Reducing Workload of Systematic Review Searching and Screening Processes

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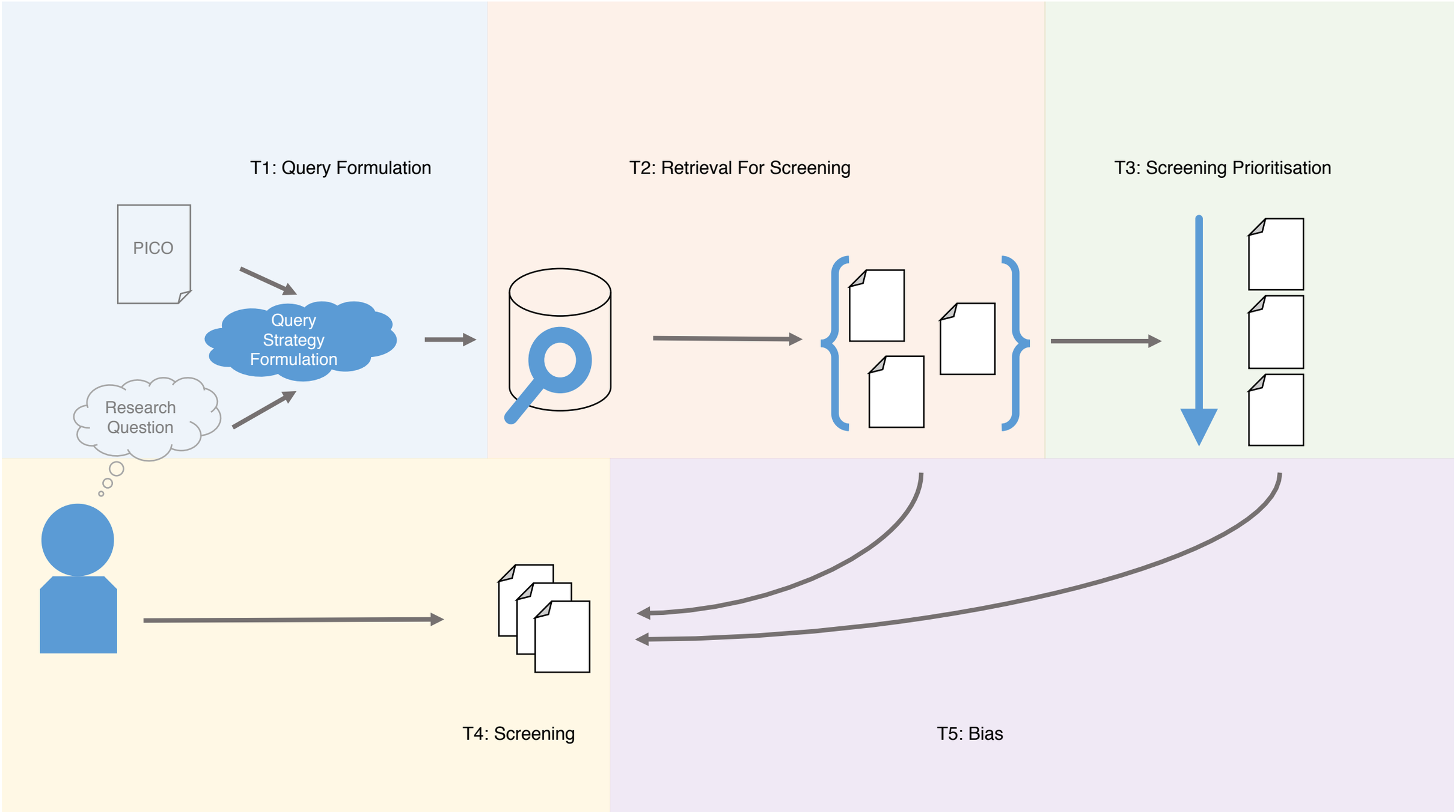
Systematic Reviews

- **Exhaustive** literature review
  - Single, focused research question
  - Synthesis of entire relevant literature
- **Extensive** use in medicine
  - Guide clinical decisions
  - Inform policy

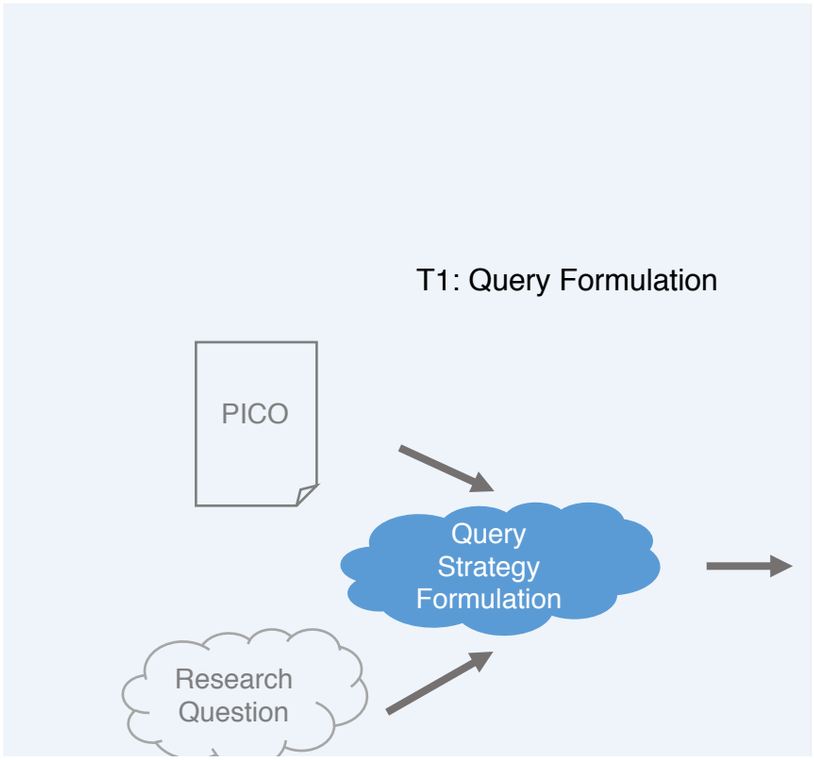
Challenge

- Systematic reviews are highly **time consuming** to produce
    - Highest workload associated with the *searching* and *screening* processes
        - Researchers manually analyse thousands (sometimes hundreds of thousands) of medical studies
- How do we **reduce the workload** associated with these two processes?
- *How well can the searching and screening processes be automated?*

Research Questions & Tasks



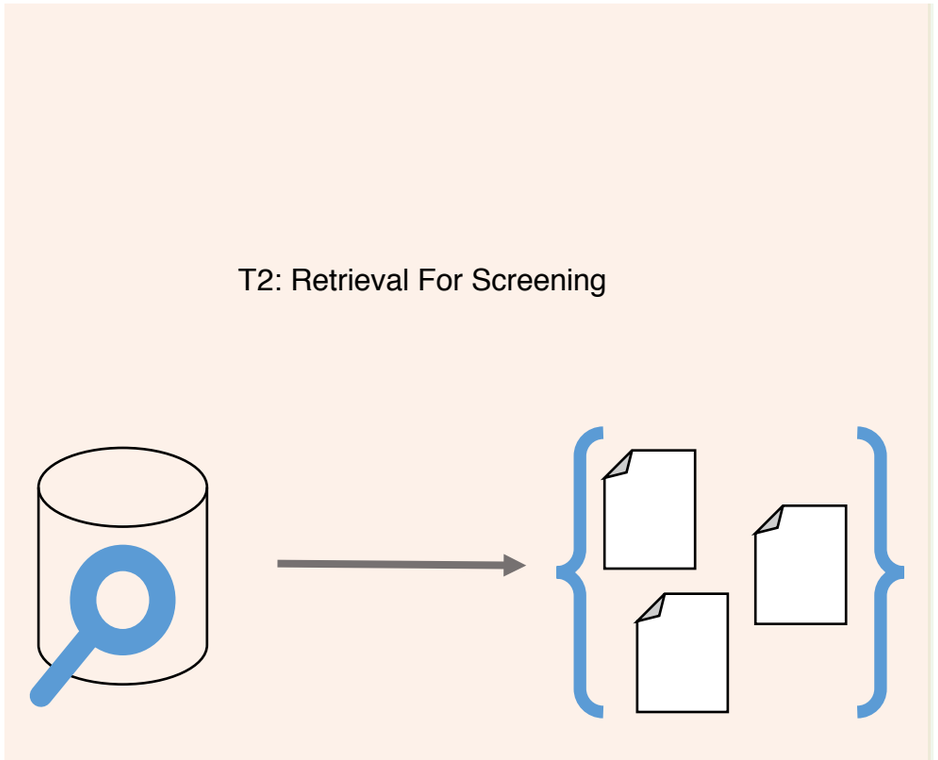
Research Questions & Tasks



- Investigating the usefulness of **domain specific features**
- Evaluate and measure the **effectiveness of search strategies**
- Exploring difference **QPPs**

RQ1: How can the effectiveness of a search strategy be measured and predicted, and can this be used to suggest better search strategies?

Research Questions & Tasks



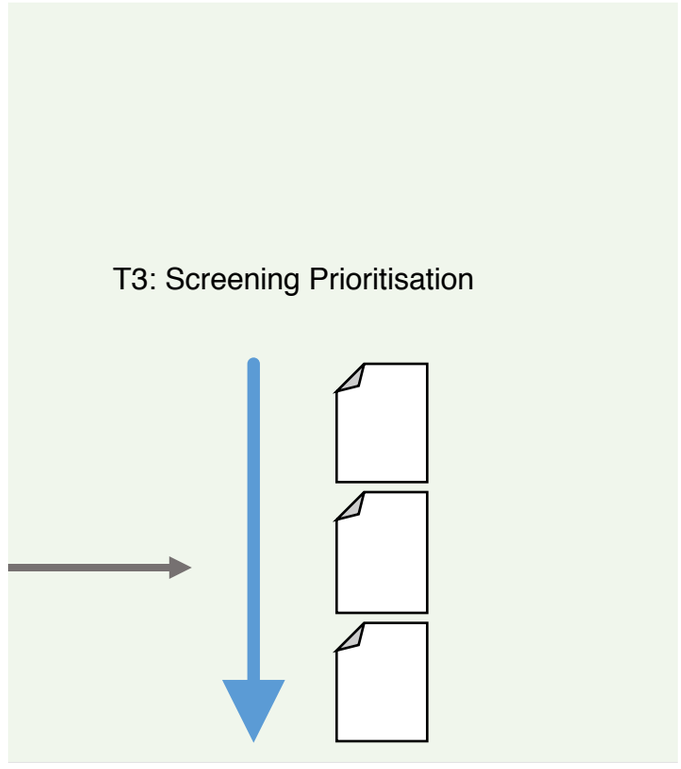
RQ2: How can the workload of the searching and screening processes be reduced and how can this be measured?

- Investigating systems for medical **citation retrieval**
  - Exploiting **document structure & fields**
- Preliminary experiments show domain specific features for search have **significant impact**

Research Questions & Tasks

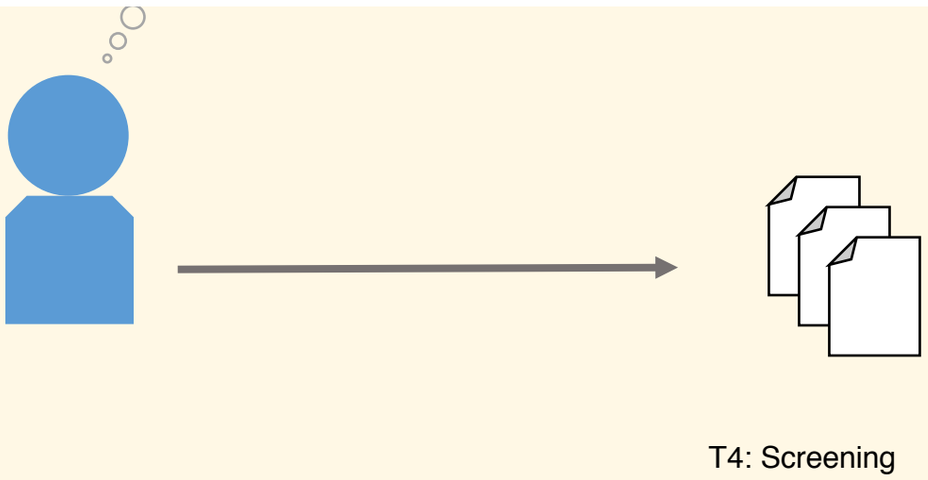
- Enabling reviews to screen and include the most **relevant studies faster**
- Exploit domain specific field statistics and ontologies as features for **learning to rank**
- **Active learning feedback** to build a learning to rank model

RQ3: How can ranking be applied to assist reviewers prioritise citations in the screening process?



Research Questions & Tasks

- Investigating the use of a **stopping point** for when a reviewer should stop looking at citations
- May exists a point in a ranked list when continuing down **does not provide any more citations** to be included
- Exploring how to **predict this point**



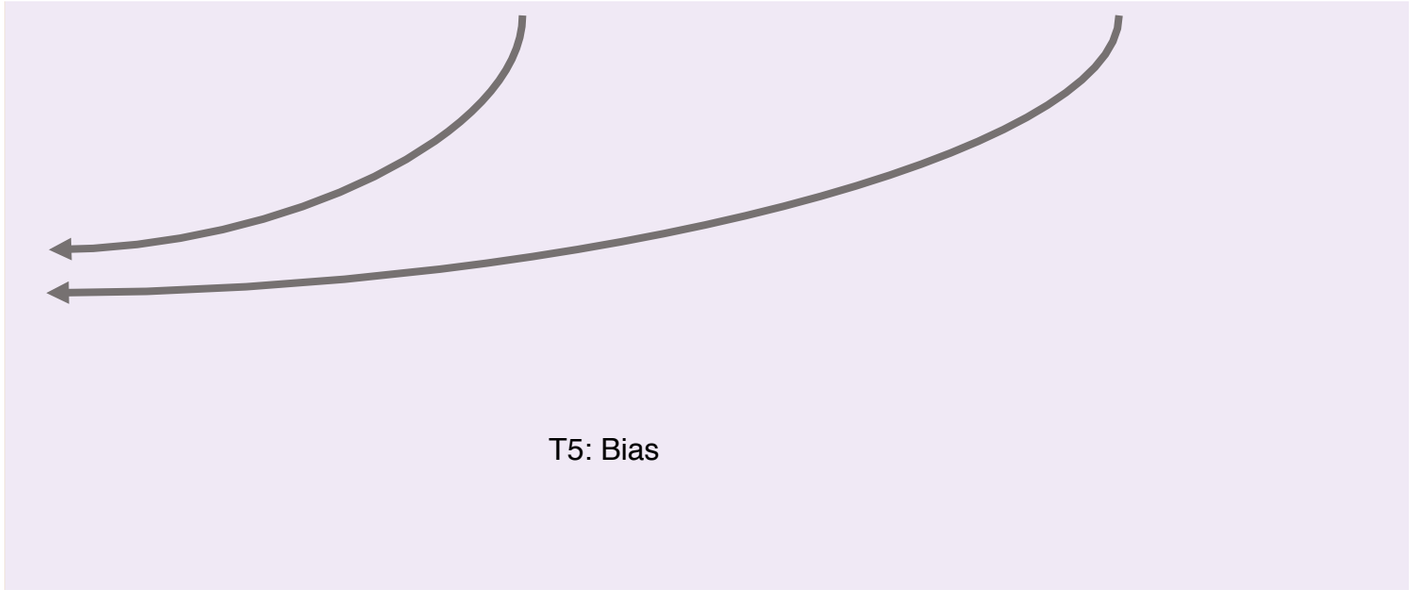
T4: Screening

RQ4: Can query and document statistics be used to estimate a cutoff for the screening process?

Research Questions & Tasks

- It is unclear whether a search strategy can be formulated to **purposefully omit strategies**
- Must perform a **similar search** to determine if this is the case - to ensure reproducibility
- Investigate **retrievability** of a query to attempt to uncover these biases

RQ5: How can search strategies be formulated to bias a systematic review?



Objectives

1. Create a test collection for evaluation
2. Produce models and algorithms for reducing workload
3. Understand structure of a search strategy
4. Detect biased search strategies

Objectives

1. Create a test collection for evaluation

- Existing collections are **insufficient**
- Earlier this year my test collection was published in SIGIR
  - Contains 94 PubMed and Medline queries
  - Uses the entire 26 million PubMed collection for experiments
- Similar collection also published for CLEF task
  - Less queries
  - Focusing on specific type of systematic review

Objectives

1. Create a test collection for evaluation

2. Produce models and algorithms for reducing workload

- Investigate existing information retrieval techniques to apply to this domain
- Have started to investigate **learning to rank** for re-ranking, published in CLEF

4. Detect biased search strategies

Objectives

1. Create a test collection for evaluation
2. Produce models and algorithms for reducing workload
3. Understand structure of a search strategy

- Investigate what makes a good search strategy
- **Query suggestion** - Offer researchers better, more effective queries

Objectives

1. Create a test collection for evaluation
2. Produce models and algorithms for reducing workload
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4. Detect biased search strategies

- Search strategies that omit studies can have a **negative impact**
  - Serious impact when informing clinical decisions
- Example: a study on the effects of smoking fails to include publications relating to the negative effects smoking has on the lungs
  - This makes the review **bias**

Wrap-up

- Investigating many open and unconsidered questions
- Potentially massive cost and time savings
- Accelerate medical systematic review searching and screening

- Faster time-to-publication of systematic reviews

- More accurate clinical decisions

- Higher quality patient outcomes

Questions


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