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Searching the scholarly literature with artificial intelligence: an Introduction

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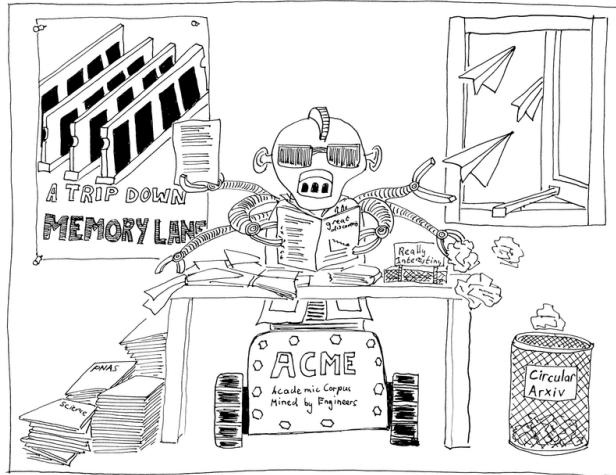
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Searching the Scholarly Literature with Artificial Intelligence: an Introduction



Can AI help you wade through the information overload?

Traditional search techniques can't cope with today's flood of articles. Artificial Intelligence may help us search more efficiently in less time. This blog series helps by trying out the available tools in a way that you can use them in your research workflow.

Each year scientists put out nearly 3 million publications according to the National Center for Science and Engineering Statistics. The consequences are easy to see if you search for a random topic in Google Scholar: almost any search will give you more articles than you can read during your lifetime, getting an overview of the field seems to be impossible. Besides, most of the results aren't even relevant, as searching with keywords has its limit. At the same time Scholar creates a bubble around the top results: the more cited (older) an article is, the higher it is ranked in your search results.

These are not the only problems modern researchers and students have to deal with. As much of the foundations of science have already been put in place, research is constantly becoming more specialized and niche research areas are created that develop their own jargon and where one needs to have a lot of expertise to even read the articles. Due to increasing multidisciplinary we have also discovered that findings in other fields may be of interest to us but are not found due to these specific jargons and the needed knowledgebase.

Luckily, new tools to tackle the article overload with artificial intelligence are being created, especially in the world of systematic reviews, where you have to get an overview of a whole research topic. In this blog series we want to introduce you to several of these tools that may also help solve general literature search issues. We will try to explain the basics behind these tools to prevent them from becoming black boxes and we will give you some insights into the pearls and the pitfalls

Why do we think Artificial Intelligence can be helpful?

It is difficult to give an exact definition of artificial intelligence, but according to Russell and Norvig: '...AI is concerned mainly with rational action. An ideal intelligent agent takes the best possible action in a situation.' This is quite a wide definition; we will focus on several specific principles we think may help in literature research:

- **Machine learning**, where an expert trains the system to find the best possible results, based on specific features it extracts from the data. This may help us for example to find relevant articles.
- **Network analysis (graphs)** by checking connections in the dataset such as citation links you can identify important, similar or additional information.
- **Natural Language Processing** tries to understand the meaning of text and reduce it to basic concepts, which may then be used to compare texts on a conceptual level or may help in creating meaningful abstracts.

Who will benefit from using these tools?

Depending on your expertise or position in the research cycle, you may have different requirements for literature research. While testing out tools, we try to discover for whom they are most beneficial. For example:

- As a young researcher, you may find it difficult to get to grips with a new field you have chosen for a Ph.D. Tools that give a clear overview and history of a subject may be very helpful.
- As a senior researcher, who has a limited amount of time available, it is nearly impossible to read up on current trends within your own field, let alone keep track of related scientific breakthroughs in other fields. You may need a tailored feed of the latest discoveries.
- If you apply for a grant, you may need to tell the story of how you stack up against the field as a whole or you might want to find research partners for a gap in the literature.

What is the aim and scope of this series?

This series strives to give you an overview and a basic understanding of the current AI tools for literature search. After reading the post, you will be able to use them in your own searches.

Most of the tools started out in the fields of medicine, social sciences and exact sciences for systematic reviews. As the publication culture in these fields is quite formalized and has an advanced infrastructure for disseminating literature, the focus will be primarily on these disciplines. However, where possible we will also explore the opportunities for the humanities. Every month we will highlight one or more tools and describe them with these main points of focus:

- 1) What does the tool do?
- 2) How can the tool be used? – Basic tutorials and examples
- 3) What are their advantages and disadvantages?
- 4) What is the underlying technology/method?

By taking the approach listed above we hope you will be interested to see how these methods might be incorporated into your work to make (re)search more enjoyable and efficient.

What's next?

In the first tool review, we will start with an application developed in Leiden: VOSviewer. It is one of the tools Nees Jan van Eck and Ludo Waltman created at the Center for Science and Technology Studies (CWTS). VOSviewer is a tool to visualize networks based upon text or bibliometric data. It is used a lot for getting overviews of research fields. Follow this blog for a detailed explanation and practical examples of VOSviewer and the other tools we will be highlighting!