Exploratory Search and HCI: Designing and Evaluating Interfaces to Support Exploratory Search Interaction

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Abstract

The model of search as a turn-taking dialogue between the user and an intermediary has remained unchanged for decades. However, there is growing interest within the search community in evolving this model to support search-driven information exploration activities. So-called "exploratory search" describes a class of search activities that move beyond fact retrieval toward fostering learning, investigation, and information use. Exploratory search *interaction* focuses on the user-system communication essential during exploratory search processes. Given this user-centered focus, the CHI conference is an ideal venue to discuss mechanisms to support exploratory search behaviors. Specifically, this workshop aims to gather researchers, academics, and practitioners working in human-computer interaction, information retrieval, and other related disciplines, for a discussion of the issues relating to the design and evaluation of interfaces to help users explore, learn, and use information. These are important issues with far-reaching implications for how many computer users accomplish their tasks.

Keywords

Exploratory search, user interfaces, evaluation.

ACM Classification Keywords

H5.5. User Interfaces: Evaluation/methodology; Graphical user interfaces (GUI); H3.3: Information Search and Retrieval: Search process; Selection process

Introduction

In recent years, search has emerged as a key enabling technology to facilitate access to information for the general user population. Everyday, millions of users around the world submit millions of queries to commercial search engines. When searching for facts users are generally satisfied with the quality of the results. This may lead some to conjecture that search is a solved problem. However, there is a growing realization in the search community that ranked retrieval and result presentation methods are inadequate to satisfy the significant proportion of queries where users wish to learn about a new topic or gather information to facilitate analysis or decision-making [4]. To meet these user demands, search engines must adapt to provide services that serve kinds of information needs beyond lookup [7].

Exploratory search represents a shift from the analytic approach of query-document matching toward direct guidance at all stages of the information-seeking process. Marchionini [4] classified search activities into three main types: *lookup* (i.e., analytic search strategies leading from carefully specified queries to precise results), *learning* (i.e., searches involving the cognitive processing and interpretation of new knowledge), and *investigation* (i.e., searches requiring critical assessment before being integrated into knowledge bases). He suggests that it is the latter two activities that constitute exploratory search, and illustrated this classification as shown in Figure 1.
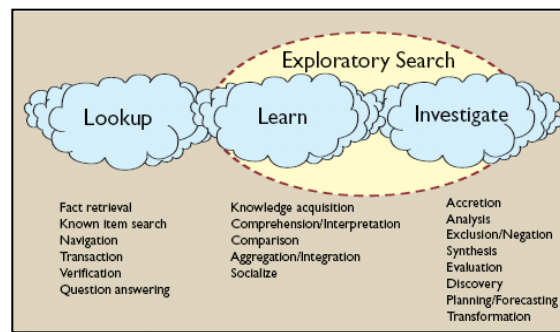

Figure 1. Search activities (taken from [4]).

Lookup searches lend themselves to turn-taking, whereas activities such as learning and investigation require a more continuous and exploratory process. To this end, searchers may benefit from interfaces that enable the grouping of results, and provide support for guided discovery processes [2, 3, 6].

To address situations where search technology may not meet their needs, users have developed coping strategies involving the submission of multiple queries and the interactive exploration of the retrieved document space, selectively following links and passively obtaining cues about where their next steps lie. In some respects, exploratory search is related to information foraging theory [5], which tries to characterize how users search for information based on their decisions on the predicted value of information, and the desire to optimize their searching behavior. When engaged in exploratory searches users are concerned with finding information to meet their informational goals, but there is less emphasis on pursuing an optimal path to their destination. For exploratory searchers, information-seeking is not just about the destination (e.g., the document or group of documents containing the required information), but also about the knowledge they acquire on their journey (e.g., the results lists they view or the documents they encounter on their browse path).

User-system interaction is important in supporting users during the exploration new domains, dynamic information spaces, or richly-connected hypertext environments such as the World Wide Web. It is clear that the interaction between the user and system is critical for the success of those engaged in exploratory search. As the articles in a recent issue of Communications of the ACM entitled "Supporting Exploratory Search" [7] demonstrate, research into the development of such interfaces is gathering pace. Given this user-centered focus it seems natural to involve the CHI community in the discussion of how we should improve the search experience, both through the development of interfaces to support exploration, and in determining the usability and effectiveness of these interfaces through the design of tailored evaluation methodologies.

Rationale for the workshop

The design and evaluation of exploratory search interfaces is challenging, and undoubtedly relies heavily on users' ability to identify and act on exploration opportunities. Through bringing together researchers interested in addressing this challenge we hope to advance the state of the art, and build a community of interest within CHI and beyond containing those who are thinking specifically about exploratory search interactions. A similar workshop organized at CHI 1998 [1] investigated some related issues, but we feel our level of understanding, and search technology (and the use of this technology) has advanced sufficiently to warrant further discussion at CHI 2007.

Aims of the workshop

Our goal is to find common elements for understanding the next generation of search interfaces to support exploration. The workshop will run for one full-day, and offer an interdisciplinary forum of discussion for researchers, practitioners, and academics interested in designing and evaluating technology for supporting exploratory search activities. It will span research fields like interactive design, HCI, computer science, sociology, anthropology, ethnography, and information science. The workshop will facilitate discussions aimed at developing guidelines for designing systems to support exploratory search activities such as those listed in Figure 1. The workshop will address the following questions, under two topic headings, *interaction* and *evaluation*:

- *Interaction*:
    - What are the important features of an interface to support exploratory search?
    - What visualization/organization features should such interfaces provide?
    - What about interfaces to support exploratory search activities that extend beyond the desktop (e.g., mobile environments, distributed displays)?
    - What are the challenges surrounding searchers' adoption of new search interfaces?
    - What about issues such as scalability, sharability, and search context?
    - Does the nature of the search environment (e.g., personal or shared) affect exploratory behavior?

- *Evaluation*:
    - How is evaluating exploratory search interfaces different from evaluating other highly interactive applications?
    - What methodologies are most appropriate to evaluate these interfaces? What are the key components of an exploratory search evaluation?
    - How do we evaluate rates of learning, discovery, accretion, and the quality of planning, analysis, and decision-making, within the context of exploratory search?
    - Is there a mechanism for comparing interfaces created at multiple sites? Would an initiative such as the Text Retrieval Conference (TREC)[1] work for exploratory search interfaces?

Workshop Organization

Before the workshop

Interested applicants will submit a short (2-4 page) position paper for inclusion in the working notes. We will invite participants to write papers on topics related to the workshop aims, and include, but not limited to:

- Novel interfaces, visualizations, and devices
- New interaction models and paradigms
- Beyond the desktop (mobile/ubiquitous search)
- Metrics and methodologies for evaluation
- Evaluations conducted or planned
- Case studies
- Experience reports and lessons learned

Position papers will be peer reviewed by workshop organizers and other experts on a program committee. Program committee members will be asked to comment on the appropriateness of the paper for the workshop, the suitability of the described research for presentation at the workshop, and the usefulness of the paper as an aid to discussion among attendees. Those papers that align best with the goals of the workshop, or form the best grounds

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[1] http://trec.nist.gov

for discussion will be selected for presentation. Presenting authors will be notified well in advance, and asked to prepare a 10 minute presentation on their position paper for the day. All attendees will be encouraged to visit the websites of two workshops we have arranged in this area[2,3] to provide some additional context for the event.

During the workshop

Activities will be focused on the design and evaluation of exploratory search systems. The workshop will begin with a welcome from one of the organizers, who will set the direction for the day, and talk briefly about the previous two workshops to provide additional context. This will be followed by a keynote presentation or plenary panel that will cover important issues in exploratory search to insure an even footing for all participants. The remainder of the workshop will comprise a mixture of selected position-paper presentations, group brainstorming, breakout sessions, and open discussion. The workshop will close with a summary of the day's activities, a summary of the main take-away messages (given by one of the workshop organizers), and a discussion of future events.

The ethos of the workshop will be of dialogue, discussion, collaboration, and participant interaction. As well as a deeper understanding of the issues that are important, a key contribution of the event will be the formation of a community of interest on exploratory search interaction, and exploratory search issues in general.

After the workshop

Following the workshop we will produce a summary of the event for publication in the SIGCHI Bulletin. We will create a discussion list for participants to remain in contact with each other, and with the organizers, that will be a forum for them to raise issues that come to mind following the workshop. The organizers will work with interested participants on further developing the issues raised at the workshop, perhaps in journal special issues, workshops,

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[2] http://research.microsoft.com/~ryenw/xsi
[3] http://research.microsoft.com/~ryenw/eess

and conferences, and the possible organization of tracks at annual symposia such as the Text Retrieval Conference.

Expected Outcomes

We hope that the workshop will:

- o Create a community of interest in exploratory search and exploratory search interaction.
- o Detail the requirements for exploratory search interfaces, and expand the discussion beyond the desktop to ubiquitous search.
- o Devise methodologies for formative/summative evaluation of exploratory search interfaces in laboratory and real-world settings.
- o Raise awareness on the importance of addressing the exploratory search challenge.

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