Implicit Search Feature Based Approach to Assist Users in Exploratory Search Tasks

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Abstract

User online search is a commonplace, yet complex information-seeking process especially in the case of exploratory search where the user is conducting informational type searches. Exploratory search is any search behavior that is characterized by a large amount of uncertainty about the goals of the search or a dearth of knowledge about the domain. As a consequence, searchers who are doing exploration may need support to help them search within the unknown. Therefore, analyzing and modeling users online search behaviors when conducting exploratory search tasks could be instrumental in discovering meaningful insights about the underlying search process.

As the first contribution, this dissertation proposes a framework for evaluating exploratory search based on implicit features and user search action sequences extracted from the transactional log data to model different aspects of exploratory search namely uncertainty, creativity, exploration, and knowledge discovery. We demonstrate the effectiveness of the proposed framework by showing how it can be used to understand and evaluate user search performance and thereby make meaningful recommendations to improve the overall search performance of users. The experiments in this dissertation are based on data collected from various user studies where users are conducting exploratory search tasks on different topics. We show that one can effectively model user search behavior using implicit features to predict the users future performance level with high levels of accuracy.

Given the high level of uncertainty, complexity, and evolving nature of exploratory search tasks, providing assistance or recommendations to a searcher to meet their specific needs is a challenging problem. As the second contribution, we demonstrate that the proposed search process based recommendations improve the search performance of low-performing users over time using simulations. This dissertation combines both quantitative and qualitative methods to validate the effectiveness of the recommendation approach.
Qualitatively, it incorporates independent human assessment to evaluate before and after recommendations. Quantitatively, it uses evaluation metrics on effectiveness, metrics on the assessing the goodness of search trails based on the order of queries/Web pages and Web page categorization taxonomy to find different aspects of information coverage.