Pilot study to evaluate efficiency of DistillerSR®'s artificial intelligence (AI) Tool over manual screening process in literature review

Kamra S, Hyderboini R, Sirumalla Y, Venkateswara Rao J, Chidirala S, Dabral S, Gogna S, Mandlik R, Goyal R

IQVIA, India

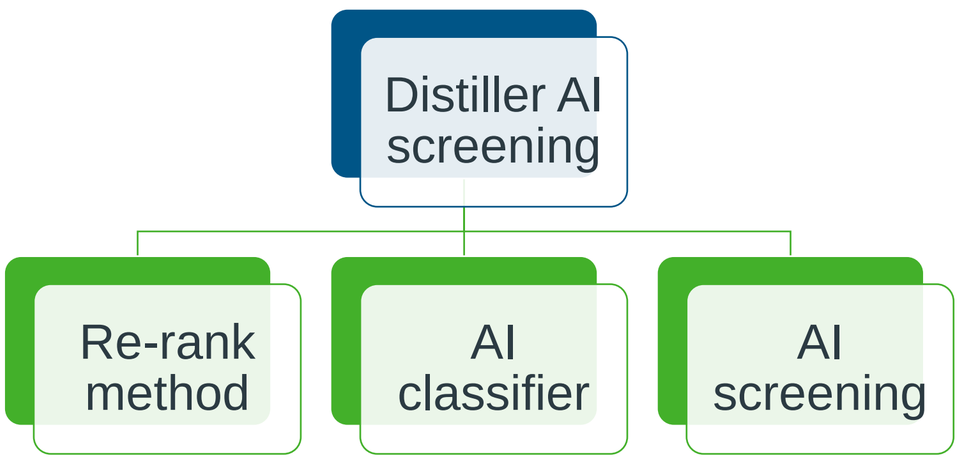
Background and objectives

- Although systematic reviews are the cornerstone of evidence-based medicine, they are time consuming and there is growing demand to produce evidence more quickly, while maintaining robust methods[1].
- Therefore, this research aims to compare the efficiency (speed and accuracy) of title/abstract (Ti/Ab) screening between manual approach and semi-automated approaches of DistillerSR®.

Methodology

- Embase® electronic database using OvidSP® was searched on 26 August 2021 from 2018 to assess efficacy and safety of anti-tumor necrosis factor (TNF) agents and their biosimilars in adult patients with ulcerative colitis (UC).
- Identified references were screened using manual screening method and three approaches of DistillerSR® (Figure 1)

Figure 1: Different screening approaches of DistillerSR®

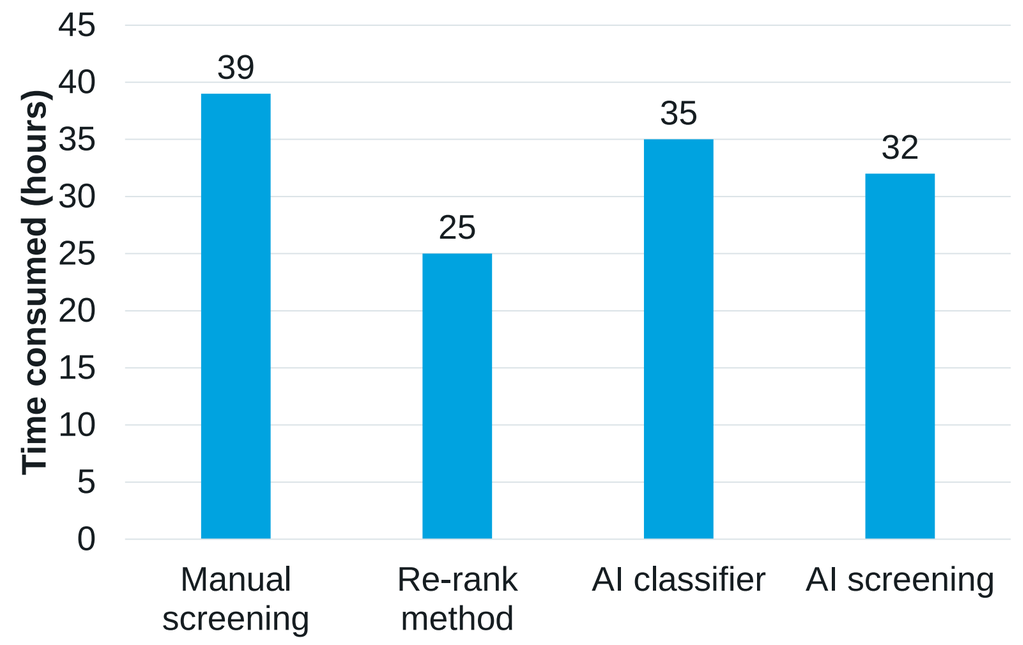


- **Manual screening** was done by a single reviewer in MS Excel®.
- **Re-rank** method includes reviewing references until 95% or more of includes are found. Then AI Review bulk excludes the remaining references based on the highest remaining score.
- **AI classifier**: An include/exclude classifier (similar distribution) using sample dataset (~400 references) was created to train classifier. Validity of classifier was confirmed using F1 score.
- **AI screening**: Distiller AI was trained with ~300 references (using quality checked Ti/Ab screening). AI feature generated "AIReview score" for individual references and screened the remaining references.

Results

- Overall, 1257 references were screened using aforementioned methods.
- Time consumed for screening the references was least using re-rank method followed by AI screening method, AI classifier and manual approach (Figure 2).
- However, the accuracy of screening could not be calculated using the re-rank method as this method trains the machine to screen the included references first and then bulk exclude the remaining references. Th re-rank method is considered the best way to screen references.

Figure 2: Time consumed using various approaches



- In terms of accuracy, AI classifier method was more accurate than AI screening method for screening such a small sample (Figure 3 and Figure 4).
- The percentage of critical error was also more using the AI screening method than the classifier method.

Figure 3: Accuracy using AI classifier screening

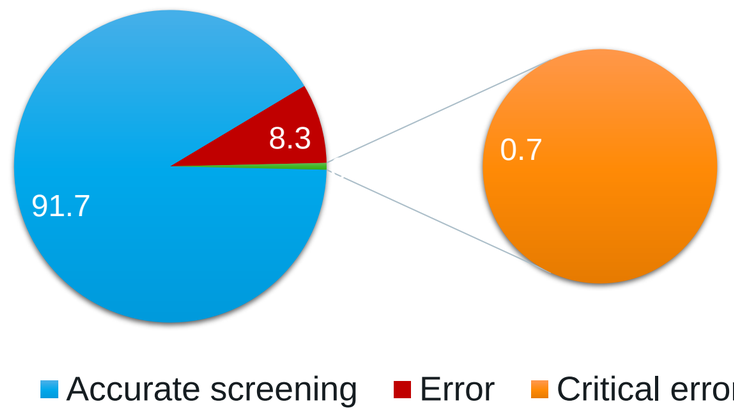
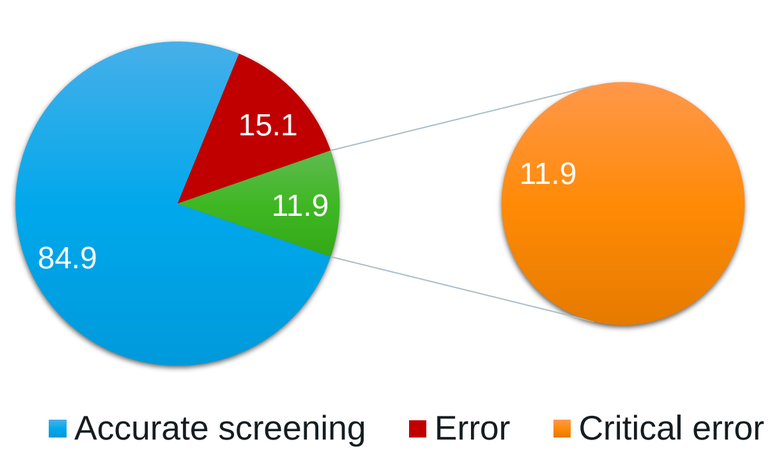


Figure 4: Accuracy using AI screening



- Overall, different screening methods should be chosen based on number of references to screen and complexity of eligibility criteria.
- In our pilot study of UC, we found a lot of references focusing on crohn's disease as both UC and Crohn's disease (CD) fall under inflammatory bowel disease (IBD). As a result, the training of the DAISY-Classifier was conducted multiple times to differentiate between UC and CD, and to include IBD articles. Therefore, one should always be aware of challenges in the project and train the classifier on specific aspects.

Conclusion

- Findings of our pilot study suggested that Distiller's re-rank report is the most efficient for screening less than 5,000 references as it is one of the dynamic models.
- AI classifier and AI screening methods use static models and are not relevant for screening less than 5,000 references.
- However, the results are subjective and cannot be generalized. Further research with different scenarios and larger datasets (>5000 references) are required to support the current evidence.

Source: [1]Hamel C, Hersi M, Kelly SE, Tricco AC, Straus S, Wells G, Pham B, Hutton B. Guidance for using artificial intelligence for title and abstract screening while conducting knowledge syntheses. BMC medical research methodology. 2021 Dec;21(1):1-2.

Virtual ISPOR 2022 – 15-18 May 2022. Contact Sheily Kamra