On a Web Browsing Support System with 3D Visualization

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ABSTRACT

Existing commercial Web browsers provide various utilities and functions, e.g., Web bookmarks and a browsing history list. Since the bookmark and history functions only the title and URL of the Web page, users who cannot remember the contents of each Web page have difficulty retracing their steps. In this paper, we propose a bookmark system based on a 3D interface. Additionally, our system offers three main functions; a 3D browsing history function, a marker function, and a look-ahead loading function. These functions enable users to browse Web pages more effectively.

Categories and Subject Descriptors

D.2.2 [**Software Engineering**]: Design Tools and Techniques— *User interfaces*; H.5.2 [**User Interfaces**]: [Graphical user interfaces (GUI)]; I.3.8 [**Computer Graphics**]: Applications

General Terms

Design

Keywords

3D Technology, Web browser, Visualization

1. INTRODUCTION

A variety of technologies and softwares for the World Wide Web are being developed these days. Since a huge number of Web pages exist today, most Web browsers offer a bookmark function for more effective Web browsing. However, in most browsers, the bookmark function cannot retain a lot of information and is restricted to items such as the title and URL of each Web page. In this paper, we propose a system for viewing Web bookmarks with 3D visualization.

Users tend to forget the content of Web pages that has a low access frequency. If the content is forgotten, it is difficult for users to remind it with only a title and URL. Additionally, when a Web page is updated, users must access it in order to check the updates. Our system loads the image of each Web page in advance and shows it alongside the addition to the title and URL. It also uses a 3D visualization technology that can a display images in several modes, i.e., a book mode, a circle mode, and a cube mode.

Hascoet has proposed a BookMap [1]. This BookMap is a user interface for Web navigation systems. In BookMap such as the Web bookmark and browsing history data are made into graphs, and shown visually. Kaasten [2] and others proposed the importance of the Back button, a browsing history, and Web bookmark

and expressed concerns about these issues. Their system offers an interface that shows small Web pages at one side of the title and URL. These systems are implemented with a 2D user interface. Compared to the 2D interface, our 3D interface system has high browsability, and enables users to check Web pages clearly and easily. Struart[3] has proposed a 3D Web browsing environment WebBook/WebForager which employs a book metaphor into work space. Users can be browsing Web pages in 3D space. Our 3D visual Web bookmark system has two different points compared with this system; (1) Our system can use be used with and kind of Web browsers. (2) A page pre-reading function is implemented.

2. THE VISUAL BOOKMARK SYSTEM

2.1 System Outline

Our visual Web bookmark system can display several Web page image simultaneously. Figure 1 shows an example of the system. Using our system, users can see an overview of the cached pages. Therefore, it is easy to check for modifications in each page. For example, if the design of a Web page has changed, a user will be able to recognize it.

As shown in Figure 1, our Web bookmark system has three layout modes; a book mode, a circle mode, and a cube mode. Image (a) in Figure 1 shows a book layout mode, based on a book metaphor. In this mode, users can see each page as if he/she were browsing books in the real world. Since the book metaphor has been applied in some systems, it is easy for most users to use. Image (b) in Figure 1 shows a circle layout mode, that allows users to browse several Web pages, the images of Web pages are drawn around the circumference of a circle. In this mode, three pages are situated in a circle with the center page that is interesting for the user being is bigger than the other pages. Image (c) in Figure 1 shows a cube layout mode. In this mode, images of Web pages are on the surface of a cube. A user can follow his/her browsing history by rolling over the cube.

In all layout modes, there are several buttons and a slider under the 3D interface. These are the next-button, the prev-button, the load-button, and the save-button, located at the bottom of the screen. The next-button and the prev-button can turn images over and move them to the left or right. The load-button obtains current data for each Web page. The save-button is for saving the current layout. The slider can change the transparency of the interface.

2.2 System Architecture

The Architecture of our bookmark system is shown in Figure 2. There are three main modules (an image generator module, a data handling module, and 3D interface module), as well as database.
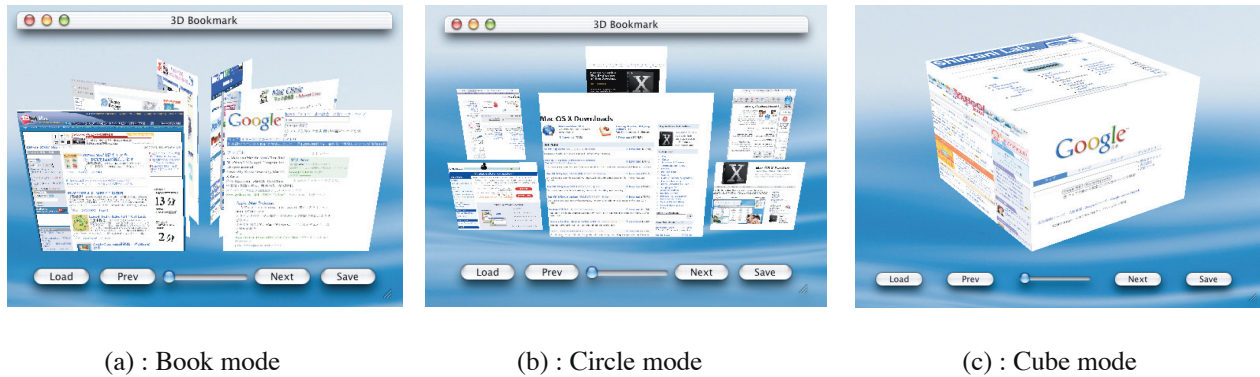
(a) : Book mode   (b) : Circle mode   (c) : Cube mode
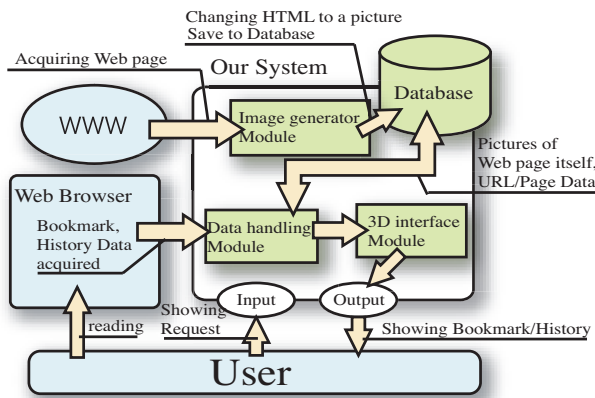
Figure 1: 3D Layout Mode

Figure 2: System architecture

The image generator module obtains bookmark data from the database. This module takes the title and URL of Web pages from the bookmark and then accesses the URL to obtain Web page data (i.e., HTML text and some image files). In order to generate an image of the Web page, this module displays the obtained data as a Web page in a virtual Web page viewer. Since the viewer is constructed virtually, it is invisible to users. The displayed Web page is converted to an image file and stored in the database.

The data handling module obtains the bookmark, which is created by Web browser and registers the Web page data from the database. This module extracts the titles and URLs from the obtained data, and sends them to the 3D interface module. Moreover, the titles and URLs extracted from the Web browser's bookmark are added to the database.

The 3D interface module obtains images of Web pages from the database, based on data from the data handling module. This module constructs the 3D user interface using an OpenGL graphics library. The transparency of the interface can be changed by adjusting the alpha value, giving the transparency information.

3. FUNCTIONS FOR EFFECTIVE WEB BROWSING

Our bookmark system has three functions; (1) a 3D browsing history function, (2) a marker function, and (3) a page pre-reading function.

1. 3D browsing history function
   This function shows the user's browsing history based on the 3D interface. The operation is basically the same as that in the 3D bookmark. Also, the function offers a sort function for the history. Namely, users can arrange the order of the images of Web pages.

2. Marker function
   This function offers a method for attaching memos to images of Web pages displayed in a 3D bookmark. Using this function, users can add more detailed information to the image. This function helps users to know the contents of each Web page.

3. Page pre-reading function
   This function enables users to generate images of Web pages in advance. The system extracts the URLs included on a Web page, and then accesses each URL to generate images of Web pages. Since a hyperlink is shown in a text, there is little information about the linked page. For example, an user can not see the design of a linked Web page. Using this function, users can check the Web page overview in advance. This function is especially effective when a user uses a search engine such as Google. The search results may contain many URLs. Generally, it is time-consuming for users to access to each URLs. The page pre-reading function can generate images by accessing the URLs. Accordingly, this function offers a preview list for Web pages included in the search results.

4. CONCLUSIONS

Our 3D Web bookmark system can offer an alternative user interface for Web bookmarks. Our system is based on advanced 3D visualization technology. Advantages of our system can be described as follows; (1) Users can check bookmarks using various layouts. This enables users to check the overview of Web pages more efficiently. (2) The 3D browsing history function, marker function, and page pre-reading function can support more effective Web browsing.

5. REFERENCES

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