Current Research in Supporting Complex Search Tasks

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ABSTRACT

There is broad consensus in the field of IR that search is complex in many use cases and applications, both on the Web and in domain specific collections, and both professionally and in our daily life. Yet our understanding of complex search tasks, in comparison to simple look up tasks, is fragmented at best. The workshop addresses many open research questions: What are the obvious use cases and applications of complex search? What are essential features of work tasks and search tasks to take into account? And how do these evolve over time? With a multitude of information, varying from introductory to specialized, and from authoritative to speculative or opinionated, when to show what sources of information? How does the information seeking process evolve and what are relevant differences between different stages? With complex task and search process management, blending searching, browsing, and recommendations, and supporting exploratory search to sensemaking and analytics, UI and UX design pose an overconstrained challenge. How do we evaluate and compare approaches? Which measures should be taken into account? Supporting complex search tasks requires new collaborations across the fields of CHI and IR, and the proposed workshop will bring together a diverse group of researchers to work together on one of the greatest challenges of our field.

KEYWORDS

Interfaces, Information Interaction, Information Access, Interactive Information Retrieval, Search Processes, Search Tasks

1 INTRODUCTION

One of the current challenges in information access is supporting complex search tasks. A user's understanding of the information need and the overall task develop as they interact with the system. Supporting the various stages of the task involves many aspects of the system, e.g. interface features, presentation of information, retrieving and ranking. Many search systems treat the search process as a series of identical steps of submitting a query and consulting documents. Yet information seeking research has shown that users go through different phases in their search sessions, from exploring

and identifying vague information needs, to focusing and refining their needs and search strategies, to finalizing their search. To be able to support exploring and discovering strategies we need to understand the characteristics of different tasks including open-ended, leisure-focused sessions. This is a highly complex problem that touches upon and bridges areas of information seeking, interactive information retrieval, system-centered (ranking, evaluation) and user interface design.

The background for this workshop is derived from the Interactive Track (2014–2016) of the Social Book Search Lab at CLEF [11], which investigates scenarios with complex book search tasks and develops systems and interfaces that support the user through the different stages of their search process. But the aims of the workshop are broader and addresses all aspects of supporting complex search tasks.

2 GOALS AND OBJECTIVES

The overall goal of the workshop is to create and foster an interdisciplinary forum where researchers can exchange and contribute to the development of alternative experiments and prototypes. The main aim is to better understand how to support complex search tasks, addressing many open research questions to be explored, including:

Context What are the obvious use cases and applications of complex search? In what sense are these "complex"? What generic characteristic do they share? How can search become an integral part of its context, and the context integral part of search?

Tasks What are essential features of work tasks and search tasks to take into account? And how do these evolve over time? How can complex tasks be decomposed into manageable sub-tasks, and partial results composed into comprehensive answers? How can we monitor and support task progress?

Heterogeneous sources With a multitude of information, varying from introductory to specialized, and from authoritative to speculative or opinionated, when to show what sources of information? When to show more or other types of information than directly requested by the searcher? Do we know when the user has gotten enough?

Search process How does the information seeking process evolve and what are relevant differences between different

stages? What search tactics and search strategies are effective? How can we promote the use of effective search strategies? How does the information need evolve and what are relevant success criteria for the end result and intermediate steps? How can we cast these as effective complex queries, and how to (interactively) construct such queries?

UI and UX Does the need of complex task and search process management, blending searching, browsing, and recommendations, and supporting exploratory search to sensemaking and analytics, make UI and UX design an overconstrained challenge? What affordances are required and in what stage of the search process? How can we make the search process transparent to the user? How and when does the initiative shift between system and user? How can interfaces support various user groups and their special needs?

Evaluation How do we evaluate and compare approaches? How can we design realistic evaluation campaigns for interactive search? Can we carve out one or a range of generic aspects testable on a suitable benchmarks? Is there enough empirical evidence to ground simulated interactive search? What kind of novel retrieval models are needed to combine topical, contextual and preferential aspects?

3 WORKSHOP FORMAT

SCST 2017 was a half day workshop on supporting complex search tasks—a *work*shop proper where discussion is central, and all attendees are active participants.

The workshop started with a full round of introductions of all participants, making everyone feel welcome and part of the workshop. Then, the workshop continued with two short keynotes to set the stage and ensure all attendees are on the same page.

3.1 Keynote Speakers

Mark Hall (Edge Hill University, UK) gave a keynote on "Where does it end? Complex Search Tasks and Evaluation" [12]. He takes an academic perspective and explores the blurring boundary between complex search tasks and the larger work tasks that motivate the search. This has important implications for what aspects of the process we should evaluate and how we do the evaluation in a meaningful and measurable way.

Jussi Karlgren (Gavagai, Sweden) gave a keynote on "Complex Aspects of Seemingly Simple Information Needs" [15]. He presented the industrial views and discussed how the typical information needs of corporate customers are often posed in short and basic questions but are surprisingly hard to formulate in meaningful queries, and answering them requires complex processes of curating and aggregating diverse and disparate data.

3.2 Paper Contributions

The workshop invited short paper contributions that are presented as posters. We received 11 submissions and accepted 9 (for an acceptance rate of 81%). Each paper was reviewed by at least three reviewers. Paper contributions are presented as a 1-minute boaster talk and as a poster during the interactive poster session.

Rutter et al. [20] discuss a case study of a type of complex task that at face value is simple and straightforward, but turns out to be complex to resolve: how do you make a phone safe for a child. There is a lot of opinion online, many possibilities for actions, many variations in hardware and software, but ultimately no one clear and correct answer for everyday phone users.

Bogers et al. [4] report on the experiences and challenges in organizing the CHIC and SBS Interactive Tracks from 2013 to 2016 in the form of a list of important properties. These properties inform the design of new IIR evaluation campaigns and related researcher communities in ways that expand our understanding of information (seeking) behavior.

Koesten and Singh [17] focus on how a large governmental data portal in the UK supports users in conducting complex search tasks involving data, identify problems with the used interface, and discuss potential research directions to improve interfaces for complex data related search tasks.

Hoeber et al. [13] examine the use of exploratory search strategies for purposive sampling from large text collections. The use of exploratory search strategies that leverage visual analytics enables them to consider the relevance of the data in addition to more traditional sampling methods.

Egusa et al. [7] investigate the use of concept maps—graphical representations that allow people to represent their knowledge explicitly—to evaluate the effects of interactive complex search. Their study showed a significant change in the concepts maps produced before and after executing a complex search.

Huurdeman [14] proposes a framework for the design of search user interfaces for complex search tasks. His framework covers three different types of features—personalizable features, informational features, and input & control features—and discusses the different stages of complex information seeking where these features are relevant.

Ventocilla et al. [21] suggest a bottom-up approach to displaying and exploring relations and correlations in data sets. Using billiards as a metaphor, a graph-representation of (cor)relations in a data set are unfolded in directions based on the user's choices. This provides an intuitive exploratory faceted search interface with quantitative analyses calculated at run-time.

Novin [19] argues that studies on complex search tasks should make their designs more context-based, which will make them more applicable to real-world scenarios, as well as more reproducible and falsifiable. The paper reviews literature on cognitive experiments that stress the importance if situation on actions and proposes a outside-in approach where the context is defined first, then the work task, after which different experimental variables can be considered.

Arora and Jones [2] conducted a user study to investigate how users perceive relevance and importance of highlighted document fragments related to specific search topics, to better understand how to generate effective summaries of documents. The results provide insights on what types of information are effective for satisfying information needs and why users find some parts more relevant than others.

3.3 Breakout Discussions

The second half of the workshop consists of 3-4 breakout groups, seeded from the open research questions (see §2) and the contributed papers, each group thoroughly prepared by a chair who guides the discussion, with examples from relevant IR evaluation campaigns such as the TREC Session and Tasks Tracks and the SBS Interactive and Suggestion Tracks, and from concrete examples of complex support systems with their UX and UI challenges. One of the topics will be an Interactive IR task that is planned for the TREC Tasks Track.[1] Finally, the breakout groups report to the audience and a panel of experts, with continued discussion on what we have learned. A report of the workshop including a summary of the break-out discussions will be published as a SIGIR Forum report.

The discussion will continue during a social event in a more informal way over food and drinks, deep into the Oslo night. The organizers have gained a proud reputation for their open and inclusive workshops, leading to new research collaborations, other workshops, and new evaluation tracks.

The workshop will bring together a varied group of researchers —bridging CHI and IR in a natural way—with experience covering both user and system centered approaches, to work together on the problem and potential solutions, and identify the *barriers* to success and work on ways of addressing them. The format allows us deal with a relatively large number of participants while still preserving the interactive workshop character – the last edition at ECIR'15 had 41 paid registrations (and the head count was even higher on the day of the workshop).

4 RELATED WORKSHOPS

This workshop is a follow-up to the first SCST workshop at ECIR 2015 [8, 9] and is closely related to the Interactive Track of the CLEF Social Book Search Lab of 2015 and 2016 [10, 11]. The Interactive track is focused on the domain of book search, whereas the proposed workshop addresses issues around the search process and system interaction from a broader perspective.

Some of the organizers were involved in the *SIGIR 2011 Workshop on "Entertain me" Supporting Complex Search Tasks* [3] and in the spin-off TREC Contextual Suggestion Track [5, 6]; in related discussion within the *SWIRL '12: Strategic Workshop on Information Retrieval in Lorne* [1]; and the *NSF Task-Based Information Search Systems Workshop* [16]. There is a broad research agenda emerging that attracts interest from research in all areas of HCI and IR.

The workshop builds on the results of the earlier discussion, and through the CLEF Social Book Search Lab [18] has already been pushing this line of research with a range of user studies, novel user interfaces, and analysis of large scale social data. The workshop will be held to have a more focused discussion based on the results so far.

The workshop provides a comprehensive overview of current work on supporting complex tasks in a variety of settings, and fosters new collaboration within across the fields of CHI and IR, on one of the most important topics in the coming years.

5 ACKNOWLEDGMENTS

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[1]Information about the 2017 Tasks Track is available at http://www.cs.ucl.ac.uk/tasks-track-2017/

[2]See http://easychair.org/
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