Computer Science Seminar

Improving Interactive Search with User Feedback

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Abstract: Capturing users' feedback can improve the interactive search. In search tasks, users typically generate feedback while browsing the search results. That feedback may include clicking the items, reading important text content, query reformulation, and other interactions. They can reveal users' latent intents and additional information needs, providing essential extra information to improve users' search experience. Unlike traditional search, the interactive search is enriched by more interactions and comprises three significant steps: Users browse the initial retrieval contents and generate feedback. The feedback is received and analyzed by the search system. The search system presents new search results based on users' feedback. However, the complexity of human interactions challenges these three crucial steps when building an efficient interactive search engine.¡br¿
The first challenge is obtaining informative and valuable feedback from the users. This thesis introduces a new approach that can diversify the initial search results, allow users to explore multiple aspects of their original queries, and generate instructive feedback. The approach is the first to use Simpson's Diversity Index and Binary quadratic optimization in search diversification problems. Compared to the previous research, this method is more efficient and fast.¡br¿
Another critical challenge is reducing the biased noise in the received feedback. In this thesis, we propose a novel de-biased method to decrease the feedback's high bias caused by users' observations. The approach uses a new observation mechanism to simulate the users' observation process and train a neural network model to detect the observation bias. This new model outperforms the previous click models in both click simulation and document ranking.¡br¿
The last challenge is effectively extracting different interaction information and using them to improve the search. In this thesis, we focus on document-level and sentence-level interactions. We propose two different approaches with reinforcement learning frameworks. These methodologies introduce new techniques to reformulate the query and rank the items. Both methods significantly improve the search performance in the interactive search process.¡br¿
Together these techniques provide imperative solutions to the challenges in the three critical steps of the interactive search systems and enable the users to obtain a better search experience.

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