a research assistant to support the search engine.

5) Multidimensional search to narrow down your results and find articles quickly. Journal recommendations help you decide where to publish your article or discover similar research and researchers.

The engine offers a range of truly amazing options, the most notable of which are: filtering outputs based on (year, publishing institution, field of study, country, article type, author, publisher, and goal).

3.10. SEMANTIC SCHOLAR REPOSITORY

Semantic Scholar is one of the most prominent digital repositories powered by artificial intelligence. It is a project developed at the Allen Institute for Artificial Intelligence and was released to the public in November 2015. It is designed to be an AI-powered search engine for academic publications, using a combination of machine learning, natural language processing, and computer vision to add a layer of semantic analysis to traditional citation analysis methods. Compared to Google Scholar and other repositories, Semantic Scholar is designed to highlight the most important and impactful papers and identify connections between them.

https://www.semanticscholar.org/

You can create an official account on the platform using the researcher's email. Once registered, you can search through millions of papers included on the site by simply typing the title of the research paper you're looking for or search any topic across various scientific fields and disciplines. You will be presented with hundreds of thousands of research papers related to your specific topic. For example, I searched for the topic "Modern Research Methodologies" and received a summary of research related to my search.

You can download the research paper as a (pdf) file or save it to your library associated with your account on the repository, which you can access anytime. The site also allows citation of all research papers, and you can view the publisher or journal that released the paper and visit the publisher's site. These features are provided by this academic tool.

One of the good services this repository offers is the ability to sort or filter search results. You can search by author name or sort results by the most recent, oldest, most cited, most influential, or most downloaded papers. You can also filter by the journal or publisher name, the field of study, or the researcher's interests. All of these features are AI-powered.

As for the researchers' accounts on the repository, they are one of the truly wonderful and unique services provided by the site. After creating a personal account, researchers can edit their profile, add their full name, title, workplace, and personal photo. You can also search for your research and papers and add them to your personal profile. For example, in the image, my personal account contains a list of my research, which I have added to my profile and can be made public.

On the main page of the tool, all of the researcher's papers are displayed, with the option to edit them and update the personal profile by clicking on the "Edit other page" option. You can add personal information, including a scientific biography of the author, and add other academic accounts such as "ORCID," "Google Scholar," or the researcher's personal website. The site also allows you to track the number of "citations" for your papers, showing how many citations they have and the highest citation rates for all your research. Additionally, you can add co-authors for your research paper and follow a large number of researchers whose research paths align with your focus or field of expertise. This allows you to benefit from the research they publish periodically and stay updated with their work.

4. THE DIFFERENCE BETWEEN SMART SEARCH ENGINES AND TRADITIONAL SEARCH ENGINES

Traditional research methods have been the standard for a long time. However, with the advancement of technology and the evolving needs of users, the limitations of traditional search methods have become increasingly evident. Traditional search relies on keyword-based algorithms and indexing. By aligning queries with relevant content, they form the cornerstone of information retrieval. While efficient in many scenarios, this approach is limited to the literal interpretation of queries and often overlooks the subtle details and complexities of human language.

On the other hand, AI-powered search represents a groundbreaking approach. It utilizes machine learning, natural language processing, and semantic understanding. Unlike traditional search, it decodes the underlying intent and context of the query, providing more personalized and accurate results. AI can interpret the core purpose of the query and deliver results that are more relevant, for example, based on previous search activities. Prerender (2023)

5. CHALLENGES FACED BY TRADITIONAL SEARCH ENGINES

Traditional search engines face several challenges, the most prominent of which are:

1) **Information Overload:** These search engines provide a vast amount of information, making it difficult for researchers to distinguish between relevant and irrelevant content. In contrast, smart search engines excel at providing concise answers, offering precise information while focusing on the problem without unnecessary elaboration or irrelevant details.

2) **Inability to Provide Comprehensive Answers:** Traditional search engines struggle to deliver the correct or comprehensive answer, often providing multiple results without narrowing them down to a specific response. Smart search engines, on the other hand, are designed to quickly provide accurate and concise information.

3) **Lack of Data Verification:** One of the challenges of traditional search engines is their inability to independently verify the information

retrieved. In contrast, smart search engines provide the source of the information and list the fields of origin, verifying both the content and the publisher's credibility. Needl. (2023)

4) **Lack of Natural Language Processing (NLP) and Machine Learning (ML) Algorithms:** Traditional search engines lack the ability to use NLP and ML algorithms, which are integral features of smart search engines.

5) **Absence of Advanced Filtering Capabilities:** Traditional search engines lack the important feature of advanced filtering and customization, which is widely available in smart search engines.

6) **AI-Powered Features:** With the use of artificial intelligence, smart search engines offer features such as automatic suggestions, personalized recommendations, and visual search options. Nestify (2024)

Table 2

Table 2 The table in English based on your request:			
Type of Search Engine	**Key Tasks**	**Approximate Global Usage (%)**	**Field of Use in Science**
AI-powered Search Engines	- Text analysis and context understanding	80-85%	Technical Sciences (Artificial Intelligence, Computing)
	- Personalizing results based on user behavior		Medical Sciences (Literature reviews, Biological research)
	- Supporting voice search		Social Sciences (Data analysis and predictions)
	- Offering intelligent recommendations		
	- Continuous learning to improve results		
Traditional Search Engines	- Traditional text-based search	15-20%	Humanities (Historical and Literary research)
	- Displaying results based on keywords		Economic Sciences (Searching for public data)
	- Ranking results based on links and relevance		Basic Academic Research

6. CONCLUSION

At the end of this research on AI-powered search engines, we find that this technology has revolutionized the way information is retrieved and processed. AI-based search engines have proven highly efficient in improving result accuracy and performance speed, in addition to providing a personalized user experience that meets individual needs more effectively. These engines rely on advanced algorithms that understand user behavior and deeply analyze data, leading to more accurate and relevant content delivery.

It is expected that search engines will undergo further developments as AI technologies progress, opening the door to new ways of interacting with information, such as using natural language queries and voice interactions. Machine learning will contribute to reducing misinformation and improving the quality of the results presented, thereby enhancing trust in search engines.

Despite these advancements, there are still significant challenges that need to be addressed, such as privacy and security concerns, as well as the accuracy of information. Continuous efforts must be made to develop search tools ethically and responsibly, with clear policies in place to protect user rights.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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