Group Recording of Web Navigation

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1. INTRODUCTION

Finding information on the web is often an experience that easily degrades from excitement (*"Everything is there!"*) to frustration (*".. but I don't know where it is!"* or *".. but I can't find it anymore!"*). Of course, when something relevant is found, the user is strongly motivated to avoid to repeat the (painful) search again for the item by using bookmarks. Several techniques add functionalities to standard bookmarking: their goal is to to make permanent user's navigation and experience. Web recorders such as WebVCR [1] offer to replay navigation while Web-R [6] stores navigated pages locally. Collaboration during the navigation can improve the results of the search as well its efficiency and several tools were proposed for enhancing *social navigation* such as recommender systems [4] or adaptive group collaboration [2].

In this paper, we present a prototype that allows users to exchange information about their navigation via *navigation path* recording, annotation and editing. Each user can therefore use our system to create a permanent and modifiable collection of URLs that can be shared with other users. As an example application, a typical activity of a researcher is to navigate to find relevant references to her current research interests; once the user found and annotated a set of URLs, she can share them with her research team, therefore increasing, as a result, the group knowledge.

2. GROUP RECORDING

Our prototype GROUPRECORDER offers a cooperative environment to store and retrieve navigation paths and supports the paradigm of social navigation since it offers full awareness of what other users in the group are navigating. GROUPRECORDER allows users to create paths from their own navigation: the user can annotate each URL and delete unnecessary and irrelevant entries (the problem of frames, embedded images, dynamic commercial advertisement etc. is well recognized in this area [1]). The whole set of recorded paths is, then, offered to all the users of the group as an as-

set to the group knowledge. The recorded paths are also searchable (for text in the URL or in the comment).

GROUPRECORDER is designed to be highly portable and browser independent: in fact, its proxy-side component runs everywhere a Java Virtual Machine does and its client-side component is a standard Java applet that does not leverage on specific characteristics of the browser (as long as it supports Java applets) and requires minimum installation (i.e. setting the proxy address).

2.1 The architecture

GROUPRECORDER consists of two components (see Fig. 1). The proxy-side component is in charge of extracting the navigation paths of each user during her navigation and offering recording, etc. to the clients. The client-side component is much simpler: it is a Java applet, run on a separate browser window, that, by interacting with the proxy-side component, is able to present the user her current path, to allow annotation, to offer awareness of other users' actions and storing/retrieving information.

The proxy-side component of GROUPRECORDER is implemented by using the Web Intermediaries (WBI) [3], a programmable proxy in Java that receives the user's HTTP requests and produces or filters the responses. Programming applications in WBI is done via *MEG*s (request editor, generator, monitor end document editor) that can be combined to create an application into what is called a plugin.

The WBI Plugin that realizes GROUPRECORDER consists of two MEGs. The `AuthorizationGenerator` MEG recognizes the user by the usual challenge-response mechanism of the Proxy-Authorization HTTP header.

The `AppletGenerator` MEG is the core of the system. First of all, it allows the user the usual navigation in the Web, by fetching the requested URLs and sending them back to the client. Then, it also manages the communication with all the RECORDER applets in order to provide *(a)* monitoring and storing user's browsing information, *(b)* searching among GROUPRECORDER recorded paths, *(c)* the *awareness* of other users' actions (i.e. currently navigated pages) and *(d)* the annotation of URLs within the path.

2.2 Functionalities

The user, say *Alice*, starts by loading a specific start-up page, called `http://_init`, into the browser. This URL is
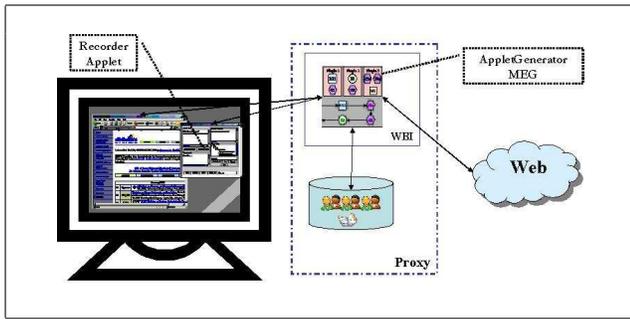
Figure 1: GROUPRECORDER **architecture.**

intercepted by the proxy and an HTML file containing the Java Applet (named the RECORDER) is sent back to the browser. This HTML page also contains (as parameter to the applet) the username by which the user is recognized within the system, username that was entered (with a password) during the authentication phase.

A thread in the `AppletGenerator` MEG, waits for connections on a ServerSocket to manage the new users' connections to the system. In fact, the client-side applet communicates with AppletGenerator MEG that *Alice* just logged in the system and wants to share her navigation with all the other users in the system. The `AppletGenerator` MEG also manages three additional threads to manage operations related to user logout (destroy of the applet), saving the recorded paths and searching among the recorded paths.

The RECORDER applet shown to Alice is in Fig. 2. If Alice starts recording her navigation, all the links that pass through the proxy are shown on the left-top textarea. She can add comments, delete unnecessary links (such as embedded images, etc.) and, then, save the path (with the comments) by using the appropriate buttons. If another user, say *Bob*, logs into the system, his currently visited page is shown on the top-right textarea of Alice RECORDER. On the right-center panel, Alice can browse the paths saved by each user enrolled into the system (also if currently not logged in). By selecting a path, its links are shown and by selecting a link, the comment related is shown in the left-bottom textarea.

Alice can also search for recorded paths with a given name or that contain a given keyword in the URLs or in the comments. Alice can browse (by using cursor arrows) through all the items (users, path names, URLs or comments) that contain the keyword.

3. CONCLUSIONS

The work on GROUPRECORDER is still at a preliminary stage. The prototype described here is fully functional and we are currently working on improving the presentation of some characteristics such as the visualization of the recorded paths (possibly with snapshots or other visual aids, see, e.g. [5]), the capability to move links up/down during the recording. Another improvement currently under way is the capability of saving the recorded path to an HTML file in such a way to support a sort of *group portal* that would be offered by
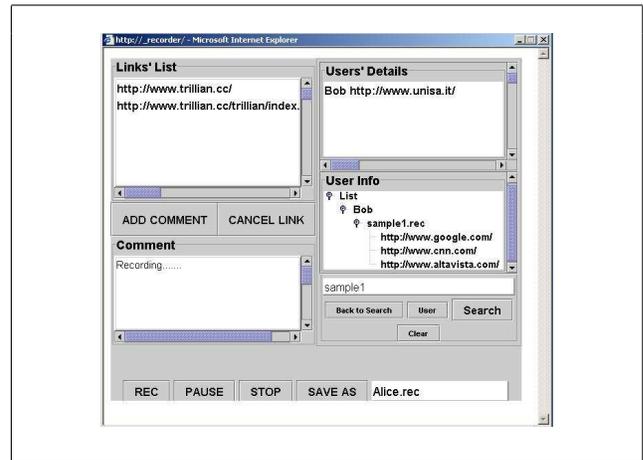

Figure 2: The RECORDER **applet as shown to Alice.**

the WBI proxy acting as a server, as well as allowing to easily send a recorded path (in HTML) to a user that does not participate to the group. Successively, we plan to add new functionalities as multiple groups management and operations that allow users to merge different recorded paths as well as splitting a path in two recorded paths. The concept of "path" will probably be extended to attempt to catch a single focussed navigation activity of the user as, e.g., the WebTrails in [7].

4. REFERENCES

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