Systematic Literature Review – *An Example*

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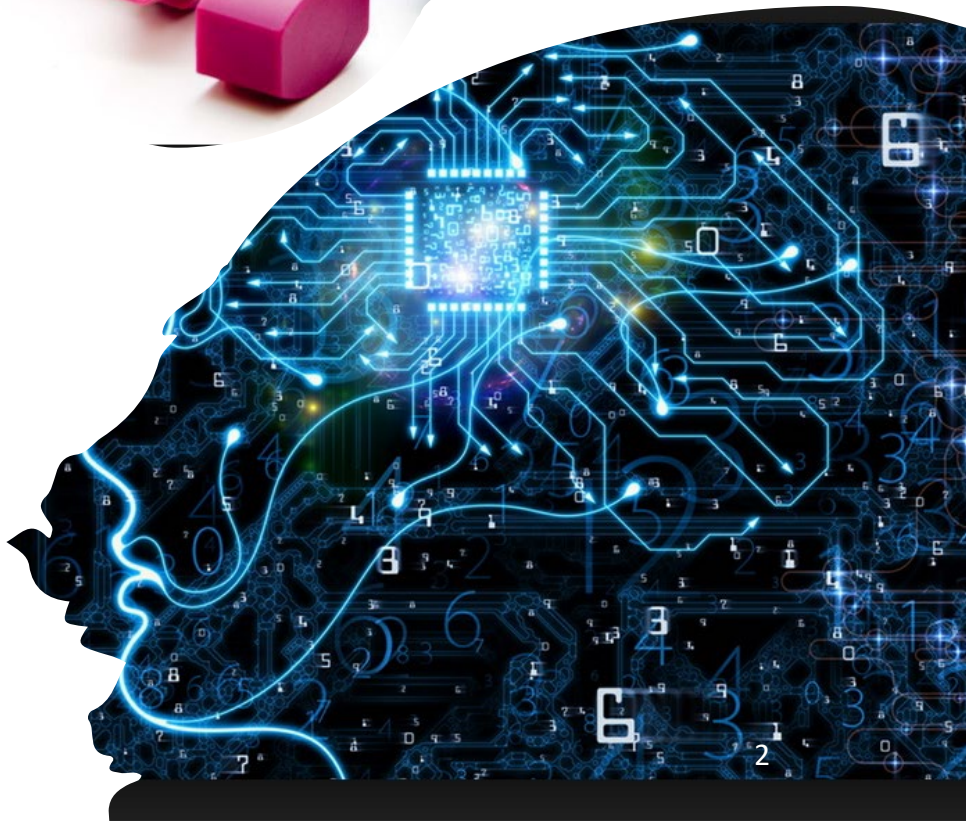
Review Title

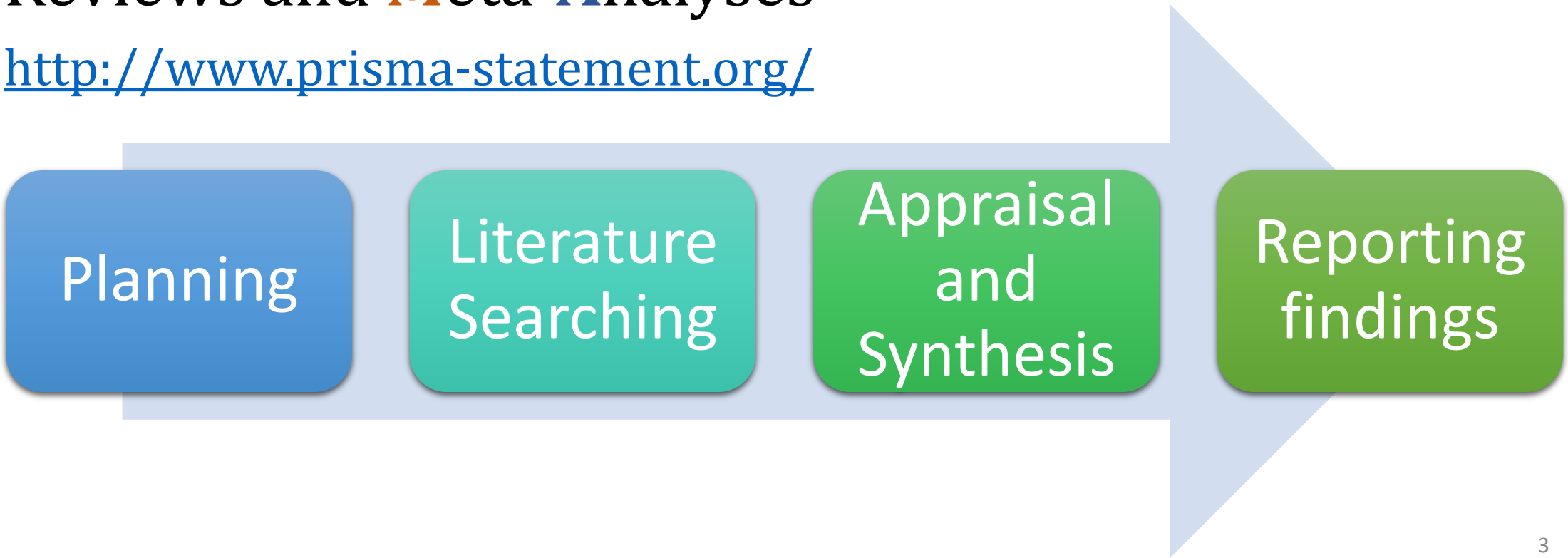
Investigating machine learning techniques for predicting risk of asthma exacerbations: A systematic review



PRISMA Methodology

PRISMA - **P**referred **R**eporting **I**tems for **S**ystematic Reviews and **M**eta-**A**nalyses

http://www.prisma-statement.org/



Planning

Formulating the review question

How do machine learning techniques perform in predicting the risk of asthma attacks?

Deciding the review criteria

- Search Strategy
- Main outcomes
- Risk of bias assessment

Planning ctd.

Developing a search strategy

Databases

Medline, Cochrane, Google Scholar, Embase, IEEE Xplore

Search Keywords

Asthma AND (attack OR exacerbat* OR control* OR symptom*) AND (detect* OR predict* OR diagnos* OR manag*) AND ("artificial intelligence" OR AI OR "machine learning" OR "deep learning" OR "neural network" OR computer-based OR "computer based" OR computer-assisted OR "computer assisted" OR "computer technology" OR technology)*

Planning ctd.

Developing the review protocol

Developing and registering the review protocol.

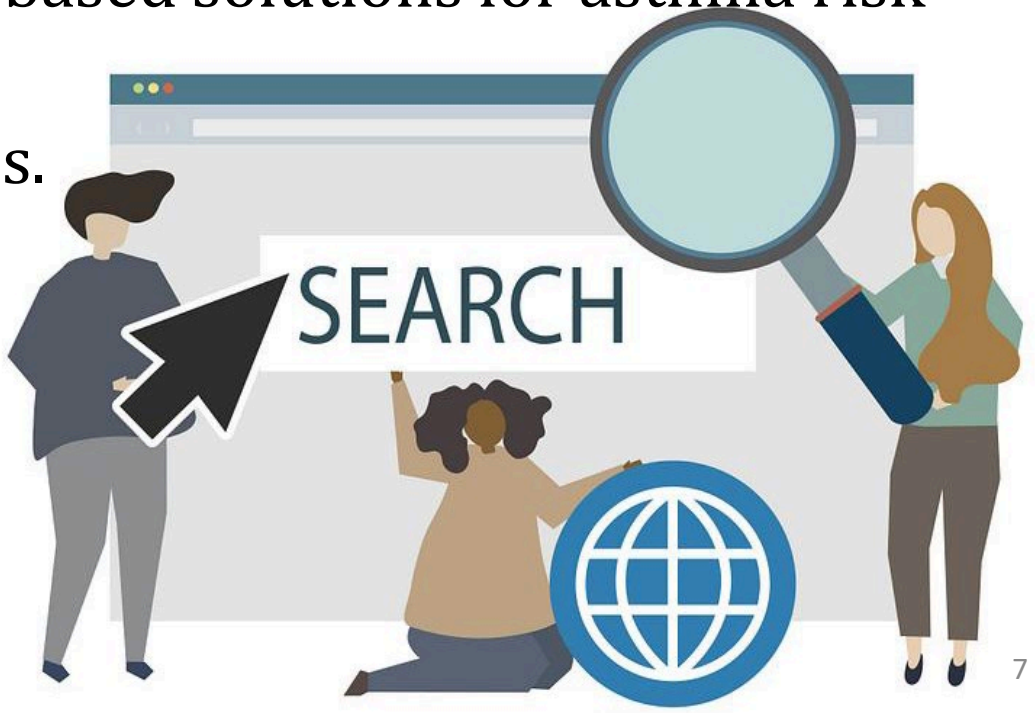
https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=402178

Literature Searching

Study Selection

Inclusion Criteria

- Primary studies of machine learning-based solutions for asthma risk prediction in adults and children
- Studies published from 2010 onwards.
- Available in English language



Literature Searching ctd.

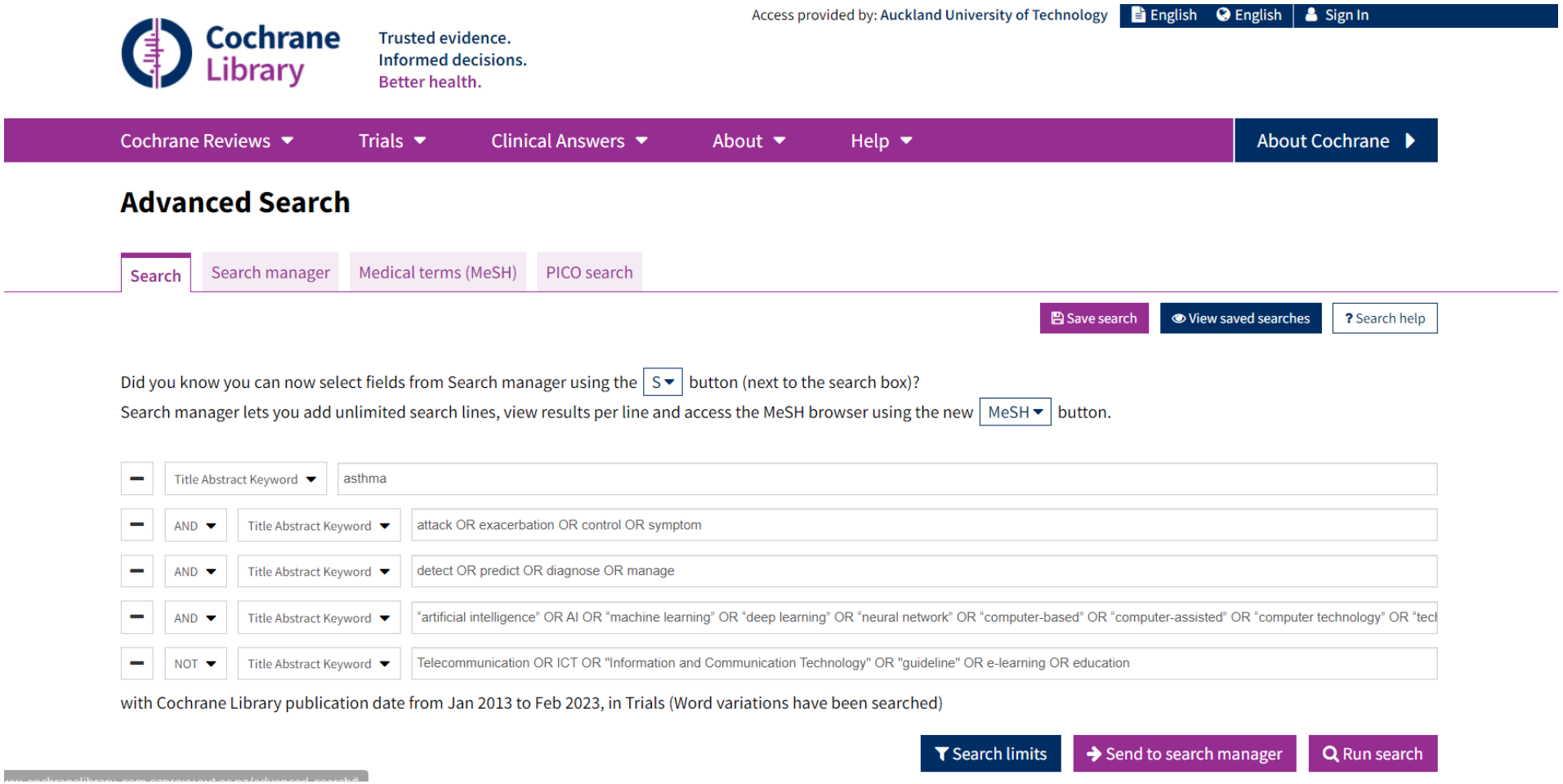
Study Selection

Exclusion Criteria

- Studies that focus on the diagnosis/prediction of asthma itself (as a condition) rather than asthma exacerbations.
- Studies focusing on predicting asthma symptoms/control/severity level, number of ED visits, and Peak Exploratory Flow Rate (PEFR)
- Reviews, systematic reviews, editorials, letters, comments to the editor, book chapters, abstracts, conceptual papers, opinions, unavailable sources, protocols, commentary, and unpublished full-text documents.

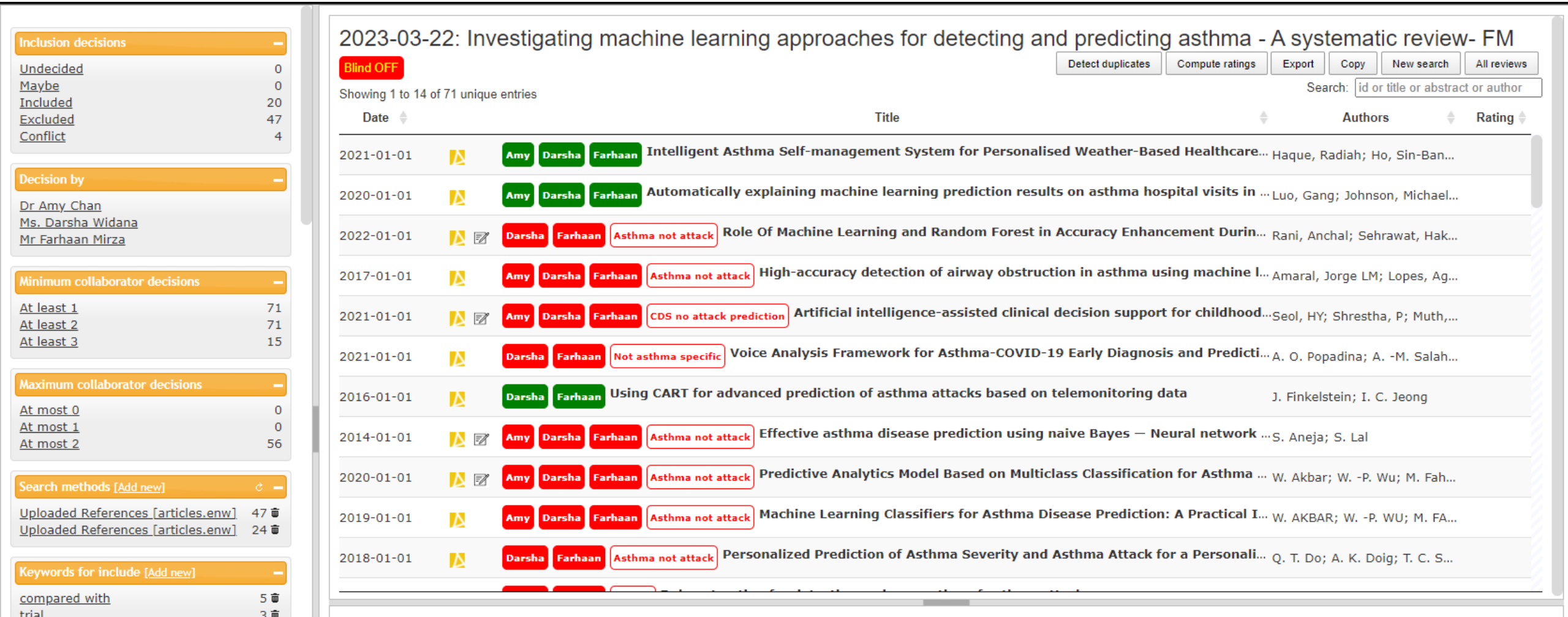
Literature Searching ctd.

Searching databases



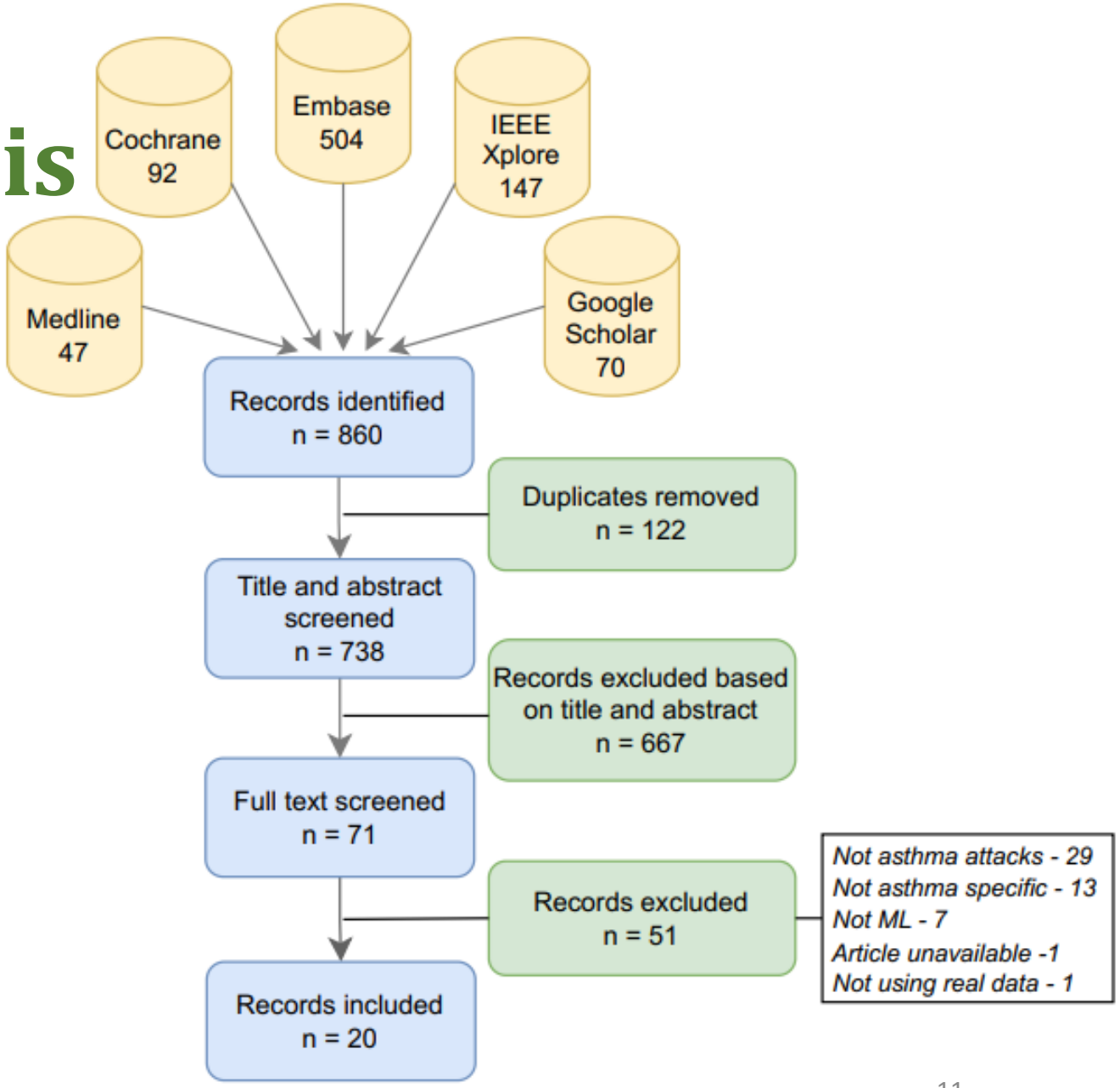
Appraisal & Synthesis

https://www.rayyan.ai/



Appraisal & Synthesis

PRISMA Flow Diagram



Appraisal & Synthesis ctd.

Risk of bias assessment

CASP-Critical Appraisal Skills Programme

https://casp-uk.net/casp-tools-checklists/

Appraisal & Synthesis ctd.

Synthesised studies **based on the characteristics of the outcome** of the different machine learning models.

- Predicting the risk of asthma attacks as a classification
  - Predicting the risk of asthma attacks with a prediction window
    - Predicting risk of asthma attacks with a prediction window of less than a month
    - Predicting risk of asthma attacks with a prediction window of more than a month
  - Predicting the risk of asthma attacks without a prediction window
- Predicting the risk of asthma attacks as a probability

Report Findings

- Writing the review paper and publishing

Darsha Jayamini, W.K., Mirza, F., Asif Naeem, M. et al. Investigating Machine Learning Techniques for Predicting Risk of Asthma Exacerbations: A Systematic Review. J Med Syst 48, 49 (2024). https://doi.org/10.1007/s10916-024-02061-3

Thank
you