Systematic review tools integrated with AI for data extraction: Feature analysis

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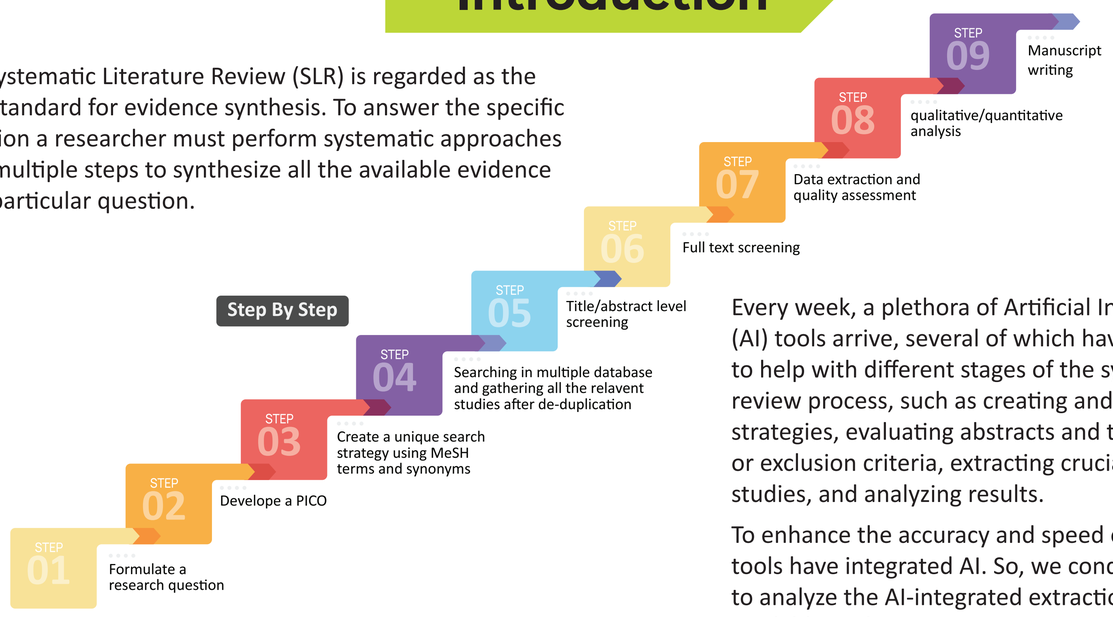
Introduction

The Systematic Literature Review (SLR) is regarded as the gold standard for evidence synthesis. To answer the specific question a researcher must perform systematic approaches with multiple steps to synthesize all the available evidence on a particular question.



Every week, a plethora of Artificial Intelligence (AI) tools arrive, several of which have a chance to help with different stages of the systematic review process, such as creating and honing search strategies, evaluating abstracts and titles for inclusion or exclusion criteria, extracting crucial data from studies, and analyzing results.

To enhance the accuracy and speed of extraction, the tools have integrated AI. So, we conducted a review to analyze the AI-integrated extraction features of the available tools.

Methods

- For this feature analysis, we identified the list of all the AI tools possible that are currently used in conducting SLR in two ways. 1) From the previously published literatures about SLR tools and 2) a Google search with a group of keywords “Systematic review tools”, “tools used for systematic literature review”. After the retrieval of the list of tools, we correlated with our inclusion criteria. We included any that were functioning web-based tools that require no coding by the user to install or operate, so long as they were used to support the SR process and can be used to review clinical or preclinical literature. No coding requirement was established because the target audience of this review is medical researchers who are selecting review software to use; thus, we aim to review only tools that this broad audience is likely to be able to adopts.
- We evaluated the tools by visiting the individual websites of the tools and assessed for their integration with AI for data extraction part of SLR. This was carried independently by 2 reviewers, and all disagreements were adjudicated by a third.

Results

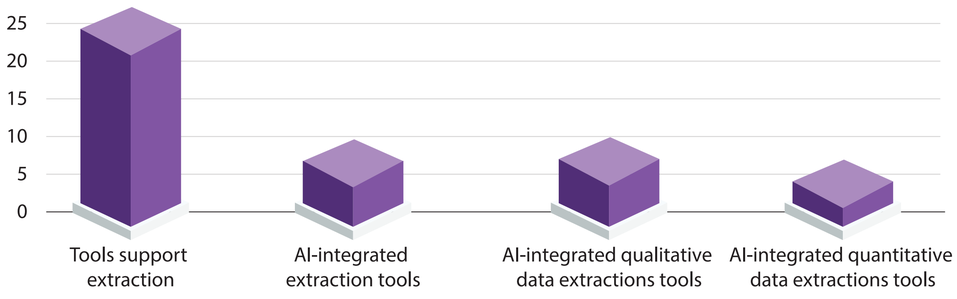
We retrieved the names of 26 AI-based SLR tools from our different search strategies. Out of the 26 tools included, 24 have features to perform data extractions, but only 6 tools (Iris.ai, Nested Knowledge, Pitts.ai, RobotReviewer, Laser.ai, and Easy SLR) integrated AI into the data extraction. Remaining tools have the feature to perform extraction in a manual way. Some of the tools like DisttellerSR provides you a dignified space to create table and everything, but in a manual way.

The Nested Knowledge and Pitts AI tools have integrated with ChatGPT for data extraction. These two tools have been integrated to AI to extract qualitative data in an efficient by its integration with ChatGPT.

Iris AI provides that it will automatically extract and systematize any key data points from text and tables into a table layout of your own design, while RobotReviewer is used for automatic data extraction from CT.gov of qualitative variables.

Most of the AI-integrated tools have explored the qualitative extraction of data like demographics (title, author, study start and end, male and female, etc.) and are still in the development of quantitative extraction.

S.No	Tools used	Source link (url link)	extraction (yes/no)	qualitative (yes/no)	quantitative (yes/no)	Supportive statement
1	Abstrackr	http://abstrackr.cebm.brown.edu/review/create_new_review	No	-	-	-
2	ASReview	https://asreview.nl/about/	No	-	-	-
3	Colandr	https://www.colandrcommunity.com/how-to--guidance.html	No	-	-	-
4	Covidence	https://www.covidence.org/reviewers/	No	-	-	-
5	DistillerSR	https://www.distillersr.com/products/curatorcr-evidence-management	No	-	-	-
6	EPPI-Reviewer	https://eppi.ioe.ac.uk/cms/Default.aspx?tabid=2914	No	-	-	-
7	FAST2	https://www.fast2.tech/product/	No	-	-	-
8	Iris.ai	https://iris.ai/features/	Yes	Yes	yes	Automatically extract and systematize any key data points from text and tables into a table layout of your own design
9	LitSuggest	https://www.ncbi.nlm.nih.gov/research/litsuggest/	No	-	-	
10	Nested Knowledge	https://nested-knowledge.com/	Yes	Yes	No	Powered by GPT-4, Nested Knowledge has tailored the tool to benefit the user during the data extraction process. This tool provides valuable suggestions and cuts the time required to extract significantly
11	PICOPortal	PICO Portal	No	-	-	
12	pitts.ai	https://pitts.ai/	Yes	Yes	Yes (male, female demos)	Using integration with Chat GPT (using OpenAI API), we make it possible to receive GPT-generated recommendations of values and sentences during data extraction for all sort of data items like population characteristics, percentage of men and women in a study, mean age of the participants in the trial etc.
13	Rayyan	https://www.rayyan.ai/	No	-	-	
14	Research Screener	Research Screener	No	-	-	
15	RobotAnalyst	National Centre for Text Mining — NaCTeM — RobotAnalyst	No	-	-	
16	RobotReviewer/ RobotSearch	https://github.com/ijmarshall/robotreviewer	Yes	Yes	-	Automatic extraction of data from clinical trial reports RobotReviewer is a system for providing automatic annotations from clinical trials (in PDF format). Currently, RobotReviewer provides data on the trial PICO characteristics (Population, Interventions/Comparators, and Outcomes), and also automatically assesses trials for likely biases using the Cochrane Risk of Bias tool
17	SWIFT-Active Screener	https://www.sciome.com/swift-activescreener/	No	-	-	-
18	SWIFT-Review	https://www.sciome.com/swift-review/	No	-	-	-
19	SysRev.com	https://www.sysrev.com/	no	-	-	-
20	Laser ai	https://www.laser.ai/	Yes	Yes	-	Harmonise data extraction and reduce double work with custom templates that suit your needs. Quality assurance and data cleaning modules make your review audit-ready and transparent with a detailed project history.
21	Easy SLR	https://www.easyslr.com/	yes	yes	yes	Automated Data Extraction Automatically extract key data from studies and link it to highlighted sources for easy verification with our AI-powered tool.
22	iSLR	https://www.sorcero.com/solutions/intelligent-systematic-literature-review	No	-	-	-
23	SR accelerator	https://www.sr-accelerator.com/#/	No	-	-	-
24	Litstream	https://www.icf.com/work/research-evaluation/litstream-systematic-literature-review	No	-	-	-
25	JBI sumari	https://sumari.jbi.global/	No	-	-	-
26	Giotto compliance	https://www.giotto.ai/industries-overview#in_healthcare	No	-	-	-

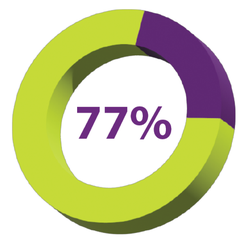


AI-based extractions tools

out of 26, 24 have features to perform data extractions, but only 6 tools integrates AI

Tools without AI-based extraction

20 tools don’t support AI based extractions



Discussion

- Depending on the breadth, technique, and resources available, a systematic review can take anywhere from six months to three years to complete, requiring an average of 67 weeks and a significant number of human resources from protocol registration to publication.
- The issues associated with AI-based data extraction include: 1) data quality extraction; 2) decision-making algorithm efficiency; 3) critical data extraction; 4) adaptation to many forms of literature; and 5) accountability.
- To ensure that all pertinent material is included in the systematic review, it might be required to overcome this difficulty by combining AI and human review.
- By doing so, it may be possible to guarantee that the review has all pertinent data and that the extractions are trustworthy and correct. An alternative strategy is to utilize AI to extract data in standard formats from publications, and then human reviewers can confirm that the extractions are accurate and comprehensive.
- This can help to ensure that the extractions are accurate and reliable, and that all relevant data is included in the review.

Conclusion

- **The efficiency of data extraction for systematic reviews (SLR), which are essential for assembling the body of knowledge regarding the efficacy and safety of healthcare therapies, could be greatly enhanced by AI.**
- **Most of the tools integrate AI to accelerate the SLR process. But very few have explored the most time-consuming ‘data extraction’ part. Since the data reported in each study differs and the complexity varies, tools have explored only the extraction of qualitative information and are in the beta stage of exploring the quantitative part. Though integration of AI can improve the speed of the SLR process, it is evident that human intelligence plays a pivotal role in data extraction as AI tools need supervision**

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