DCU at the NTCIR-12 SpokenQuery&Doc-2 Task

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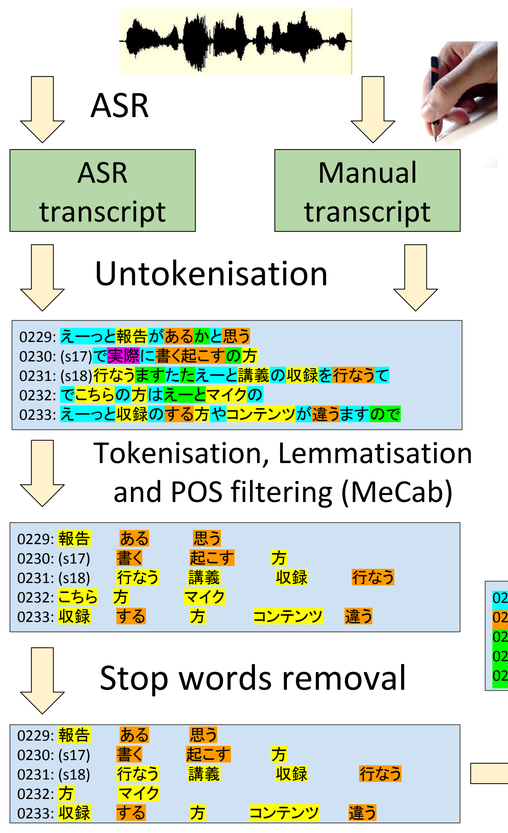
Introduction

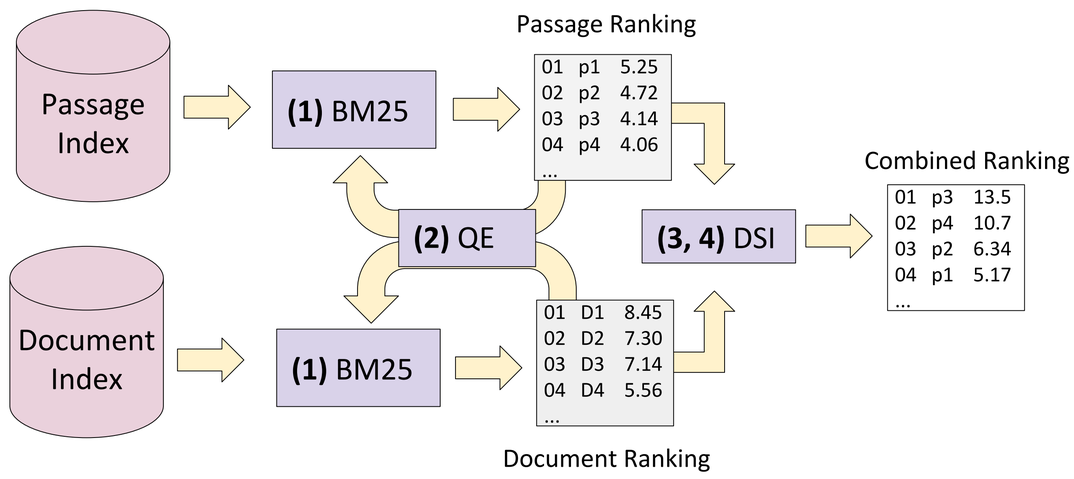
- DCU participated in the slide-group task to rank pre-defined passages in order of relevance to a spoken query.
- Passage ranking implemented by combining passage and document retrieval scores computed with Okapi BM25[1].
- Query expansion (QE) with pseudo relevance feedback (PRF).
- BM25 and QE parameters optimised to improve the ranking quality of passages and documents.

Motivation and Related Work

- Short passages are less redundant, thus considering a passage in the context of its document may improve its retrievability and provide robustness to ASR errors.
- Passages that share a document are more likely to be about similar topics.
- Previous work has shown that exploiting evidence from documents can improve passage retrieval effectiveness[2,3,4].

Data Processing





Q : query
D : document
p : passage
e : p or D
t : $term$
Q', Q_d, Q_p : expanded Q

Retrieval Models

(1) BM25 (baseline) $S_{BM25}(Q,e) = \sum_{t \in Q \cap e} w_e(t)$

(2) BM25 + QE $S_{BM25\text{-}QE}(Q,e) = S_{BM25}(Q',e)$

(3) Document Score Interpolation (DSI)
$S_{DSI}(Q,p) = \lambda S_{BM25}(Q,D) + (1-\lambda) S_{BM25}(Q,p)$

(4) DSI + QE
$S_{DSI\text{-}QE}(Q,p) = \lambda S_{BM25}(Q_d,D) + (1-\lambda) S_{BM25}(Q_p,p)$

Term weighting

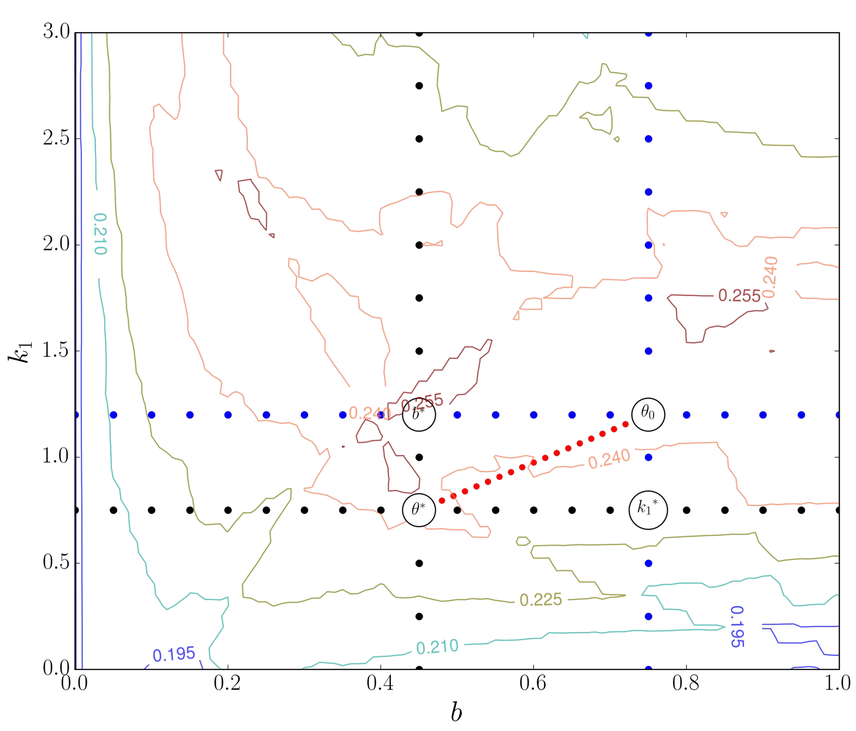
$$w_e(t) = \frac{(k_1+1)tf(t)}{tf(t)+k_1(1-b+b\frac{\text{docl}}{\text{avel}})} \frac{(k_3+1)qf(t)}{qf(t)+k_3} w_1(t)^d$$

$$RW(t) = \log \frac{(r_t+0.5)(N-R-n_t+r_t+0.5)}{(n_t-r_t+0.5)(R-r_t+0.5)}$$

Term selection in QE $OW(t) = r_t RW(t)$

Parameter Optimisation

- BM25 and QE parameter optimisation[5].
- Linear search method to maximise MAP given training queries.



Experiments and Results

- Train set: SpokenQuery&Doc-1 (SQD-1)
- Test set: SpokenQuery&Doc-2 (SQD-2)
- ASR = REF-WORD-MATCH transcripts.

Query	Doc.	Model	MAP	
			SQD-1	SQD-2
MAN	MAN	BM25	.241	.278
		BM25-QE	.262	.293
		DSI	**.330**	**.343***
		DSI-QE	**.387***	**.342***
MAN	ASR	BM25	.190	.212
		BM25-QE	.179	.217
		DSI	**.240***	**.279*^**
		DSI-QE	**.278***	.238
ASR	ASR	BM25	.178	.188
		BM25-QE	.183	.183
		DSI	**.253***	**.250***
		DSI-QE	**.299***	**.240***

Bold, *, and ^ mark significant differences w.r.t BM25, BM25-QE, and DSI-QE respectively @ 0.95 conf. level.

Conclusions

- Results reaffirm that passage retrieval effectiveness can be improved by incorporating document-level evidence.
- Score interpolation seems to be an effective technique to achieve this purpose.
- PRF and QE provide no significant gains in retrieval effectiveness in our retrieval set-up.

References

[1] S.E. Robertson, S. Walker, S. Jones, M.M. Hancock-Beaulieu, and M. Gatford. *"Okapi at TREC-3"*. Proc. of TREC-3, 1995.

[2] H. Nanjo, T. Yoshimi, S. Maeda, and T. Nishio. *"Spoken document retrieval experiments for SpokenQuery&Doc at Ryukoku University (RYSDT)"*. Proc. of NTCIR-11, 2014.

[3] S. R. Shiang, P. W. Chou, and L. C. Yu. *"Spoken term detection and spoken content retrieval: Evaluations on NTCIR-11 SpokenQuery&Doc task"*. In Proc. of NTCIR-11, 2014.

[4] P. Arvola, J. Kekalainen, and M. Junkkari. "*Contextualization models for XML retrieval. Information Processing & Management*", 2011.

[5] M. Taylor, H. Zaragoza, N. Craswell, S.E. Robertson, and C. Burges. "*Optimisation methods for ranking functions with multiple parameters*". In Proc. of CIKM'06, pages 585-593, 2006.

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