A task-focused approach to support sharing and interrupt recovery in web browsers

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Abstract

Over the last two decades a vast number of services have moved online, and many new online services have been created. Recent work shows that many users are overloaded by the number of webpages they use. We introduce TabFour, a prototype web-browser which introduces three novel features that address design requirements identified in an initial design study. First, webpages can be grouped into *tasks*, providing a target for resumption after an interruption. Second, tasks can be annotated, supporting resumption after longer intervals. Third, tasks can be shared through a simple web-service, allowing users to share groups of web-pages more easily than with existing tools.

Keywords

Web browser, task focused, interruption, asynchronous collaboration, context sharing.

ACM Classification Keywords

H3.3. Information search and retrieval: Search process. H.5.2. User Interfaces – user-centered design, graphical user interfaces (GUI), prototyping. H4.3. Communications Applications: Information Browsers.

General Terms
Design, Human Factors.

Introduction

Over the past decade, tasks accomplished using a web browser have increased in complexity and density [3]. Users are spending more time in their web browsers, working on such varied tasks as shopping, vacation planning, and research. These tasks are often done in parallel, and users frequently switch between tasks either on their own or due to interrupts [2,4]. Hence, users often find it difficult to accomplish a task in a single session [5]. In a recent study, 83% of users reported resuming an information seeking task on the web, and 24% of those had resumed the task more than a week after suspending it [9]. Despite the evidence that many users are overloaded, modern web browsers provide only basic support for handling the interruption and resumption of tasks.

Motivated by the apparent difficulty of resuming tasks, we conducted a series of semi-structured interviews to explore users' browsing habits, needs, and coping mechanisms. We generated a set of five design require-ments, which informed the design of TabFour, a task-focused prototype web browser.

In TabFour, webpages can be grouped into *tasks*, providing a target for resumption after an interruption. Tasks can be annotated, supporting resumption after longer intervals. Finally, tasks can be shared through a simple web-service, allowing users to share groups of webpages more easily than with existing tools.

To evaluate our design, we conducted a small user study in our usability lab. We briefly describe the experimental protocol, and report results from questionnaire data collected.

Related Work

There has been previous work addressing the problem of supporting interruption and resumption of tasks in web browsers. These systems are typically created as browser extensions [8,9] or a separate helper application [5]; TabFour is a standalone web browser developed using Adobe AIR.

Searchbar [9] creates new tasks based on the search queries performed by the user. Tasks are shown in a sidebar and each task has a summary page with user annotations and bookmarks. Though binding the creation of a new task to a user's search activity seems like a good approach for those users who resort to passive mechanisms for task resumption, it is still unclear whether users actually prefer this mechanism. TabFour relies on specific user actions to create tasks, which allows a user to continue using a more traditional interface without tasks until the more complex features are required.

Prior work by MacKay [8] includes a horizontal task-bar below the URL bar to manage tasks, and these tasks can be stopped and resumed. However, TabFour further supports other artifacts related to browsing, such as bookmarks and history, as well as task sharing.

Jhaveri and Räihä's Session Highlights tool shows thumbnails of the pages visited by the user, grouping them spatially based on the time the page was accessed [5]. Tabfour shows thumbnails of the current and bookmarked pages, grouped by task.

Formative evaluation

Motivated by the apparent ongoing trouble users have with switching between tasks, we conducted a small formative evaluation. We began by conducting semi-structured interviews with 9 users, aged 18 to 29. The interviews focused on browsing behaviour, such as common or recent tasks performed; the use of existing tools, such as browsers and browser extensions; features within those tools, such as tabs, bookmarks, and history; search behaviours; and the sharing of webpages with other people.

We observed that most participants relied on search when revisiting a page, either by using a search engine or the auto-complete feature of the address bar, rather than using history or bookmarks. In fact, history was rarely used; several users were not aware of how to access the full history in their preferred browser. Common complaints were that there were simply too many items in the history, and that items were difficult to find because it was hard to remember exactly when they had been visited. These observations coincide with those made by Morris [9] and by other researchers over the past decade [1,7,10].

Similarly, bookmarks were rarely used, except those placed on the bookmarks toolbar, which were used frequently. Users again complained that the list was simply too long to scan.

Participants often used sites together. For example, one participant opened several news sites simultaneously at the beginning of each day. Another recently planned a trip where she cross referenced flights, hotels, driving directions, and course information, all from different sites. Participants employed several coping strategies for saving these task states, such as sending themselves an email containing annotated URLs, or noting down URLs in a simple text document on the computer desktop. These and other strategies have been previously identified by other researchers [6,9].

We believe that these coping mechanism provide several advantages over traditional tools such as bookmarks or history. The presence of an artifact, such as an email or document, provides a powerful reminder of the pending tasks [2,4]. This is akin to how office workers tend to organize their documents in visibly separate piles along their workspace as reminders [2,6]. Artifacts like email can carry annotations, adding contextual information pertaining to the task and facilitating rapid task resumption even after long periods of time. Finally, these artifacts may be accessible from multiple computers, and users find them more reliable and less prone to loss, for example due to operating system upgrades [6].

Finally, we noted that users frequently had difficulty sharing webpages or groups of webpages, and a few reported that they had previously avoided sharing URLs or had given up while trying to.

Design Requirements

From the rich, qualitative data we collected during the semi-structured interviews we derived several design requirements, intended to support advanced users of web browsers:

1. Support the grouping of webpages into tasks,

2. Facilitate task switching and resumption,

3. Include navigation artifacts, such as bookmarks and history, as context for a task,

4. Allow annotation of webpages and tasks, and

5. Ease sharing of pages and tasks between users.

These design requirements informed the design of our TabFour prototype, detailed in the next section.

The TabFour Browser

Using Adobe AIR and ActionScript 3, we developed a prototype browser which satisfies the design require-ments listed above. Figure 1 shows a screenshot of this browser. In this section, we relate specific features of the TabFour browser to the design requirements.

Grouping of webpages (R1) is accomplished by organ-izing them into tasks, which appear in an additional bar located above the tab bar. Only those pages which belong to the current task are shown in the tab bar, reducing clutter in the tab bar and increasing the number of pages the user is able to successfully manage. Tasks are also listed in the "Active" and "Inactive" panels on the left. Suspending a task to the Inactive panel frees space in the task bar, making it easier to separate immediate tasks from long term tasks; this increases the visibility of current tasks and facilitates task resumption and switching (R2).
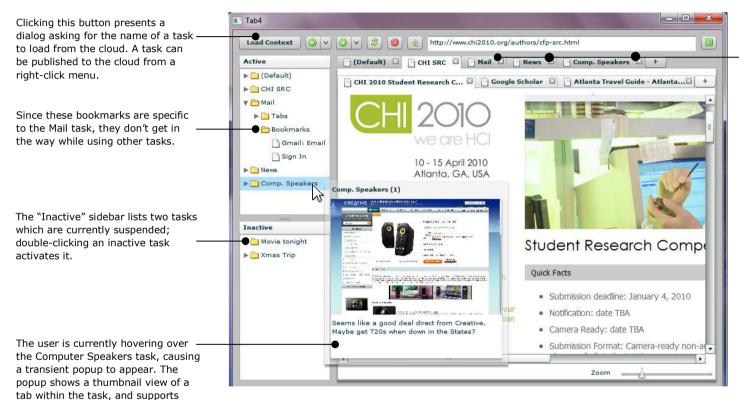
Bookmarks can be added to a particular task (R3); this reduces conflict and keeps the users from having to scan a long list of bookmarks. If the user is already using the task at the time of bookmarking, no extra effort is required to organize these bookmarks.

When hovering over an item in the task sidebars a popup panel appears, which displays a thumbnail view of a webpage within the task and provides a text box which is used to add annotations (R4). The thumbnail view is useful for quickly seeing an overview of a task, facilitating task switching (R2).

Annotations can be added both to an individual page, such as to summarize a document, or to an entire task, such as to synthesize information from various sources. If sharing a task (R5), an annotation could be used to provide an overview or instructions for the recipient.

Sharing of tasks is accomplished in two ways. First, a task may be drag-and-dropped to any application which accepts either HTML-formatted or plain text. The task contents, including the task name, tab titles and addresses, bookmarks, and annotations, are formatted and pasted into the application. This is easier than manually copy/pasting URLs into an email (R5), which was a common topic in our interviews.

Additionally, users may share tasks over the internet using a simple web-service. To do this, the user right clicks the task, selects "Share task" (not shown), and enters a textual string. They can then instruct another user to load the task by telling them the string, such as in an email or instant message. The other user simply presses the "Load task" button on their browser and enters the same string; the task, including all tabs, is immediately loaded as an active task and displayed. This is easier than opening many URLs one by one, and annotations and bookmarks are also shared. (R5).

Clicking this button presents a dialog asking for the name of a task to load from the cloud. A task can be published to the cloud from a right-click menu.

Since these bookmarks are specific to the Mail task, they don't get in the way while using other tasks.

The "Inactive" sidebar lists two tasks which are currently suspended; double-clicking an inactive task activates it.

The user is currently hovering over the Computer Speakers task, causing a transient popup to appear. The popup shows a thumbnail view of a tab within the task, and supports annotations in the text box at the bottom of the popup.

Some tasks are frequently used, such as "Mail" or "News". Others are used only a few times, such as the task about purchasing computer speakers.

figure 1. Screenshot of the TabFour browser in action. The user is currently using five tasks, including the an initial "Default" task, shown in tabs directly below the address bar. Within the current task, three webpages are open in tabs. Currently open tasks are shown in the "Active" sidebar on the left-hand side.

Evaluation

We ran a small lab study with 8 participants to examine the usability of our system in a high-pressure setting. Subjects planned flights for two vacation trips using Mozilla Firefox and the TabFour browser in counter-balanced order; they were interrupted twice by an experimenter who assigned additional tasks, by email or instant message. These tasks required the subject to suddenly shift their focus, then return to the original task when done. All participants stated that task-based browsing was useful, and made it easier to complete the tasks; that they would use task-based browsing if available in their primary web browser; and that it was easier to share webpages in TabFour.

Limitations and future work

Due to time constraints we were unable to integrate tasks and history, but we believe this is a fruitful area. We were only able to run a very targeted evaluation; it will be important to analyze longer real-world usage.

Conclusion

We have presented TabFour, a task-focused browser that supports grouping webpages into tasks and annotating them, in order to support task switching and resumption, and sharing tasks via email or a simple webservice. In a lab evaluation involving rapid task switching, all users reported that task-based browsing was useful and helped them complete their tasks.

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