

## Collaborative Brushing and Linking for Co-located Visual Analytics of Document Collections

Petra Isenberg, University of Calgary, Canada  
Danyel Fisher, Microsoft Research Redmond, USA

Many real-world analysis tasks can benefit from the combined efforts of a group of people. Past research has shown that to design visualizations for collaborative visual analytics tasks, authors need to support both individual as well as joint analysis activities. We present Cambiera, a tabletop visual analytics tool that supports individual and collaborative information foraging activities in large text document collections. They define collaborative brushing and linking as an awareness mechanism that enables analysts to follow their own hypotheses during collaborative sessions while still remaining aware of the group's activities. With Cambiera, users are able to collaboratively search through documents, maintaining awareness of each others' work and building on each others' findings.

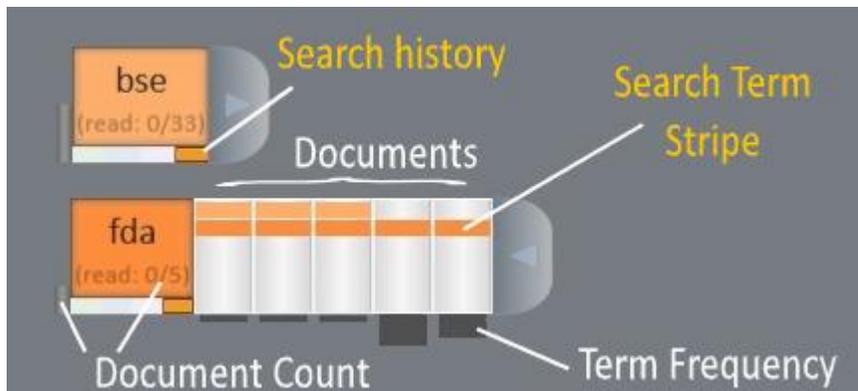


Figure 1. Initial search result overview. One closed search box (top), and one opened search box showing five result details (bottom).

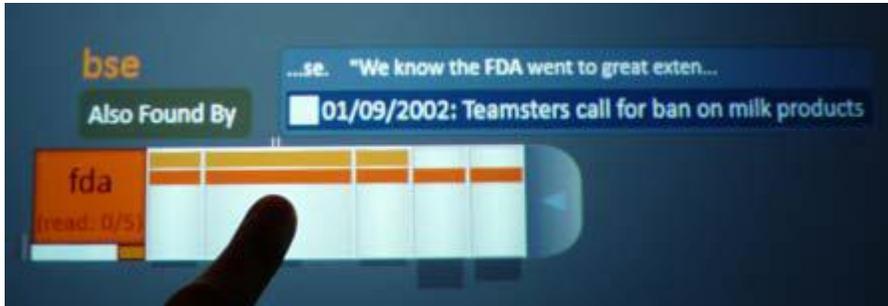


Figure 2. Detail-on-demand is shown for the document under the finger. It shows that “bse” also found this document (top-left), a document timestamp, title, and sentences that include the search term (white text, right).



Figure 3. Color scales to encode search terms. Each analyst’s searches receive one hue of their base color

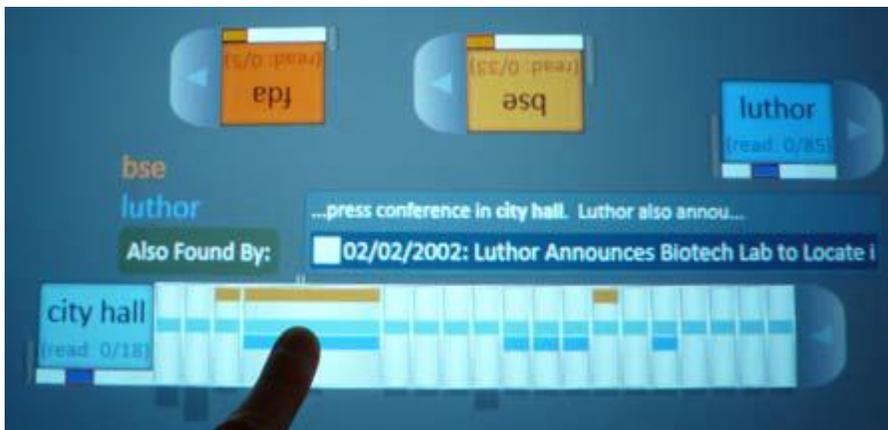


Figure 4. Different base-colored stripes show when searches from other users have found the same documents: Ana has search lists for “city hall” and “luthor”.



Figure 5. Ana and Ben have both searched for “mad cow.” The search box has both blue and orange marks under it; the stripe that corresponds to the term is split and shows both their colors.



Figure 6. Ana drags a single result up and out of the search box, and so creates a floating representation of a document. Note that this representation shares the striping pattern of the search result.

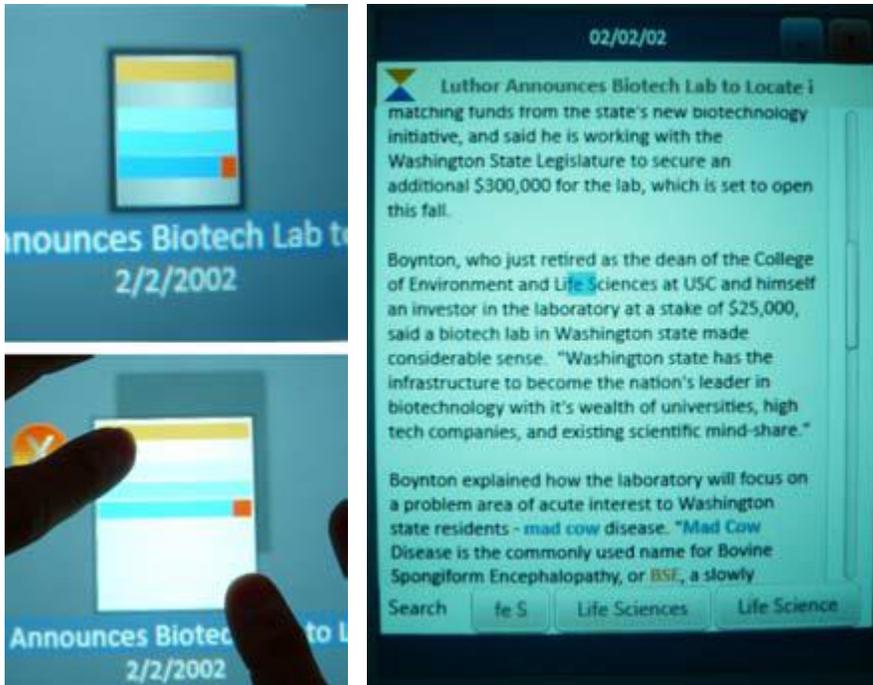


Figure 7. Minimized document representation (top left) and the full document reader (right). The reader is opened by resizing the minimized representation (bottom left).

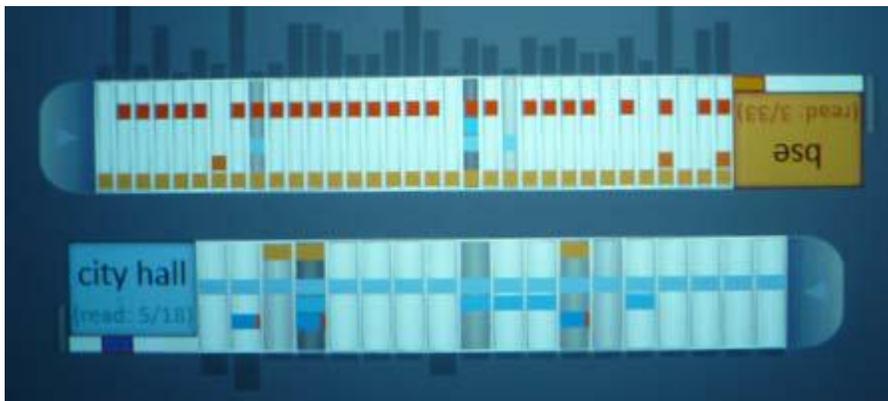


Figure 8. A darker background for individual documents indicate that a document has been opened in the document reader. A darker color indicate repeated document access.



(a) Glyph

(b) In detail-on-demand.

(c) In document reader.

(d) In document title.

Figure 9. Icon representing who read a document. Each triangle stands for one analyst. The icon is embedded in three places. The three examples show documents that have been read by both the blue and orange analyst.

In authors' design, they have emphasized persistent colorings in order for users to share common ground. In previous sections, we have outlined four different forms of collaborative brushing and linking:

- search stripes, to help users see other search terms,
- document read wear to show what documents have been read and by whom,
- red highlights around documents to cue that the document is visible in the workspace, and
- search boxes which show who has repeated the same

In summary, Cambiera is a system for information foraging activities on a multi-touch tabletop display. Collaborative brushing and linking allows users to maintain common ground and awareness as they work, loosely coupled, on visual analytics task.

**search.URL:**

[http://ieeexplore.ieee.org/xpl/freeabs\\_all.jsp?arnumber=5226628](http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=5226628)

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