

Integrating Back, History and Bookmarks in Web Browsers

Shaun Kaasten and Saul Greenberg

Department of Computer Science

University of Calgary

Calgary, Alberta, Canada T2N 1N4

+1 403 220 6015

{kaasten, saul}@cpsc.ucalgary.ca

ABSTRACT

Most Web browsers include Back, History and Bookmark facilities that simplify how people return to previously seen pages. While useful, these three facilities all operate on quite different underlying models, which undermines their usability. Our alternative revisitation system uses a single model of a recency-ordered history list to integrate Back, History and Bookmarks. Enhancements include: Back as a way to step through this list; implicit and explicit ‘dog-ears’ to mark pages on the list (replacing Bookmarks); searching/filtering the list through dynamic queries; and visual thumbnails to promote page recognition.

Keywords

History, revisitation, navigation, WWW, browser design.

THE BACK, HISTORY AND BOOKMARK PROBLEM

Tauscher and Greenberg studied how people visit web pages [7]. They found that about 60% of the pages a person sees are ‘revisits’ i.e., pages they have been to previously. They then recommended that web browsers should make it very easy for people to return to previously visited web pages. Indeed, today’s browsers contain standard facilities that ease revisitation: the Back/Forward buttons, History and Bookmarks. There is no question they are useful: when Tauscher and Greenberg found that Back comprised 30% of all navigational acts, Bookmarks around 3%, with Forward and History less than 1% each [7]. However these revisitation facilities, which are essentially unchanged from the earliest versions seen in NCSA Mosaic, have several problems that undermine their usability.

The Back / Forward stack. These buttons are implemented as a stack of pages collected during a session, which leads to several problems [4]. First, as people navigate different branches on the web, the stack model pops old branches off the stack, which means that some pages are no longer reachable. Second, because Back is session-based, pages seen in previous sessions are not accessible. Third, most people naively model Back as a recency-based list rather than a stack, which explains why they are sometimes confused about what pages can or cannot be reached [2].

Finding pages in History. History automatically collects

pages onto a visual list as a person visits them. The main problem (somewhat shared by bookmarks) is that a person must visually scan this long list to find a desired page. This can be difficult. First, people may have difficulty recognizing the page representation (displayed as the page URL or title) as it may not match how a person ‘remembers’ the page [3]. Second, the various ways of ordering of pages in the list may make it hard to find i.e., by positioning the page in an unfamiliar context (e.g., alphabetic order) or by embedding it within a URL hierarchy.

Maintaining explicit Bookmark lists. People must mark a page explicitly at the time they visit it to turn it into a Bookmark, and then must maintain the list. This is heavyweight. First, bookmarking requires a decision the person may not be ready to make. If the person realizes in hindsight that a page should have been marked, he or she must relocate it through some other mechanism. Second, the bookmark list can become overly cluttered, containing stale or no longer useful pages [1]. Third, long alphabetical bookmark lists make desired pages difficult to find. Fourth, effective bookmark lists require constant maintenance, something that people are reluctant to do [1].

Lack of Integration. Perhaps most seriously, browsers provide the above revisitation mechanisms as separate and unintegrated facilities. All use dissimilar underlying models (e.g., stack vs. recency vs. explicit lists) and interfaces.

THE SOLUTION: AN INTEGRATED SYSTEM

We have developed a fully functional revisitation system (Figures 1 and 2) that works within Microsoft’s Internet Explorer. Its major contribution is how it replaces Back, History and Bookmark with a single integrated revisitation facility at no extra cost in screen real estate.

Recency-ordered list with duplicates removed. Recency is an excellent predictor of what pages a person is likely to revisit [7]. Consequently, our system maintains and displays all pages seen in all sessions only as a simple recency-ordered list. This is sensible: a person can now expect to find a page they had recently visited near the top of the list. To save space, we show duplicate pages only in their latest position.

Page Representation. We try to make scanning the list for a particular page easier by representing pages not only by title, but by its visual thumbnail image. As people visit a

Kaasten, S. and Greenberg, S. (2000) **Integrating Back, History and Bookmarks in Web Browsers**. In *Extended Abstracts of the ACM Conference of Human Factors in Computing Systems (CHI'01)*, ACM Press.

Also as *Report 2000-675-27*, Department of Computer Science, University of Calgary, Alberta, Canada, November.
<http://www.cpsc.ucalgary.ca/group/lab/papers/index.html>

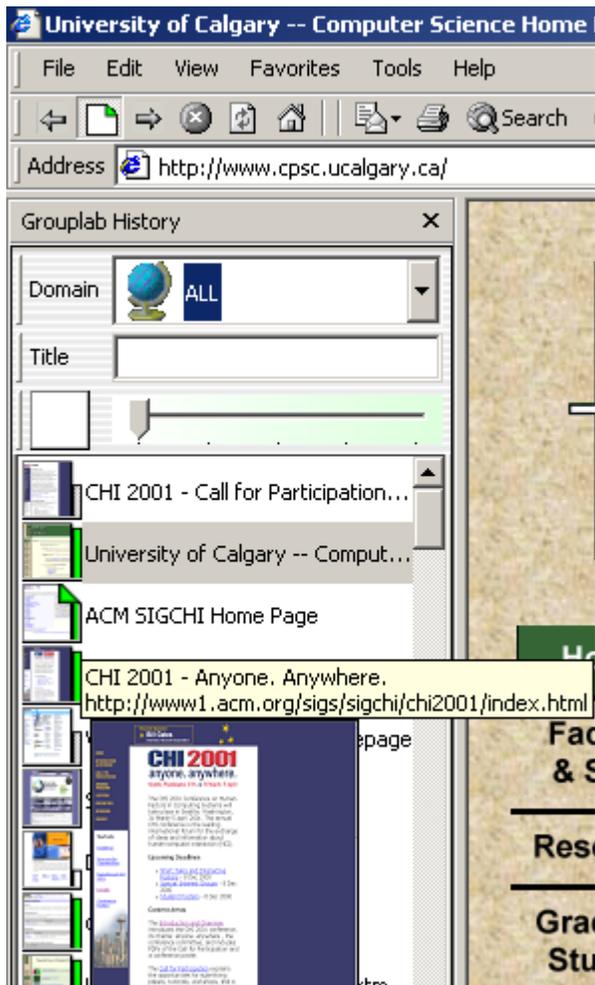


Figure 1. Integrated Back, Bookmarks and History

page, our system automatically captures and scales its image. While the list shows a small thumbnail, a much larger version (where large fonts are readable) pops up automatically (including the full title and URL) as a person moves the mouse cursor over that page in the history list (Figure 1 bottom, the CHI 2001 page).

Recency-based Back Button. Back and Forward now work on this recency-based list instead of a stack: the buttons are just shortcuts for moving up and down the history list [4]. If the list is visible, we bold the currently visited item on the list. Seeing Back and Forward simply move to the next item on the list re-enforces (and matches!) people’s mental model of Back-as-recency. Because Back now works on the sessional recency list, people can *always* return to any previously seen page with Back.

Implicit/Explicit Page Marking. Our next strategy was to integrate bookmarks directly into the history list, and to make them lighter-weight to select, use and manage. First, we create implicit bookmarks by visualizing a page’s ‘read-wear’ [5]. That is, using the heuristic that a page visit frequency is related to that page’s importance, we increase its visual distinctiveness by marking it with a vertical green band whose height and colour value increase with visit frequency. Thus ‘seen once’ pages are unmarked, while

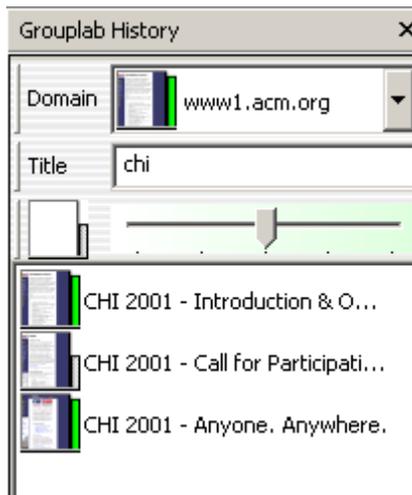


Figure 2. Search for ACM CHI Papers

highly visited pages have a full dark bar (see Figures). Second, people can create the equivalent of explicit bookmarks by right-clicking the thumbnail: this ‘dog-ears’ the page (the folded corner on the top right of the thumbnail), thus making it even more visually distinctive within the history list. As with Bookmarks, users can re-title a page if they wish.

Search Filters. Finally, people can rapidly and continuously filter and search the history list through three dynamic queries [6]. First, moving the slider rightwards immediately filters the list to remove pages with low visit frequencies. Moving further right shows only high frequency pages and dogears, and finally only dog-ears: this transforms the history list into a recency-ordered bookmark list. Second, people can dynamically filter the list to display only those pages whose title contains a specified sub string typed into the ‘Title’ text box. Finally, one can filter the list to display only pages from specified domains, which are selectable from a drop down menu. This menu is also a history list with sites ordered by recency. Figure 2 illustrates all three filters: its settings are equivalent to “show me the list of pages that I have visited on the ACM site with ‘chi’ somewhere in the title.”

We are now evaluating the system. Results are promising.

Acknowledgements. Thanks to Microsoft and NSERC.

REFERENCES

- 1 Abrams, D., Baecker, R. and Chignell, M. Information Archiving with Bookmarks: Personal Web Space Construction and Organization. *Proc ACM CHI*, 1998.
- 2 Cockburn, A. & Jones, S. Which way now? Analysing and easing inadequacies in WWW navigation. *Int J Human-Computer Studies*, 45(1), 105–129, 1996.
- 3 Cockburn, A. & Greenberg, S. Issues of Page Representation and Organisation in Web Browser’s Revisitation Tools. *Proc OZCHI*, 1999
- 4 Greenberg, S. & Cockburn, A., Getting Back to Back: Alternate Behaviors for a Web Browser’s Back Button. *Proc 5th Conference Human Factors and the Web*, 1999.
- 5 Hill, W.C. & Holland, J.D., Edit Wear and Read Wear. *Proc ACM CHI*, 1992.
- 6 Shneiderman, B., Williamson, C. and Ahlberg, C. Dynamic Queries: Database Searching by Direct Manipulation. *Proc ACM CHI*, 1992.
- 7 Tauscher, L. & Greenberg, S., How People Revisit Web Pages: Empirical Findings and Implications for the Design of History Systems. *Int J Human-Computer Studies*, 47(1), 97-138, 1997.