

# A Solution to Revisitation Using Organic Bookmark Management

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**Abstract.** This research paper presents the design and user evaluation of an add-in software program referred to as Organic Bookmark Management (OBM). This system will complement the Bookmark and History functions by enabling users to navigate more efficiently using organic visual graphical cues. The findings from formative user studies conducted by this research have defined web usage and analysis of web browsing in terms of navigation patterns. Evaluation of the OBM alternative to the normal “hub and spoke” navigation structure of traditional Bookmarks and History functions will be conducted. The main difference between this schema and conventional designs is that it maintains a complete and consistent visual display of previously bookmarked and visited pages based on an organic metaphor. Implementation decisions and present results of usability studies in which we deploy the prototype are discussed. The results show that OBM brings qualitative improvement to the browsing experience of users.

**Keywords:** Web browser, revisitation, re-finding, organic bookmark management.

## 1 Introduction to Web Browsers

Currently the most popular browsers are Microsoft Internet Explorer (46.9% market share worldwide), Mozilla Firefox (30.8%), Google Chrome (14.9%), Apple Safari (4.8%) and Opera (2.1%) (see Fig.1). It is interesting to note that Microsoft’s Internet Explorer browser had fallen below 50% of worldwide market share for first time in September 2010 [1] and as of January 2011, it has been surpassed by Firefox in the European market.

Revisitation is one of the most important user browsing behaviors, requiring an individual’s skill to retrace their steps in order to find a piece of information. The massive data flows available and the ubiquity of the web makes this task all the more difficult. With one third of the world’s population now able to access the Internet, there are over two billion Internet users with a similar shared problem (see Fig. 2).

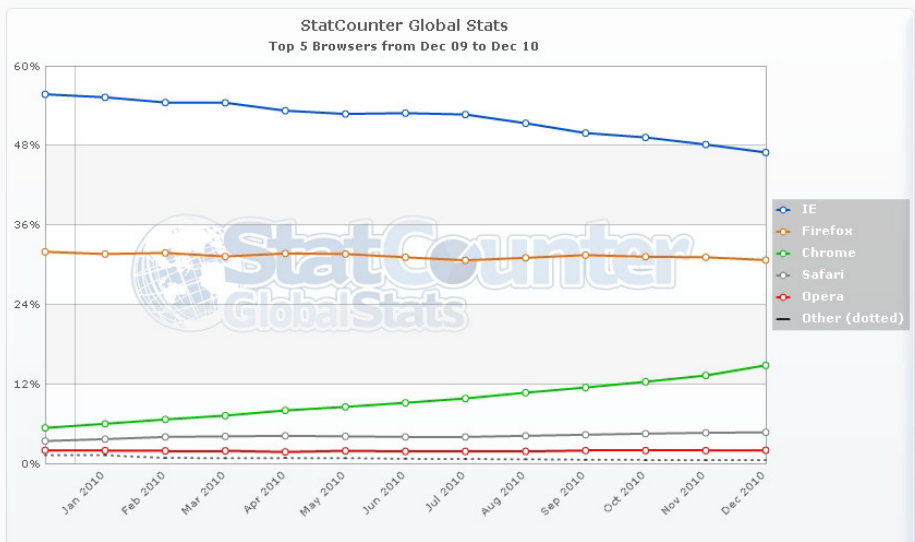


Fig. 1. Top 5 browsers by market share [1]

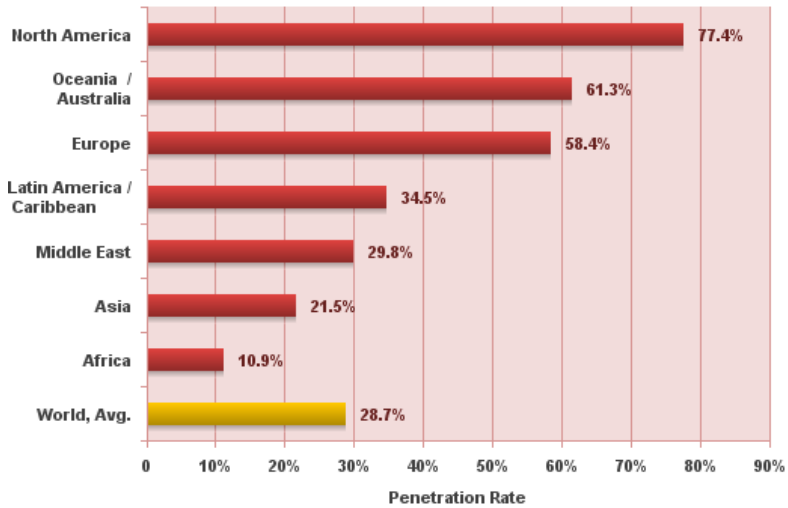


Fig. 2. World Internet Penetration Rates by Geographical Region [2]

The growth and use of the internet over the last two decades has transformed the way the world works, learns and plays. However, the sheer volume of available data has resulted in information overload. The ability to store and retrieve information for use at a later date is therefore a crucial tool which browser software developers have struggled with since their introduction in the early 1990's.

## 2 Literature Review of Bookmarks and History Management

Research has shown that 81% of web pages have been revisited [3]. Bookmarks and History are two key functions to support users in revisitation. Bookmarking demands individual effort to add-in and organize web data, while History offers to re-find the previously visited web sites based on the users records. Nevertheless, the maintenance of Bookmarks has been one of the top three usability problems on the web [4]. This could be explained by the fact that the system of Bookmarks management depends largely on tagging mechanisms and efficient directory order. As long as the tags or directory are not well organized, it is very difficult to retrieve information. The use of visual linear historical lists in the History function has been proven not helpful. A sense of disappointment often occurs when a desired web page could not be traced or when the user is unable to re-find info is older than a specific period.

Several research groups have looked at improving the Bookmarks and History functions, such as Data Mountain’s visual screenshots of visited sites and PadPrints’ graphical history map of visited pages [5, 6]. Kaasten and Greenberg (2001) even suggested combining Back, History and Bookmarks in web browsers [7]. However, all these attempts have shown their limitations to support revisitation. Cockburn and Mckenzie (2001) pointed out that there is still the lack of empirical evaluation in revisitation, especially when there are more and more users who tend to build larger bookmark collections, and this leads to the current interface schemes that produce extremely long textual menus, and therefore force users to re-organize their bookmark structure by their own efforts [3].

Currently, web browsers still rely on the individual’s capability and willingness to organize their bookmarks and history. Therefore, the question remains, how to assist users with visual management of data in a more logical and easily-manipulated

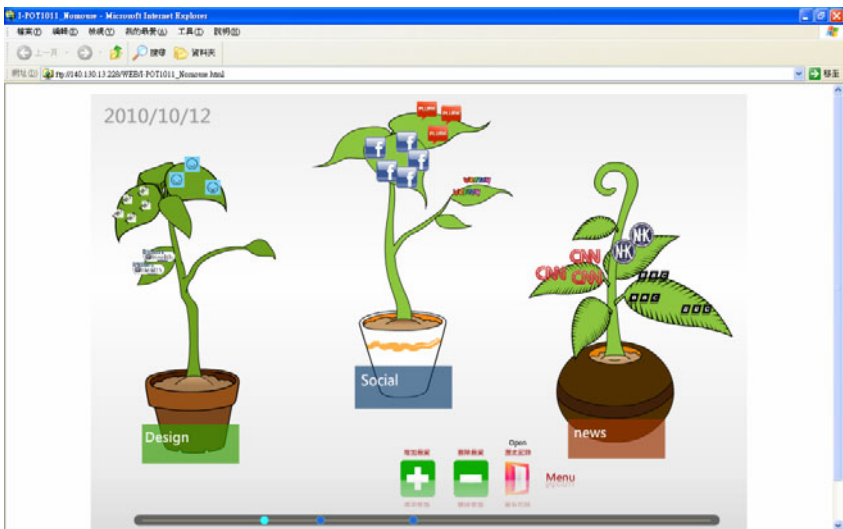


Fig. 3. Screenshot of the Organic Bookmark Management Schema

method? It is said that users can remember better with recalled attributes such as the file location, file type, keywords, associated events e.g. text messages and emails, and visual elements [8]. Furthermore, some studies suggest that the use of thumbnail previews is helpful in searching [7, 9]. Dziadosz and Chandrasekar (2002) showed that the combination mode of text summaries and thumbnail previews is better than text-only summaries and thumbnail previews only [10].

Hopefully, these valuable results will be incorporated within a new approach i.e. Organic Bookmark Management (OBM) that could simulate the growth of vegetation to facilitate revisitation. The OBM visualization aims to make information retrieval more efficient and effective by easily organizing and managing online data. By integrating the application into the web browser, OBM can build on existing functionality to trace the visited pages and reconstruct an organic look and feel.

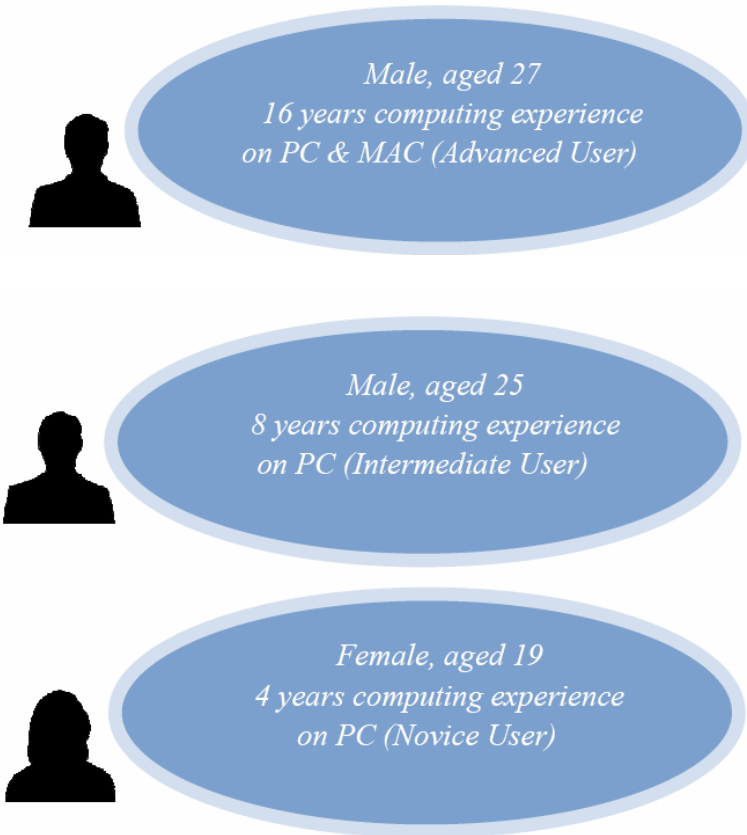
### 3 Research Method

Formative studies were conducted between September and October 2010 at the College of Art and Humanities, National Formosa University (NFU). The purpose was to obtain a qualitative understanding of how an individual performed during browsing activity, and what level of effort was required to organize and manage their History and Favorites (Bookmark). The study consisted of 40 participants (20 male, 20 female) in total, who were given 800 NT\$ (approx. 25 US\$) individually. The process started with gathering user's background information; then was followed by further general questions relating to the use of the History and Favorites (Bookmark) functions. The basic background information included: (a) gender: *males vs. females*; (b) educational background: *high school vs. college vs. university vs. higher qualification*; (c) level of computer experience: *0-2 yrs vs. 2-4 yrs vs. 4-6 yrs vs. 6-8 yrs vs. 8-10 yrs vs. >10 yrs*; (d) daily use of the Internet: *0-2 hrs vs. 2-4 hrs vs. 4-6 hrs vs. 6-8 hrs vs. 8-10 hrs vs. >10 hrs*; (e) the user's regular computer platform: *PC vs. Mac*; and (f) type of web browser of daily use: *IE vs. Firefox vs. Safari vs. Chrome vs. Others*. These six variables were tested independently to evaluate its overall usability. The initial results have already been published in detail; we therefore prefer to concentrate here on a discussion of the second phase of the usability study [11]. Within the second part of the study, a small sample of the participants was selected to do further recall and recognition testing on the Organic Bookmark Management (OBM) prototype based on their personal History and Favorites (Bookmark) data submitted during the initial screening.

### 4 Discussion of the Results

To determine if the Organic Bookmark Management (OBM) prototype could visually support users' revisitation or not, we therefore selected three participants from the group which included one novice, one intermediate, and one advanced user to evaluate its usability. The reason for choosing such a small number from amongst the 40 participants is because we would like to gain the general scope of the user pattern across different levels of computer skills in browsing, especially for the first stage in

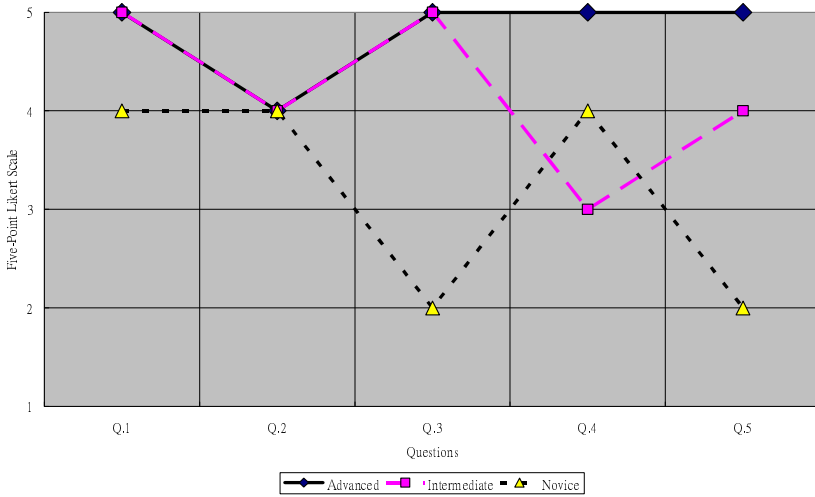
developing the OBM prototype. This group consisted of two males (advanced and intermediate), and one female (novice); see below for more details of their experience and backgrounds.



In terms of the number of bookmarks, the Advanced user had more than 200, the Intermediate user had over 100 and the Novice user had less than 10.

A mock-up of the OBM prototype (developed in Flash) was given to them to try and test in their own time for a week at home. After this period, they returned to the University where they were asked a series of questions in an informal discussion. There were six main questions relating to the OBM prototype: (Q.1) the ease of understanding the OBM metaphor; (Q.2) the easiness with which to manipulate the OBM Favorites (Bookmark) function; (Q.3) the easiness with which to view the History function; (Q.4) the usability of organizing the OBM system; (Q.5) the helpfulness of the OBM timeline; (Q.6) further suggestions to improve the OBM system.

Answers to the first five questions above were ranked using a five-point Likert scale (5=Totally Agree, 4=Agree, 3=Neutral, 2=Disagree, and 1=Totally Disagree) and can be seen in Fig. 4 below.



**Fig. 4.** Usability Evaluation Part II for OBM Prototype

Overall, all three users were generally satisfied with the look and feel of the OBM prototype. However, as can be seen above, the novice user found aspects of the History function and the timeline less than satisfactory. Clearly, the number of years of computer experience has an effect on the level of positive feedback WRT the OBM prototype. Regarding Q.6, the users further suggested how to improve the OBM system by adding more functions such as RSS Reader and Feed for further usability testing.

## 5 Conclusions

Analysis of our data shows that most participants were regarded as expert users with more than 10 years computer experience. Over half the participants surfed the Internet for more than 8 hours a day. The vast majority of participants were PC users. It is interesting to note that our participants (both male and female) were broadly in line with the worldwide statistics for the use of web browsers. Even though all the participants were aware of the History function, there were still 40% of the males and 65% of the females who did not regularly use it. This was overwhelmingly due to it being perceived as unhelpful, confusing or difficult to use. Almost all the participants were aware that the History function could display all the websites that were visited in the last few weeks. Nevertheless, 25% of the males and 45% of the females did not know that they could change the default History duration from 21 days to whatever they liked. The majority of participants knew the level of functionality within the History function; however, four times as many women (20%) as men (5%) did not. Moreover, 25% of the males and 50% of the females did not know that you could search the History function using a keyword.

There appears to be a gap in knowledge between the males and the females as to some of these basic functions. Is it that they never learnt about them, or is it that they simply don't find them easy to use and therefore they do not use them at all?

All of the participants were aware of the Favorites (Bookmark) function and almost all of the participants used this function. Nevertheless, almost all the participants found it difficult to manage their Favorites (Bookmarks). When asked about the problem of revisiting a web page that they knew they had been to in the recent past, 60% of the males and 65% of the females stated that they often experienced problems with this. The level of acceptability for users to adopt the OBM system over the traditional offerings from Internet Explorer and Firefox remains challenging. However, an add-in software extension to IE and Firefox would seem practical and beneficial.

The results of this formative study provide a solid foundation for future development of the OBM system. We believe that even the most successful browser, i.e. Internet Explorer can be improved by redesigning their Favorites and History functionality.

## References

1. StatCounter. Microsoft's Internet Explorer browser falls below 50% of worldwide market for first time (2011), <http://gs.statcounter.com/press/microsoft-internet-explorer-browser-falls-below-50-perc-of-worldwide-market-for-first-time> [cited January 22, 2011]
2. Group, M.M. Internet Usage Statistics. World Internet Users and Population Stats (2011), <http://www.internetworldstats.com/stats.htm> [cited January 22, 2011]
3. Cockburn, A., McKenzie, B.: What Do Web Users Do? An Empirical Analysis of Web Use. *International Journal of Human-Computer Studies* 54(6), 903–922 (2001)
4. Pitkow, J. GVU's WWW User Survey (1996), [http://www.cc.gatech.edu/gvu/user\\_surveys/survey-04-1996/](http://www.cc.gatech.edu/gvu/user_surveys/survey-04-1996/) (cited)
5. Robertson, G., et al.: Data Mountain: Using Spatial Memory for Document Management. In: *Proceedings of the 11th Annual ACM Symposium on User Interface Software and Technology*. ACM Press, San Francisco (1998)
6. Hightower, R., et al.: Graphical Multiscale Web Histories: A Study of Padprints. In: *Proceedings of the ACM Conference on Hypertext*. ACM Press, New York (1998)
7. Kaasten, S., Greenberg, S.: Integrating back, history and bookmarks in web browser. In: *CHI 2001 Extended Abstracts on Human Factors in Computing Systems*. ACM, Seattle (2001)
8. Blanc-Brude, T., Scapin, D.L.: What do People Recall about their Documents? Implications for Desktop Search Tools. In: *Proceedings of Intelligent UserInterfaces 2007*. ACM, Honolulu (2007)
9. Czerwinski, M., et al.: The Contribution of Thumbnail Image, Mouse-over Text and Spatial Location Memory to Web Page Retrieval in 3D. In: *Proceedings of Interact 1999* (1999)
10. Dziadosz, S., Chandrasekar, R.: Do Thumbnail Previews Help Users Make Better Relevance Decisions about Web Search Results? In: *Proceedings of SIGIR 2002*. ACM, Finland (2002)
11. Shen, S.-T., Prior, S.D., Chen, K.-M.: Revisiting Revisitation in Computer Interaction: Organic Bookmark Management. In: *Fifth International Conference on Design Principles and Practices*. Common Ground Publisher, Sapienza University of Rome (2011) ISBN1833-1874