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Opportunities and Limitations in the Use of AI to Assist With Data Extraction in Systematic Literature Reviews

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Background

Data extraction (DE) is the most time-consuming task within a systematic literature review (SLR) and high accuracy is crucial. We aimed to assess technical factors affecting DE efficiency by human researchers and evaluate how far AI tools can increase DE accuracy and speed.

Methodology

We used studies identified in a previous SLR, in three different formats:

- ***Conference abstracts (10 studies)***
- ***Editable pdfs (10 studies)***
- ***Non-editable pdfs (6 studies)***

We performed Data Extraction of these studies in the format that we would normally use in our SLR process.

In addition, we identified three well-known platforms which perform data extraction (***Elicit, Perplexity, PDF AI***) and tested whether they could extract the same data from the published studies to the same accuracy levels as researchers.

We extracted study details (location, year, inclusion/exclusion criteria, interventions, comparators etc.) and baseline characteristics for each of the studies.

Results

- When data extraction was performed by humans, the ***time*** required to extract data ***increased with increasing complexity*** of the publication format. (Figure 1)
- The ***AI platforms*** assessed were ***not able to complete data extraction successfully***, with the main issues being inconsistent or incomplete extraction. (Figure 2)

Figure 1

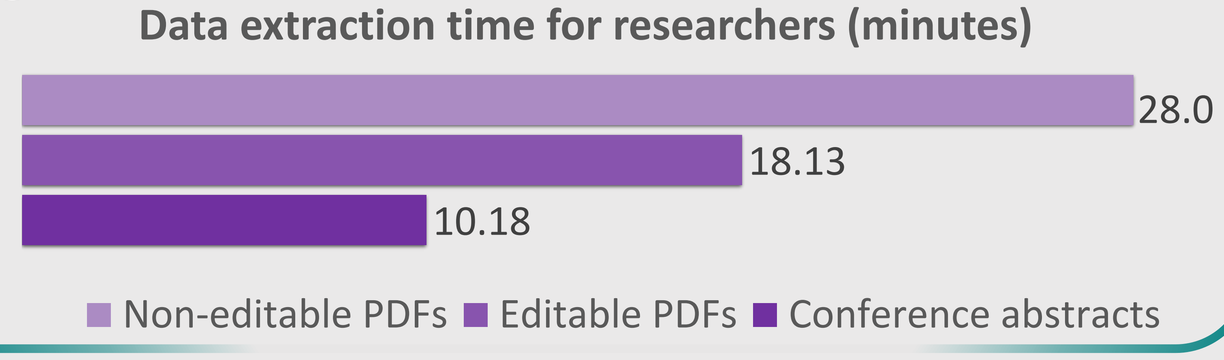

Figure 2

Elicit — https://elicit.com/, May 2024

Our experience:
- Allows the selection of bespoke categories.
- Data were extracted accurately and within seconds.

BUT
- Manual replication for each study.
- Export to .csv only with paid subscription.

perplexity — https://www.perplexity.ai/, May 2024

Our experience:
- A prompt was required to extract data from papers.

BUT
- Although some information was extracted correctly, parts of the output were fabricated.

PDF AI — Microsoft Excel add-in, May 2024

Inability to complete data extraction, as the Excel template provided, which was the same as the one used by the researchers, was unreadable by the platform.

Conclusions

- Despite the rapid evolution of AI tools, there are still limitations pertaining to their use, delaying their effective incorporation into the SLR process. These are mainly associated with the ***accurate data extraction from the papers*** and the ***flexibility*** of the AI platform that is needed to adjust to outcomes from the different research topics.
- Next steps aim to evaluate the ***potential use of ChatGPT in data extraction***, by comparing the accuracy of data extraction of the same studies included in the present work when extracted by humans versus ChatGPT.

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