# Personalized query suggestion diversification in information retrieval

**Wanyu CHEN, Fei CAI,**
**Honghui CHEN, Maarten DE RIJKE**

Frontiers of Computer Science, DOI: 10.1007/s11704-018-7283-x

# Problems & Ideas

- Problems of improving the performance of query suggestion in Information Retrieval
  - Personalization
  - Diversification
- Ideas: Combining personalization and Diversification for query suggestion
  - Greedy Query Suggestion Diversification

    ↓

    Add user's long-term search history

    ↓
  - Personalized Query Suggestion Diversification

# Main Contributions

**Table 3: Performance of query suggestion models. The results produced by the best baseline and the best performer in each column are underlined and boldfaced, respectively. Statistical significance of pairwise differences (PQSD models vs. best baseline) determined by a $t$-test ($^{\blacktriangle}/^{\blacktriangledown}$ for $\alpha = .01$, or $^{\triangle}/^{\triangledown}$ for $\alpha = .05$).**

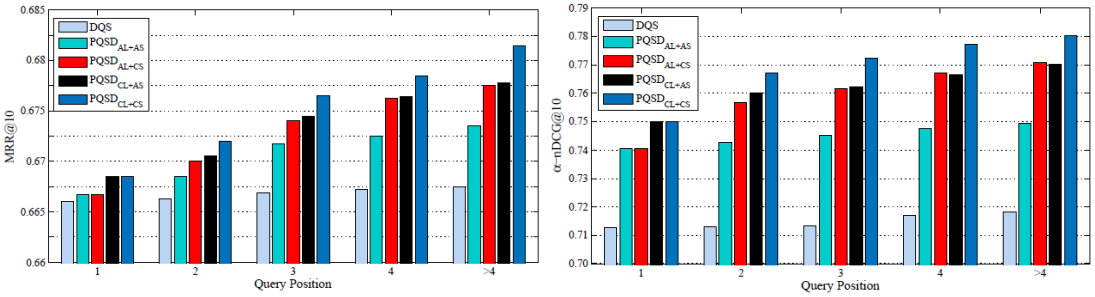
| Models | MRR@10 | $\alpha$-nDCG@10 |
|---|---|---|
| MMR | .6611 | .7021 |
| DQS | .6672 | .7152 |
| D-QS | .6698 | .7401 |
| P-QS | .6685 | .7276 |
| $PQSD_{AL+AS}$ | .6726$^{\triangle}$ | .7461$^{\triangle}$ |
| $PQSD_{CL+AS}$ | .6763$^{\blacktriangle}$ | .7644$^{\blacktriangle}$ |
| $PQSD_{AL+CS}$ | .6756$^{\blacktriangle}$ | .7686$^{\blacktriangle}$ |
| $PQSD_{CL+CS}$ | **.6807**$^{\blacktriangle}$ | **.7791**$^{\blacktriangle}$ |

## Conclusions:

(1) the combination of diversification and personalization does help boost the query suggestion performance in terms of precision and diversification of query rankings;

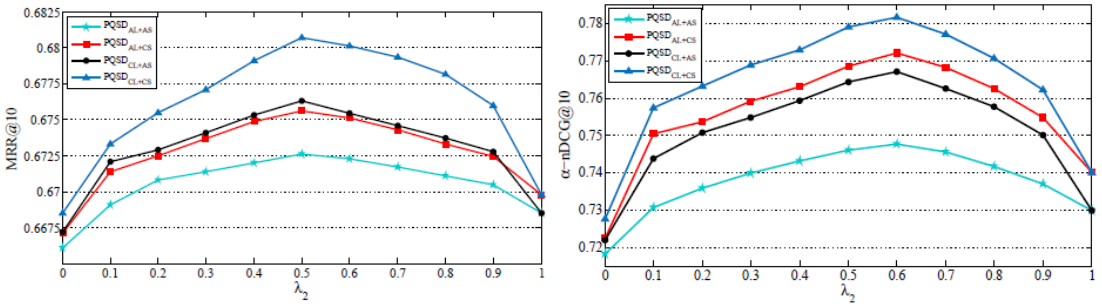
(2) A variant of our PQSD model using queries with clicks achieves the best performance in terms of query ranking accuracy and diversification;

(3) The advantages of our PQSD model over the baseline become more prominent when more query suggestions are returned.



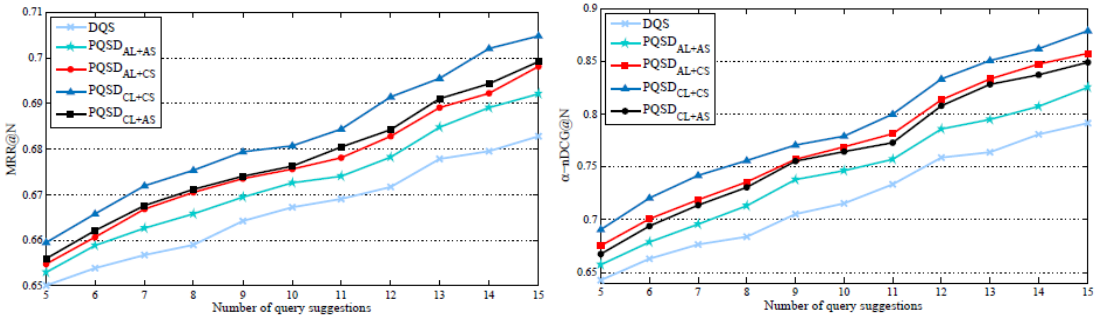

(a) Performance in terms of MRR@10. (b) Performance in terms of $\alpha$-nDCG@10.

Fig.1 Performance of PQSD models and the baseline at different query positions in a session.




(a) Performance in terms of MRR@10. (b) Performance in terms of $\alpha$-nDCG@10.

Fig.2 Effect on performance of PQSD models by changing parameter $\lambda_2$.




(a) Performance in terms of MRR@N. (b) Performance in terms of $\alpha$-nDCG@N.

Fig.3 Effect on performance of five models when more (or less) query suggestion candidates are returned.