Interactive Poster: Visualizing Online Interaction

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ABSTRACT

Various methods allow people to share artifacts, such as photos, messages, and web pages, with their online community. However, a person interested in an artifact currently has no sense of whether other people in the community have interacted with it. Our goal was to make these artifact interactions explicit. To do this, we designed a compact, artifact-centered visualization that shows the artifact's past and present interaction history. This visualization was used to facilitate the analysis of interaction data collected from an online community.

CR Categories: H.4.1 [Office Automation]: Groupware, I.3.6[Computer Graphics]: Interaction Techniques

1 INTRODUCTION

A number of photo-sharing sites, blogs, and groupware tools allow people to share artifacts, such as photos, messages, and web pages, with their online community. Examples include the Notification Collage [3] and Community Bar [4]. Aside from direct communication, the person sharing the artifact receives no feedback of whether other people in the community have seen their posting and/or interacted with it. Similarly, others who notice the artifact have no sense of whether it has attracted the interest of other community members.

Some crude technologies have been developed to mitigate this. For web sites, "hit counters" track the number of times a web page has been visited; more detailed information about viewers' actions is not readily available. In groupware for online communities, a list of all online people suggests who may have seen the artifact, but does not explicitly show their degree of interest in it (if any). Other technologies stress interpersonal interactions vs. artifact interest; these typically show online interaction by visualizing information about communications between individual members of a community [1], [6] or by using proximity of users' representations to indicate a level of activity [2], [5]. These abstract representations do not provide detailed information about the nature of the interaction. History information is not kept or disappears as new interactions occur.

To address these shortcomings, we designed a visualization of past and present artifact-centered activity. The visualization compactly shows:

- who is currently looking at/interacting with the artifact,
- who has previously interacted with the artifact,
- the length of time people have interacted with the artifact,
- the number of times people interacted with the artifact.

This visualization reveals information about online interactions, such as which artifacts people find the most interesting, and which members of the community are the most or least active.

2 VISUALIZING INTERACTION

Figure 1 illustrates our basic visualization. Our example shows how people have viewed and are currently viewing a URL posted to the Community Bar [4] online community. The artifact itself is represented in the center, surrounded by a circle. For a URL artifact, the artifact appears as a thumbnail of the web page. Color is used to identify people, where each person has a different color. For example, the blue color of the central circle in Figure 1 indicates the identity of the person who posted the URL to the community.

Each person who is currently interacting with an artifact is represented by a colored dot positioned on the circle's circumference. The identity of each person is given both by the dot's color, as well as by the first initial of the person's name inside the dot. One such dot is seen in Figure 1, indicating that one person is currently examining this URL artifact. As a person begins to interact with an artifact, the dot appears and moves towards the bottom of the circle. As the person continues to interact with the artifact, their dot moves clockwise around the circle; thus its position represents the total time of that person's current interaction with the artifact. The time annotations in Figure 1 show that this movement is non-linear; it takes eight seconds for the person's dot to reach the top of the artifact's circle, but another fifty seconds to circle around to the bottom (these time intervals can be altered depending on how one wants to use this visualization). Finally, when a person stops interacting with an artifact, their dot 'bursts' at its current position, leaving behind a lump; this is a historical trace showing past activity, as it marks how long a particular person had previously interacted with the artifact. Figure 1 (lower left) shows an example: the yellow blob reveals that another person previously interacted with this artifact for about 4 seconds. Subsequent interactions by that person will appear as a new dot, and ultimately as a new lump.

While simple, this display reveals the simultaneous interactions currently happening around an artifact, the number and identity of people who are currently interacting with it, and how long they have looked at it. Similarly, it reveals the number and identity of people who have previously interacted with the artifact and for how long.
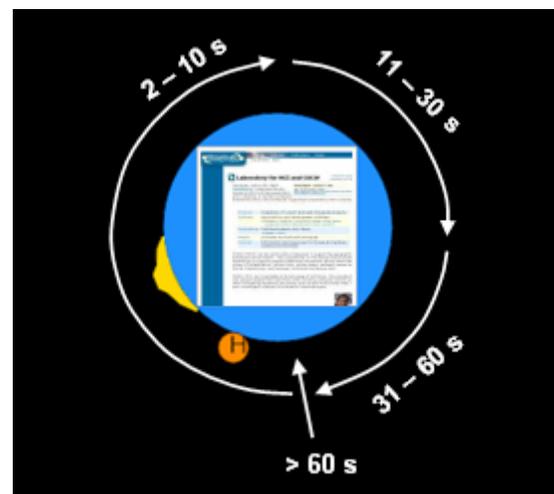
Figure 1. Visualization of people viewing a URL artifact.

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3 USING THE VISUALIZATION TO ANALYZE GROUPWARE USE

We used this visualization within a tool that let us analyze interactions within the Community Bar (CB) [4]. By way of background, CB supports informal awareness and casual interaction in distributed groups; in one sense, it can be considered a multimedia chat system used by a small group of people who are known to each other. CB is visible on the side of a user's display as a thin vertical bar containing small live multimedia items, where each item is posted by individuals. Items include webcam video, group-editable text notes, chats, web page thumbnails, and thumbnails of individual desktops. As people become interested in an item, they can examine it in detail or move into actual interaction, either by popping up a larger but transient tooltip view of that item, or an even larger independent window of it. As part of our analysis of how CB is used, we logged how a community of 15 people interacted through it for two weeks. The log tracked when people came online, how items were posted and its contents changed, and when people looked at an item in greater detail by raising either the tooltip or its window view. Resulting log files were large, and it was difficult to analyze the text of the log for the various interactions on the CB. Consequently, we created a tool for playing back and visualizing CB interactions using the visualization described in Section 2.

A snapshot of our CB visualization is illustrated in Figure 2. The visualization fills the main area. The buttons at the bottom lets a person control the playback of the visualization over time (backwards, forwards, speed up, slow down). The right side offers a detailed textual description that appears as the analyst moves over an item. Figure 3 gives another example; it is annotated and zoomed in on the visualization.

The visualization is split by a horizontal row in the middle, where each person currently logged into CB at this moment in playback time is represented by a dot (7 people in Figure 2, and 2 in Figure 3). Dots are ordered left to right by login time. When someone logs off, their dot fades away, with other dots shifting over to close the gap. The area above this row shows newly added or recently changed artifacts, i.e., the media items currently appearing on the CB. Circles are ordered left to right by the time they were last changed, and each item's color matches the color of the person's dot who posted it. If an item is not changed for two minutes, it moves to the bottom half of the screen. These are also ordered by change recency, where deleted items fade away. Thus this is a type of historical focus plus context display; the top lets people focus on the currently active items, while the bottom gives historical context.

As the trace unfolds, CB users looking at the tooltip view of an item are shown by the appearance and movement of "clones" of their colored dots. As people look at certain items, their colored dot will clone a copy and shoot it towards the bottom of the item. If the person looks at an item for less than two seconds, their clone will disappear in mid-flight. At two seconds, their clone will come in contact with the bottom of the item, and as time passes, the clone will orbit around the item.

Using this visualization technique the interaction patterns on Community Bar become apparent. Examples observed include an initial flurry of activity when a new item is posted, or the drop-off in viewers as others stop following a directed conversation between two people.

4 CONCLUSION

A compact, artifact-centered visualization with history traces was designed and incorporated into a data analysis tool for Community Bar interactions. While our tool currently visualizes only logged data, the visualization can go beyond that. Our next step is to adapt this visualization to show real-time interaction
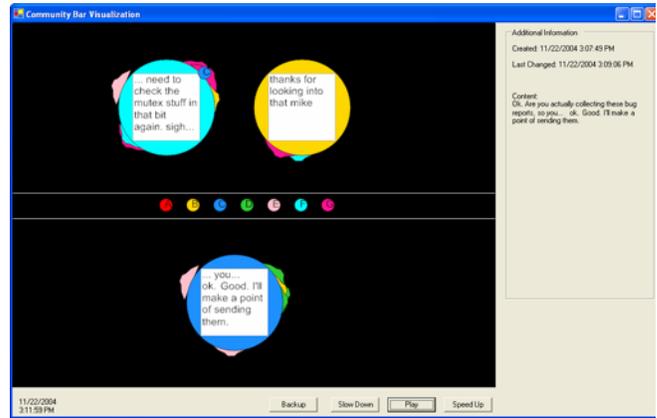

Figure 2. CB visualization showing three posted text notes. Each note had multiple viewers, some who are repeat viewers.
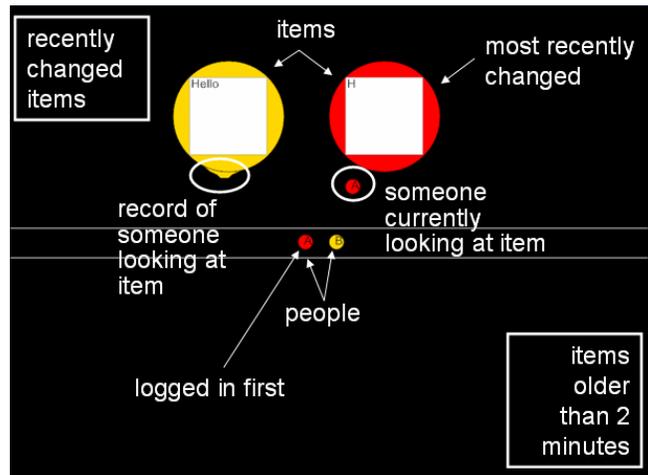

Figure 3. In CB, people can either view text notes or edit them; thus, some people may interact with items that they have posted, in addition to items that others have posted.

within the CB, similar to how Babble shows interpersonal interaction [2]. We also believe that we can use this visualization to see how people share artifacts in other online environments over long time periods, such as photo-sharing sites or blogs.

REFERENCE

[1] Elliot, K. *Particle NC*. Retrieved June 30, 2005, from University of Calgary Department of Computer Science Web site: http://pages.cpsc.ucalgary.ca/~elliotk/portfolio/projects/particle.html

[2] Erickson, T., Smith, D., Kellog, W., Laff, M., Richards, J. & Bradner, E. Socially Translucent Systems: Social Proxies, Persistent Conversation, and the Design of 'Babble'. *Proc. CHI 1999*, ACM Press (1999), 72-79.

[3] Greenberg, S. & Rounding, M. The Notification Collage: Posting Information to Public and Personal Displays. *Proc. CHI 2001*, ACM Press (2001), 514-521.

[4] McEwan, G. & Greenberg, S. Supporting Social Worlds with the Community Bar. Technical Report 2005-789-20, Department of Computer Science, University of Calgary, Canada. (2005) May.

[5] Viegas, F. & Donath, J. Chat Circles. *Proc. CHI 1999*, ACM Press (1999), 9-16.

[6] Xiong, R. & Donath, J. PeopleGarden: Creating Data Portraits for Users. *Proc. UIST 1999*, ACM Press (1999), 37-44.