TwisterSearch: Supporting Social Search with Tabletop and Mobile Displays

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Abstract

This demo presents TwisterSearch, a system for co-located and collaborative Web search that was designed in accordance with the canonical model of social search by Evans and Chi (2009). In a first phase before search, participants frame the context of the intended search and thereafter gather initial information requirements on a tabletop. These requirements are then refined through discussion and yield the foundation for the search task itself, which is performed in parallel on multiple mobile displays. These private devices are used to search the Web for evidence files and to populate the visual workspace of the tabletop with them. Moreover, the personal device allows both a highly parallel search as well as a tightly-coupled collaborative search, to enable seamless switching between collective and solitary search activities. In our TwisterSearch demo, participants can have a firsthand experience of these different individual phases of social search.

1 TwisterSearch

In recent years, research in HCI has increasingly focused on cooperative search. For instance, collaborative search for travel planning or Web search (Jetter et al. 2011, Morris et al., 2010). In a survey, Morris identified a great need for better tool support for collaborative search (Morris 2008).

We designed TwisterSearch, an interactive prototype that supports co-located collaborative Web search during the three phases of the canonical model of social search (*before search*, *during search*, *after search*) by Evans and Chi (2009). Its design is based on four design goals that are introduced in Rädle et al. (2012). TwisterSearch incorporates a multi-touch tabletop (Microsoft Surface 2.0) as public display for collaboration and multiple private interactive displays (Apple iPad) for parallel Web search (see Figure 1). Each user is equipped with the following set of objects: an Apple iPad, a digital pen, a stapled pile of

paper strips (4 x 2 cm), and an acrylic glass token. Each set has a unique color (e.g. red, blue, green). The iPad has a colored rubber case, the pen a colored ball-point, and the glass token a colored frame. This enables to clearly distinguish input and output of each user to enhance awareness among collaborators. In the following, we explain the support for the three phases of the canonical model of social search.

Figure 1. Two coworkers use TwisterSearch to search the Web for "evidence files".

Before Search

In the pre-search activity, users gather requirements and collect search terms to formulate search schemas. For that reason, each user writes keywords on paper strips using a digital pen and collects them on the tabletop surface. This materialization of keywords helps coworkers to develop a common understanding of the ongoing search and can either be done individually or jointly by suggesting keywords to coworkers. Next, semantically coherent keywords are grouped into clusters by encircling them using multi-touch gestures. The output of the *before search* phase is dynamic and changes over time, since a user can refine requirements and adapt search strategies while learning from or comparing keywords and results with other coworkers. Users, therefore, can add or remove keywords or change clusters any time during the search process.

During Search

The first reviewing of search results is in most cases a solitary activity – although *before search* is a highly collaborative activity. A system supporting social search should therefore provide a seamless change from tightly-coupled collaboration to loosely-coupled parallel work. Parallel work, however, can result in "Google races" (Morris 2008). To avoid such races and force a "divide-and-conquer" approach we allow users to assign individual clusters to each coworker. This is achieved by putting an acrylic glass token in a cluster, which indicates a user's search responsibility. All keywords contained in that cluster are instantly sent to the identical colored private display (Apple iPad). The keywords are listed on the left third of the private display (see Figure 2 (left)). A user can select or deselect keywords by tapping on it. Each tap triggers a Google search and shows a list of results on the right two-thirds of the display. The user, then, can browse the results and follow links until information

is found that is regarded as relevant using conventional multi-touch interaction (e.g. known from Safari on Apple iPad). A hold gesture on the relevant information displays a share button above the finger, which sends the result to the shared display if pressed. Results of a cluster are collected in a separate result view, which displays thumbnails of each result in a scroll viewer component that also adheres to the cluster. Gradually, users collect "evidence files" for all clusters and again they can adjust keywords and clusters while search progresses (e.g. caused by foraging and sensemaking).

Figure 2. The private display enables loosely-coupled parallel Web search (left) and the public display supports tightly-coupled collaboration and discussion (right).

Additionally, TwisterSearch provides users with many opportunities to discuss results among coworkers. It allows arguing for or against the relevance of a result during sensemaking. To do so, keywords and results are transferred to multiple private displays if the corresponding tokens are placed in the same cluster. A tap on a result in the result view then displays the result at large on each private display (see Figure 2 (right)).

After Search

The *after search* phase follows the individual search. It composes organizing and distribution of results. The distribution of "evidence files" is important since it can act as input for continuing work such as writing a research paper or business report. All search results are uploaded automatically to a Dropbox[1] folder if the user links an account with the private device (e.g. webpage content as html file). In addition, search trails to a result, keywords that were used to find a result, and the id of the user who found a result are stored for later traceability (e.g. comprehend and reproduce search).

[1] http://www.dropbox.com – (last accessed 7/28/2012)

2 Demonstration

In our demonstration, participants of the conference will be able to search collaboratively for trending topics in HCI and takeaway a printed document with their findings. The technical setup of our demo consists of a Microsoft Surface 2.0 multi-touch tabletop, three Apple iPad, three Anoto[2] digital pens, and stapled piles of paper strips.

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[2] Anoto Digital Pen Technology – http://www.anoto.com/ – (last accessed 7/28/2012)

[3] http://hci.uni-konstanz.de/blendedlibrary/ – (last accessed 7/28/2012)