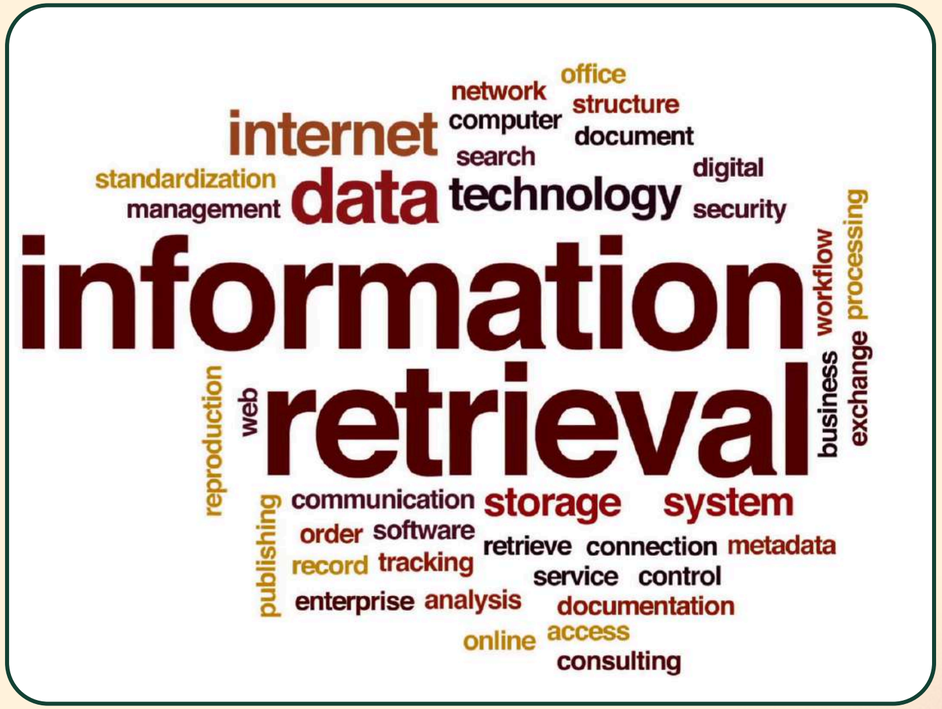
SE-PQA Dataset

Personalized Information Retrieval

Presentation by Andrea Scalora



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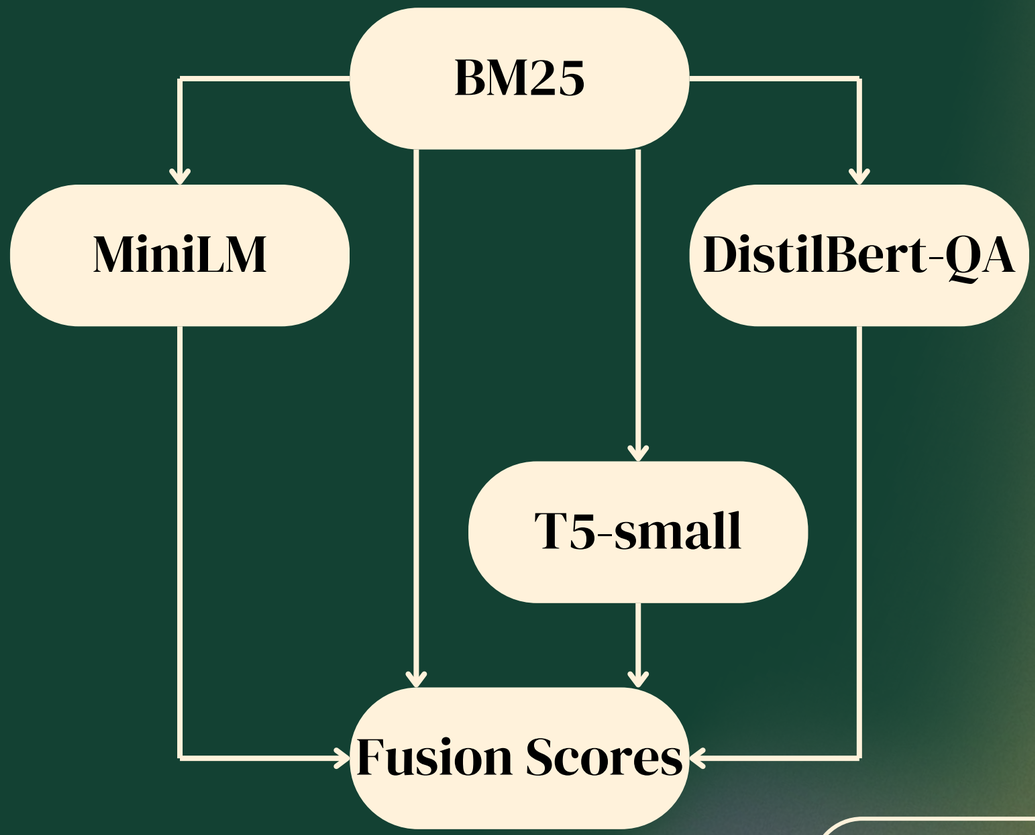
Objectives

01 • Enhance traditional retrieval methods using different approaches.

02 • Combining multiple retrieval scores.

Models



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BM25

- Robust baseline in information retrieval.
- Relies purely on statistical term matching.
- Grid Search used to ensure optimal *k1* and *b*.

Neural Rerankers

- Both capture semantic relationships between queries and documents.

MiniLM

- It generates efficient sentence embeddings.
- Small model size.
- Fast inference speed.

DistilBert-QA

- It generates sentence embeddings.
- Version of DistilBERT fine-tuned for Q&A.
- Slightly higher resource requirements.

T5-small

- Model to enrich user query.
- Tokens related to the user query.
- Grid Search used to optimise the maximum number of tokens added.
- Improves retrieval performance.

Fusion Strategies

RRF

- Computes a RRF score as 1 / (k + rank).
- Sum the RRF scores to obtain a final score.
- Boost consistently high-ranking documents.

Sum of Weights

- Combine scores using a weighted linear sum.
- Weights are chosen by empirical evaluation.
- T5 >> BM25 > MiniLM == Distilbert-QA.

Methodology

Data Preparation

- Preprocessing.
- Merging and Standardization.
- Index Construction.

Models Construction

- Baseline.
- Neural Re-rankers.

Query Expansion

- T5-small based.

Fusion Retrieval

- RRF Score.
- Weighted Sum Score.

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Results

- **BM25 Baseline**: Strong starting point for retrieval.
- **Neural Re-ranking**: The neural re-rankers did not outperform the baseline, possibly due to domain-specific factors.
- **Query Expansion**: Context added via T5 can help => tune to avoid introducing noise.
- **Fusion Strategies**: Combining multiple signals shows potential for modest improvements.

Models	P@1	recall@100	MAP@100	NDCG@3
BM25	0.71	0.93	0.77	0.77
MiniLM	0.63	0.85	0.69	0.69
DistilBert-QA	0.64	0.84	0.70	0.70
T5-small	0.72	0.93	0.78	0.77
RRF Fusion	0.66	0.93	0.72	0.71
Weighted Fusion	0.71	0.93	0.78	0.78

Table to show the results of each model.

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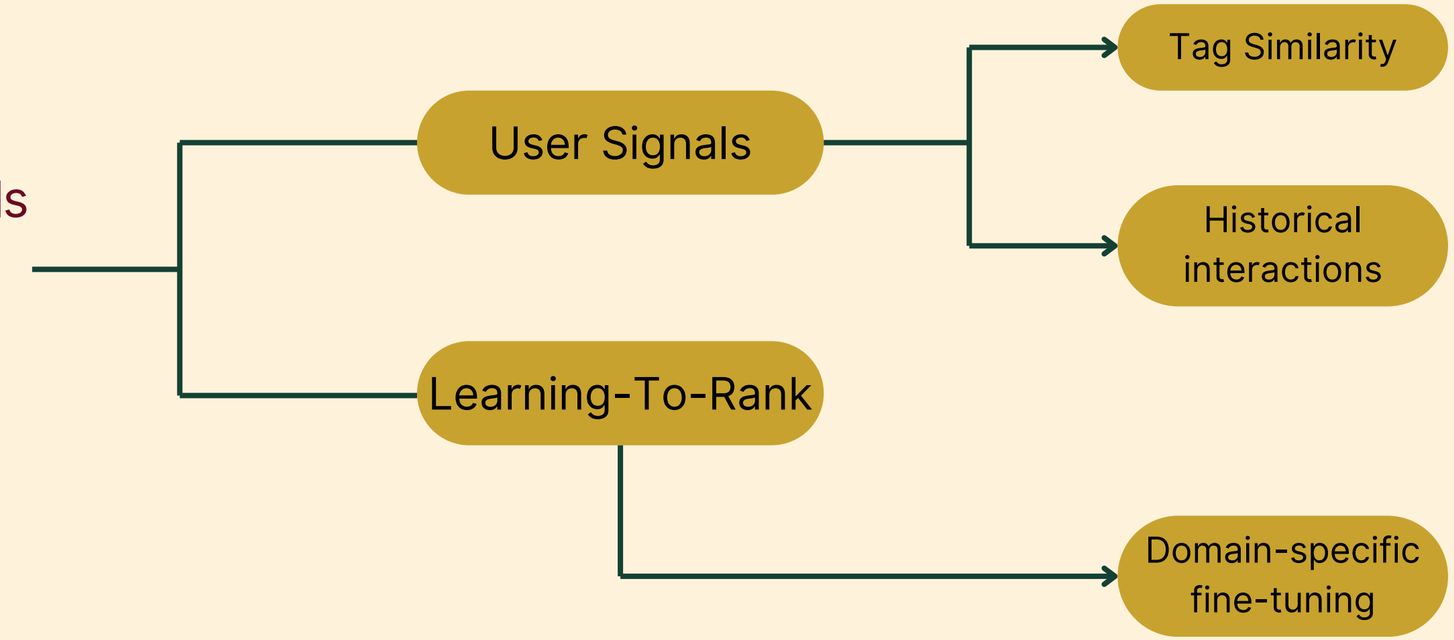
Future Improvements

Integrate additional Signals for a More Advanced Personalization System



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Thank You!

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