

AI Tools for Systematic Review and Meta-Analysis

Overview

Conduct a Scoping Review

- Systematic reviews and meta-analyses can take a considerable amount of time to plan and complete.
- As a result, they are often outdated by the time they are published.
- Artificial intelligence (AI) tools can help combat these issues by automating some aspects of the work.
- AI tools include a range of technologies and approaches that enable computers to perform tasks that typically require human decision-making.
- AI tools are rapidly advancing, with new innovations and technologies emerging regularly.

Benefits

- Enhanced efficiency and speed
- Improved accuracy and reduced human error
- Increased productivity
- Reduced labor hours

Limitations

- AI does not fully replace human judgement.
- It is difficult to connect user input to AI output.
- Bad data produces bad results.
- The computational costs are high.

Literature Search

Tools like [Litsearchr](#) (an R package that leverages text mining to identify key terms and develop search strings for use in database searches) and [TerMine](#) (a software that uses machine learning to identify key terms in a text, ranking them by frequency and importance) use advanced text-mining (the process of extracting useful information and patterns from unstructured text; it turns raw text into structured data for insights and decision-making) techniques to identify critical terms and concepts, which are then used to create and refine search queries that are more likely to retrieve relevant studies.

Title & Abstract Screening

Tools like [Rayyan](#) (a software that uses AI to enhance title and abstract screening by predicting the relevance of articles based on initial user decisions) and [ASReview](#) (a software that uses machine learning to prioritize and classify research papers by relevance, improving its predictions as users screen more studies) leverage machine learning (a type of technology where computers learn from experience by using data to recognize patterns and make decisions or predictions on their own) to assist in the initial screening of studies by predicting the relevance of articles based on training data sets and user feedback.

Full-Text Screening

Though primarily designed for qualitative analysis [a method of analyzing non-numerical data (e.g., narratives, conversations, observations) to identify patterns and summarize individuals' experiences and perceptions] and text analysis (the process of analyzing text to extract meaningful information by analyzing words and phrases for themes, sentiments, or trends), tools like [Wordstat](#) (a software that extracts key terms, clusters, similar documents, and provides visualizations to identify relevant themes) and [QDA Miner](#) (a software that helps users organize, code, and visualize qualitative data) can assist with full-text screening by automating the extraction of key information and organizing text data for easier review and analysis.

Large language models (LLMs), like [ChatGPT](#) and [Google Gemini](#), offer powerful capabilities that can be leveraged across multiple tasks in research synthesis. As of this writing, no single app has emerged as the definitive best choice for these tasks. [MOSIC's Large Language Models for Research Synthesis](#) resource provides guidance on leveraging LLMs.