Grimjack at Touché 2022

Advanced IR, Winter Semester 2021/22

Johannes Huck Jan Heinrich Reimer

Martin Luther University Halle-Wittenberg

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Task at hand

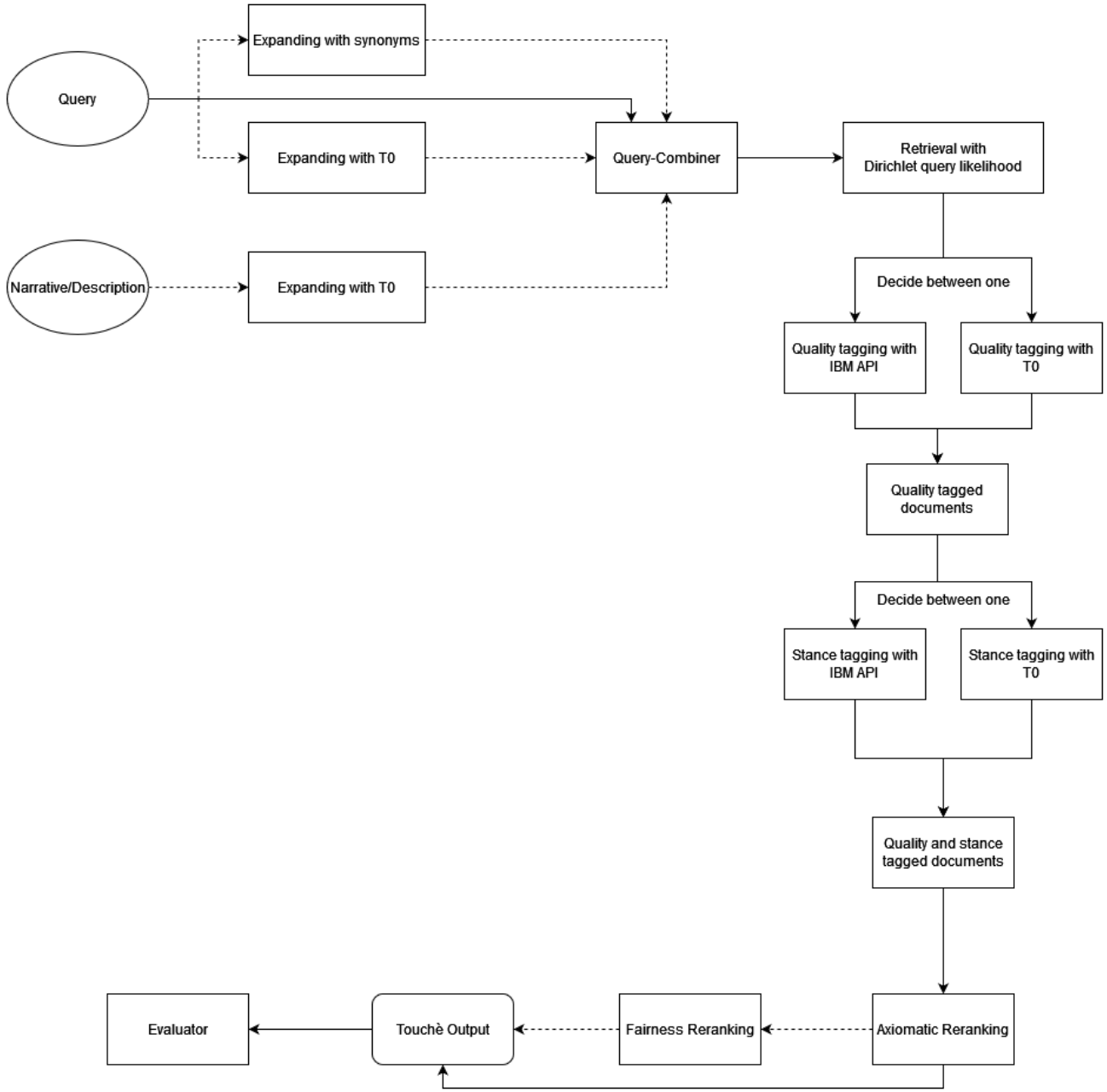
- Task 2 of Touché: Argument Retrieval
- Argument Retrieval for Comparative Questions
- Task: Retrieve relevant passages to answer comparative questions and detect their stance w.r.t the objects
- Data: > 1 million text passages from the ClueWeb

https://twitter.com/webis_de/status/1468529926026534913

General approach

- Python interface
  - Easy to use
  - High readability
  - Many IR libraries available
- Three modules: search, run file (batch retrieval) and evaluation
- Pipeline consists of
  - Query-expander and Query-combiner
  - Initial retrieval
  - Argument quality and stance tagging
  - Reranking
- Indexing and initial retrieval via Pyserini [Lin+21]

Pipeline


Query
Expanding with synonyms
Expanding with T0
Narrative/Description
Expanding with T0
Query-Combiner
Retrieval with
Dirichlet query likelihood
Decide between one
Quality tagging with
IBM API
Quality tagging with
T0
Quality tagged
documents
Decide between one
Stance tagging with
IBM API
Stance tagging with
T0
Quality and stance
tagged documents
Axiomatic Reranking
Fairness Reranking
Touchè Output
Evaluator

Query-Expander and Query-Combiner

- Expanding queries with synonyms of comparative objects
- Two different approaches
  - Based on embeddings with GloVe
  - Based on T0 language model [San+21]
  - We ask: `What are synonyms of the word <token> ?`
- With T0 extract new queries from narrative and description
- We ask: `<text> Extract a natural search query from this description.`
- Combine all new queries with OR
- Retrieve ranked list of passages with this new query

Argument quality tagging

- Extract arguments with TARGER [Che+19]
- For each argument we want to know the quality w.r.t the topic
- Two different approaches
  - Based IBM Debater API [Tol+19]
  - Based on T0
  - We ask: `<sentence> How would you rate the readability and consistency in this sentence? very good, good, bad, very bad`
- IBM Debater API returns a score between 0 and 1
- 0 means lowest quality and 1 highest quality

Example

Arg: Cars should only provide assisted driving, not complete autonomy
Topic: We should further explore the development of autonomous vehicles
Score: 0.7256

Argument stance tagging

- Next we want to know the stance w.r.t the topic
- Two different approaches
  - Based on IBM Debater API [Bar+17]
  - Based on T0
  - We ask: `<sentence> Is this sentence pro/against <comparative_object>? yes or no`
- It is also possible to expand with sentiments
- Both approaches only work for single target stance
- Calculating the multi target stance
  - Calculate the difference between objects
  - Use a threshold
  - Convert T0s output into a numerical representation

Axiomatic Reranking

- Compute preferences between documents ($\triangleq$ axioms)
- Multiple axioms vote against the original ranking
- Rerank with KwikSort [Hag+16]

Argumentative Axioms

ArgUC Prefer more argumentative units [Bon+18]

QTArg Prefer more query terms in argumentative units [Bon+18]

QTPArg Prefer earlier query terms in argumentative units [Bon+18]

aSL Prefer sentences with 12–20 words [Bon+21]

CompArg Prefer more comparative objects in argumentative units

CompPArg Prefer earlier comparative objects in argumentative units

ArgQ Prefer higher argument quality

Fairness Reranking

- Idea: prefer subjective arguments over neutral arguments
  but guarantee fair exposure for each stance (pro/con)
- Alternating stance
  - Three filtered lists by stance: first, second, neutral/other
  - Alternately select from first/second list
  - Fallback to neutral list if first/second list is empty
- Balanced top-k stance
  - Count number of documents pro first or pro second in top-k ranking
  - If first - second > 1:
    Move last pro first document from top-k ranking
    after the first pro second document after top-k ranking

Evaluation

- Use Qrels from Touché 2020/2021
- Problem: recent years used whole documents, we're retrieving passages
- If a document is relevant all of its passages are relevant
- Map passage IDs to document IDs, only 13 % have judgements
- Underestimates performance

Final Remarks

- Approach is very flexible
- Influence of different components w.r.t the retrieval score
- Stance classification may be better with RoBERTa approach
- We cannot distinguish between neutral and no stance
- New argumentative axioms
- T0 solves a lot of IR tasks,
  but is T0 *all* you need for retrieval?

Thank you!

References

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