

Visualizing Interaction History on a Collaborative Web Server

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ABSTRACT

A CoWeb is a collaborative Web space that allows people to modify content and create new pages in a very easy fashion. We modified the original CoWeb to visualize interaction history information in an effort to make it a more social space and to allow users to engage in social navigation.

KEYWORDS: Social Navigation, History Enriched Environments, Visualizing Interaction Histories

INTRODUCTION

The CoWeb (for collaborative Web) was implemented by Mark Guzdial (based on earlier work by Ward Cunningham) to support anchored discussions. In a CoWeb everybody can modify every page [1]. After clicking on a link to "modify this page" users see a form containing the content of the current page. There is no need to use HTML, although people can use any HTML tags they need. Users create new pages and links by placing asterisks before and after a piece of text. This text then becomes the title of the new page.

In a loose sense, many CoWebs become virtual communities, although there is no provision to show where people went, and what popular topics are.

Our goal was to improve the feeling of community, to make people in the CoWeb aware of each other's activities and to turn the CoWeb into a more social space. Our approach is to provide information not only on what pages have been modified, but also which pages got accessed recently. We provide this information both in global lists as well as in context, right next to links. This makes it easy to see which links lead to new material, or to topics many people are interested in. Users thus navigate both in a semantic space defined by the links, as well as in a social space defined by people's activities [2].

Pointing out new information

The CoWeb knows 3 levels of newness, shown as differently colored "new" markers. Currently the newness levels are hard coded (newer than 24 hours, newer than 3 days, and newer than a week.) Note that these markers show up everywhere there are links in the CoWeb. Thus they are visible on pages, in the list of recently modified pages, in the list of recently accessed pages etc.

In an earlier version we used a marker for pages containing links to new content. This second-level newness marker implemented a simplistic form of "information scent" [3]. In informal conversations with our users we found that they did not understand this marker so we eliminated it.

Visualizing access history

We think that access history is even more important for a sense of activity in a community than pointing out new information, partly because the number of accesses is higher than the number of modifications. Access information occurs as an effortless side effect of just using the system. It is an example for passive interaction history, to use Wexelblats terminology [4] (modifications cause active interaction history).

Access history can be aggregated into a concept of "traffic on a page". This information scales well and because it aggregates contributions from many people it avoids privacy issues. People are quite hesitant to contribute in a CoWeb. Through their accesses even lurkers contribute to an overall interaction history, where a visualization of modifications would leave out this part of the community.

On our CoWeb we use three levels of colored footprint symbols to visualize access history (see figure 1). We aggregate traffic for the past 24 hours based on findings that a recent access to a Web page is an excellent predictor for further accesses in the close future [5]. A special marker is used for pages that received no traffic for over 2 weeks. These pages are declared a "dinosaur" and marked as such.

Our hypothesis was that our visualization encourages additional traffic based on Whyte's observation that "What attracts people is people." Early results from a detailed study indicate that the social navigation markers indeed increase overall activity on the CoWeb. However the markers don't seem to significantly change people's navigation behavior. People seem to consider a CoWeb with markers as "more alive" than one without markers. Final results of this study will be available at the time of the conference.

Global vs. contextual visualization

An important aspect of the link markers is that they occur in the context of a page whereas global lists of

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modifications and accesses show history out of context. We found that users need both kinds of information. Markers embedded in the page seem to be especially useful for providing awareness of active topics related to a page, whereas global lists appear to be useful to get a quick overview of what is new.



Figure 1: CoWeb text with markers

The CoWeb keeps history as a property of the *page*, and not of the *links* between pages. This distinguishes the markers from read wear mechanisms like in the Juggler system [6]. Juggler was a history enriched MOO system, where room exits (= links) showed how often they got used. The difference between the interaction history of Juggler and the CoWeb thus is the difference of showing how many people visited a store vs. showing that most people entered a store through a particular door.

Related work

Social navigation is an emerging topic in collaborative systems and awareness support has long been recognized as an important ingredient for collaborative activities. Newness markers are used on the Web in various forms, but typically they are not maintained automatically or show several levels. There are bulletin board systems that point out hot topics but we are not aware of systems visualizing access histories or pointing out inactive pages.

Due to the short life-span of CoWeb footprints we can avoid the issue of “overshadowing” newer information that was observed for example in Juggler [6], see also [4].

Implementation

Our implementation of interaction history is quite simple. CoWeb pages are objects that remember their own access history in a FIFO list. When a page is accessed the formatter queries linked pages for their history markers. These pages then delete accesses older than 24 hours from their history and return a marker based on the number of remaining history items, or a dinosaur if the last access was more than 2 weeks ago. The formatter creates the appropriate HTML for the page and the markers. This central formatter mechanism allows markers to show up wherever pages are referenced in the CoWeb, including in the list of recently modified pages lists etc. Keeping the history information inside the page objects has advantages but also a number of drawbacks.

For example it is not possible to provide markers for links leading to outside material or for Web sites in general.

Problems with our Approach and Future Work

Presently pages store only timestamps. This allows users to promote a page by reloading it several times. We consider implementing a more elaborate, external history mechanism to prevent this, possibly using intermediaries [7]. This future system will be able to show “new” markers only if material is indeed new for a user. An external history will allow us to maintain separate histories for different user groups and to assign different “weights” to users.

We identified the hard coding of access and newness levels as a flaw of the system. Each CoWeb community and even sub areas within one CoWeb differ greatly in the amount of traffic and their rate of change. The system cannot adjust to these variations. In this point the localized approach to read wear of the Juggler system is superior.

Currently markers encode history-levels only through color. We are experimenting with sonifications of the history information as well as with a quick-navigation Java applet using the markers in combination with sound.

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