Using automation tools to improve the speed of conducting a systematic review

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BACKGROUND

Systematic reviews (SR) are considered one of the best sources of evidence to inform evidence-based healthcare[1]. To improve the speed and quality of systematic review (SR) production, methodological innovations and automation tools have emerged to support many of the steps required to complete a SR. One of the first steps is to conduct a systematic search of the literature to identify relevant studies. Although guidance has long existed to assist the with the search process, there has been a lack of technological innovation in systematic searching. As the automation of the entire SR process increases[2], searching tools are starting to be developed and used more often, including the open access Systematic Review Accelerator[3] software developed at Bond University. This presentation discusses the use of searching tools to support SR searching in four key areas: word frequency analysis, search validation, search translation, and deduplication of search results. New developments in Bond's Systematic Review Accelerator (SRA) software will be presented in this context.

EXTENDED ABSTRACT

Search strategies are built using a range of methods, including the identification of key terms found in the titles and abstracts of articles known to be relevant. Word frequency analysis, or text mining, counts the number of times keywords appear in the title, abstract and keywords fields of articles to help identify key terms that can be used in a search strategy. The SRA is an example of a tool which automates this process[4].

Best practice in developing SR search strategies is to validate the search by ensuring that it finds all articles from a set of known relevant articles, called a validation set. Automated tools such as the Search Refiner being developed at the University of Queensland and the CSIRO now make it possible to map and examine the impact of individual search terms within a search. The degree to which search terms contribute to search efficiency can now be seen allowing the modification of searches to maximize recall (finding all relevant articles) and precision (minimizing irrelevant articles found).

After constructing a systematic search, it is important to translate that search to run in additional databases, for example Cochrane CENTRAL or Embase. Much of this work to date has been done manually or using simple techniques such as Word macros. The Polyglot Search Syntax Translator tool, part of the SRA, has been developed to automatically translate PubMed or Ovid Medline to multiple databases, taking much of the work out of this process[5].

After running a search in multiple databases there are always duplicated search results. Examining these results and removing the duplicates manually is a time-consuming process. The SRA is one tool which aids with this process by automatically removing the majority of duplicates with no concern that unique articles will be lost[6].

Automating the steps of systematic review production where possible is an important step in managing the increasing volume of published research and providing best evidence to inform decision making. In healthcare this has direct implications for patient outcomes. The tools described in this presentation help facilitate the transition to increased speed and quality in this type of research.

CITATIONS AND REFERENCES

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