MAKING FAVORITES USEFUL

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ABSTRACT

In this paper, we describe our work in adding functionality to the standard favorites, or bookmarks, list typically available in modern web browsers. Our goal is to increase the rate at which those browsing the web can "re-find" information they have previously bookmarked for later perusal. To this end, we have developed a favorites manager, deployed in a simple web browsing application, that introduces favorites management features beyond those found in typical web browsers, including additional metadata, automated organization, and search tools. We present the details of this application, along with the results of a user trial measuring the usability of the favorites management system we developed.

KEY WORDS

Graphical User Interfaces, Bookmarks, Favorites, Web

1 Introduction

Re-visiting websites is a task commonly performed by internet users. One way users quickly find favorite sites is to assemble a collection of favorite pages using the embedded favorites management tools available in common web browsing applications. These tools are limiting, providing only a means of storing the title and URL of pages of interest to the user. Furthermore, these stored URLs are only very naively organized; common favorites management systems only allow for alphabetical sorting or hierarchical organization of the favorites. Also, the task of moving, renaming, or copying favorites is often difficult in these systems. Finally, most favorites management systems currently available run in an application window separate from the web browser, requiring the user to interact with multiple windows in order to retrieve a favorite website, or in order to organize and manage their favorite sites. The Internet Explorer favorites system is no exception, requiring additional windows in order to add a new favorite site or to rearrange the list of favorites.

In this paper, we outline our work in expanding on the functionality of typical favorites management systems. To overcome some of the limitations of current favorites management systems, we have created a favorites manager, deployed in a basic web browsing application, shown in Fig-
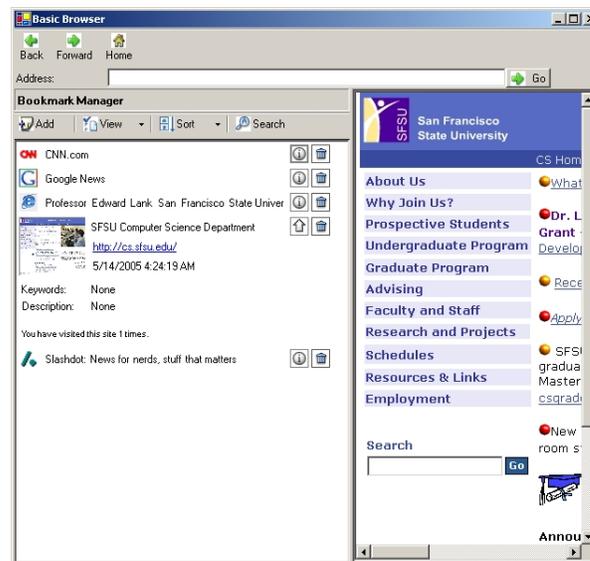

Figure 1. Our favorites management system, embedded in a simple web browsing application.

ure 1. We have enhanced the favorites management system in six ways:

- Enhanced metadata

- Easy edits

- Multiple views

- Multiple orderings

- Search

- Visual cues

This favorites manager introduces the ability to store both automatically generated and user-specified metadata with individual favorites. This metadata can include user-specified or html metatag keywords and site description. Users can easily edit the metadata, and they can view favorites either as an exhaustive list or categorized by automatic or user-specified metatags. Various date and time information is automatically captured, including the time the item was added to the favorites list, the time the site

was last visited, the time the site was last updated, and the number of times a user visited the site. Users can order the favorites list based on any of this temporal information, or by title. Users can search using metadata or time information. Finally, visual cues such as the site's favorite icon and a screenshot of the site is captured for each favorite item in the list, as an aid to user recognition of the items stored in the favorites list.

Our specific goal is to determine the effectiveness of our enhancements in improving a user's web browsing experience. To test this, we conducted a user trial to gauge initial receptiveness to our added functionality and to guide our future work in this area. Our initial user trial demonstrates a high level of user satisfaction with our enhancements, as well as an apparent inclination to make increased use of the favorites management system that incorporates such enhancements.

This paper is organized as follows. We first outline the difficulties inherent in current favorites management systems, followed by related work in improving favorites management systems, as well as research in refinding information on the internet. We then describe the application we have developed, focusing on the increased functionality introduced for managing favorites. Next, we describe the results of our user testing of this application. Finally, we describe our on-going work in improving the favorites management interface to allow for more rapid retrieval of visited sites.

2 Background

Researchers have long noted the difficulties users face when attempting to interact with their favorites management systems. One such problem is the manner in which users create favorite items. Favorites items are often quickly added to the favorites list, without regard to any criteria, using whatever default information the management system associates with them [5]. This often leads to a collection of favorites that users feel are "a mess," and that offer little or no benefit to the user in terms of re-finding previously visited sites [4]. Additionally, favorites items added in this manner rarely offer enough information to effectively "remind" a user why they added the item in the first place.

As more and more items are added into the collection of favorites, it quickly becomes difficult to find specific items of interest during a browsing session. Appropriate organizational metaphors could alleviate this difficulty, for example the creation of a hierarchical system for storing favorites. A great deal of research indicates, however, that while users may have such organizational ability available to them within their system, they are unlikely to expend the effort necessary to organize their data in such a manner [6]. Such disorganized collections of favorites leads to a breakdown in the information management system, making it unusable, and unable to continue to scale to handle additional favorites [1].

In order to address such shortcomings, a number of methods have been proposed to assume some of the organizational tasks required to effectively maintain a favorites management system for the purpose of re-finding and retrieving favorite websites. Some solutions propose the use of agents within the context of collaborative communities of favorites users. One such system, CoWing [7], attempts to assist the user in the classification of their bookmarks, while simultaneously recommending additional favorites from other users in the community.

A different approach to the agent solution involves using agents to glean information from websites that have been browsed, and using this information as a means of automatic organization. The Dynamic Bookmarks System [8], for example, analyzes the relationship between favorites sites as well as the browsing patterns of users as a means of organizing and and presenting favorites to the user. Many other systems, like the PowerBookmarks [2] system, advocate examining the contents of the actual site being stored in order to organize the favorites collection.

One final method of saving websites for later reference is that of simply archiving every website a user visits in a browsing session, and providing a means of later searching that archive. One aspect of Microsoft's MyLifeBits project [3] is an Internet Explorer plugin that allows for the annotation and archiving of all of the websites a user visits. Many of the major search engines, like Yahoo! and Google, now provide similar tools to maintain an archive of all of the web content a user browses, and exposes a search interface to later retrieve viewed documents.

None of the projects presented provide enhanced favorites functionality within the web browser itself. Attempts to address the problems of managing favorites have varied from one extreme of requiring the user to manually organize and maintain the favorites store, to the extreme of excluding the user from the organizational process entirely. The goal of our research is to integrate some of these solutions into a unified favorites management system, while preserving the simplicity and familiarity of standard favorites management systems.

3 Improving the Favorites Interface

We have developed the SmartBookmark System as our answer to the problems posed by current favorites management systems. We identify the following deficiencies in current bookmark/favorite management systems:

1. Lack of Context: Limited information is stored with each favorite item, hindering a user's ability to locate or recall a given site based solely on this information.

2. Organizational Restrictions: Only naive organizational methods are available to users. Favorites can be organized alphabetically by title, or hierarchically. This hierarchy is often restricted in depth, and does not easily allow a single item to appear in multiple places in the hierarchy.

3. Modification Difficulties: Standard systems offer only title and URL information to the user for modification. The manner in which an item can be modified is not explicit in the interface. Instead,

4. Limited Search Ability: No advanced search capability is provided to quickly retrieve individual favorites based recalled attributes of that favorite.

In this section we address each of these deficiencies by describing the enhancements introduced in our Smart Bookmark system. The enhanced features of our system include enhanced metadata and editing, multiple views of information, organizational enhancements such as multiple orderings, advanced search functionality, and better view cues to content.

3.1 Enhanced Metadata

The first improvement is the automated collection of html metatag data, which is stored and presented with the favorite item when it is saved into the favorites list. This information is used not only to provide a context by which the user can recall a page, but to automatically categorize the favorite item. The information can also be used to search for the favorite item at a later date. In an effort to include the user in the organizational process, as well as to allow the user to provide meaningful contextual clues about the favorites item, this information is editable.

Along with available html metatag data, various date and time information is stored with the favorite item. This includes the date the site was added into the favorites list, as well as the date the site was last visited. The system will also attempt to intermittently retrieve the date the site was last updated, in order to provide notification to the user that the site has changed since their last visit. The number of times an individual favorite site has been visited is also tracked in order to provide additional information about the relative value of the site to the user.

3.2 Easy Edits

In the Smart Bookmark system, editing of an item takes place directly within the favorites management window. This is in contrast to common favorites management systems that require the opening of multiple windows in order to edit favorites information. All of the textual information, including the title, keywords, and description, that has been stored with each favorites item is editable, giving the user the ability to explicitly control associated metadata. Figure 2 shows the in-situ editing of a favorites item. Note the appearance of the text field that is being edited; a mouse rollover causes the the field to change appearance to provide an explicit indication that the information contained in that text field is editable.
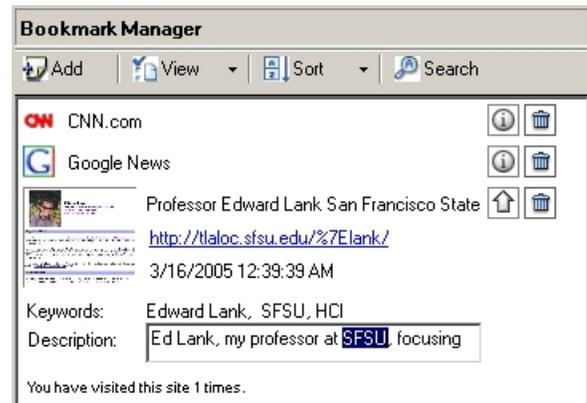

Figure 2. Editing a favorite item in-situ.

3.3 Multiple Views

Two major "views" are exposed to the user in our favorites management system. These are the list view and the category view.

Figure 3. The default view of the favorites management system, showing the minimized favorite items.

The list view simply lists all of the sites currently in the favorites management system. The favorite items in this view are initially displayed in a minimized state, as pictured in Figure 3. In the minimized state, the favorite item shows the favorite icon (or a default icon if no favorite icon was found), the title of the webpage, and icons to allow for expansion or deletion of the item. With the click of a mouse, the user can expand the minimized item to display the enhanced metadata information associated with favorite item.

As can be seen in Figure 4, this information includes a thumbnail of the screenshot taken when the user last visited the website. It also includes the editable fields presenting the keywords and description of the site, as well as the date and time information, and the number of times the user has visited the site. If the system has detected that the item has been updated since the last time the user visited the site, a small update icon is also displayed.

The second view is the category view. This view is created by automatically dividing the favorite items into
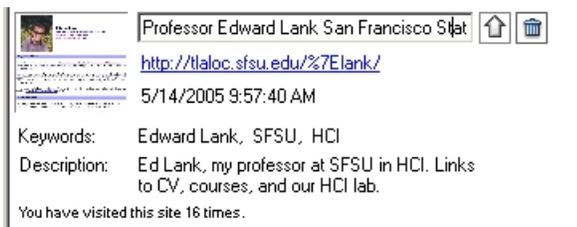
Figure 4. An example of a favorite item maximized. Note the rollover behavior of the textfield, explicitly indicating the ability to modify data.

categories created from the previously described keywords that have been associated with each of the items. Note that an individual favorite item can appear in multiple categories, depending on the number of keywords that have been specified. The category view is pictured in Figure 5, and continues the use of minimized items that can be maximized to explore the additional contextual information.
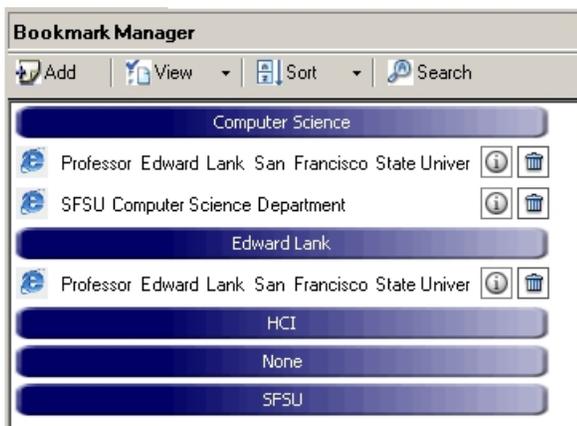

Figure 5. The category view of the favorites management system.

3.4 Multiple Orderings

Both of these views allow for multiple orderings. The ordering methods leverage the presence of the metadata to sort the items in the current view. Items can be sorted alphabetically by title, by the date the sites were last visited, or by the number of times the site has been visited.

This multiple ordering is a significant enhancement over bookmark management in web browsers such as Internet Explorer. In Internet Explorer, users must manually rearrange their favorites lists. Particularly by including metrics such as number of times visited and the time the favorite item was added, we can offer the user easy access to most common or newest favorites without requiring manual shuffling of bookmarks.

3.5 Search

A simple interface for searching the favorite items is provided. Three different search methods are provided: keyword search, date search, and a combination of both keyword and date search. The keyword search searches all of the available textual information associated with each favorite item, including the title, keywords, and description. The date search can search for any of the date information available (date and time added, date and time last visited, date and time updated).

A search panel provides access to the search functionality. When the user presses the search button, the bookmarks move down to make room for this search panel, allowing integrated search and access to bookmarks.

3.6 Visual Cues

Finally, visual cues have also been incorporated into the favorites items. If a favorite icon has been specified by the visited site, we preserve that icon. The use of a favorite icon allows sites like Google, CNN, and others to have meaninful icons associated with the favorite item even when the favorite is minimized.

We also capture a screenshot of the site when it is visited, to provide an additional visual cue to aid in user recall of a specific website based from their favorites list. When the item is expanded by clicking on the "Info" icon, the thumbnail of the webpage is displayed along with other metadata associated with the item.

3.7 Deficiencies Revisited

Early in this section, we introduced a series of deficiencies with current favorites management systems in web browsers, including lack of context, organizational restrictions, modification difficulties, and limited search. Our enhancements have addressed these deficiencies in a number of ways.

Lack of context has been overcome in our system using enhanced metadata and improved visual cues. Both automatically collected and manually specified metadata is used to create categories of items. These categories are exposed to the user through a category view. Similar web pages will typically share certain metadata attributes, and will therefore be clustered in the category view. By explicitly specifying metadata for stored favorites, the user can more effectively use categorization. Visual cues, specifically the inclusion of an icon and a thumbnail of the web page, enable recognition of web page content rather than requiring explicit recall of the information on the web page. This eases browsing within the favorites list.

The metadata also improves the organization of favorites. Rather than requiring an explicit, hierarchical organization, favorites can now be organized using a keyword style management system. This category view can be used explicitly by the user. As well, in typical browsers,

favorites are reordered manually, with limited sorting capabilities. In our system, we extend the organization of favorites to include temporal information such as most recently visited, or most commonly visited. The flexibility of ordering and categorizing improves on typical linear or hierarchical organizations typical of other favorites management systems.

Modification of existing favorites is significantly enhanced through improvements to the editing system. Our in-situ editing allows users to edit the information associated with any item in their favorites at any time via a simple click and type interface.

Finally, search has been improved. More metadata is associated with any item in the favorites list, simplifying search queries. As well, by incorporating categorization and multiple orderings, browsing is also improved.

4 User Trial and Results

A user trial was conducted to determine initial user response to the functionality added to our favorites management system. Trial participants were allowed to use the basic web browsing application with the embedded favorites management system. The participants were asked to browse to some of their favorite sites, and to add these sites to the favorites management system. Participants were also asked to browse to additional sites, and to return to the favorite sites they had saved via the favorites management interface. Finally, users were asked to explore some of the additional functionality of the favorites management interface, including switching between the category view and the list view, as well as to attempt to locate some of the sites they had added via the search interface provided in the management system.

After completing these tasks, trial participants were asked to answer a brief questionnaire designed to gauge their satisfaction with the favorites management system provided. In addition, participants were asked to compare the favorites management system provided with their current web browser's bookmarking or favorites system. The comparative results from this questionnaire are presented in Figure 6.
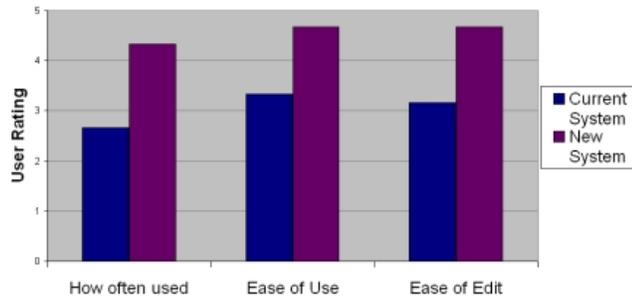

Figure 6. Comparative results from the user trial.

The participants were asked to answer each of the

questions using a standard Likert scale, where a response of one indicated not easy or not likely, and a response of five indicated very easy or very likely. A clear difference in user preference was seen in the results from the questionnaire. Participants indicated that they would make use of saved bookmarks more often with our favorites management system (p = 0.027 versus their browsers bookmark/favorites system). Furthermore, trial participants indicated that they found the new management system to be easier to use than the standard management system in their preferred browser (p = 0.012), and that it was easier to modify items in the favorites list in our system (p = 0.029).

Participants were also asked to score the ease of refinding items they had saved to the new management system, as well as how meaningful the automatically generated categories were. Scored on the same Likert scale, trial participants indicated that it was very easy to re-find stored favorites items (mean of 4.67) and that the automatically generated categories were very helpful (mean of 4.67).

From these results, we can conclude that the enhancements added in our favorites management system presented the users with an improved favorites experience. Users indicated that our system was much easier to use, specifically in the area of modification of favorites items. We also saw positive responses when users were asked about the categorization enhancements, and the ease of favorites retrieval. In fact, users indicated that because of these enhancements, they would be more likely to make use of items in their favorites list when using our SmartBookmark system.

5 Future Work

Given the encouraging results obtained from our initial user trial, we plan to move forward in our research in this area. In our on-going work, we are designing an Internet Explorer plug-in to embed the favorites management application we have created directly in a full-featured web browser. The goal is to deploy this plug-in in an expanded user trial in the near future.

In this user trial, we plan to also look at user response to automated versus semi-automated metadata for favorite items. The current system stores all html metatag keywords and the description html metatag with the favorite item to provide contextual information for later browsing sessions. This information also provides some means of searching for items.

One problem with this approach is that metatag information is often unavailable on websites, and this results in the favorite item being categorized simply in a "None" category. In the opposite extreme, many pages contain an overwhelming number of keywords, which results in one favorite item automatically generating a correspondingly overwhelming number of categories that may apply only to that item.

To address this problem we are exploring functionality that explicitly enforces some minimal user intervention through prompting when a favorite item is added. Prompt-

ing is used to allow the user to select from among the html metatag keywords specified on the web page, thus reducing the number of categories generated when an added favorite item has many html metatag keywords. As well, prompting may encourage the user to add more relevant metatags to items in the favorites list.

Additional annotation automation could also be provided in the form of "gang annotation," or the process of applying a single annotation to a series of added favorites. Consider, for example, the task of collecting background materials for a research paper. If a user were to store background papers that were of interest in the favorites list in one browsing session, each of these could automatically be included in a category specified only once during that session. These related research papers would then be immediately available in one category for later perusal.

Finally, we would like to further leverage the information that is automatically captured with our favorites management system. One possibility is providing an explicit "Updated Pages" category, that is dynamically updated as the system discovers updates to the pages stored in the favorites list. The application could also re-categorize individual favorites listings to respond to updates to the the html metatags on the favorites sites.

6 Conclusion

In this paper, we present a new system for the management of favorites in the context of browsing the web. This system incorporates advanced features such as automated metadata collection for favorites and improved visual cues to provide contextual clues to users. The system also automatically manages the categorization of these favorites based on both user-specified and automatically collected information.

We describe a study that compares the favorites management system we developed with the standard favorites management system currently available in web browsers. We note a significant user preference for the features incorporated in our management system.

Acknowledgments

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