VisStream: Visualizing Temporal Multimedia Conversations

Charlotte Tang and Saul Greenberg

Department of Computer Science
University of Calgary, Calgary, AB, T2N 1N4
[tangsh *or* saul]@cpsc.ucalgary.ca

Casual interaction is recognized as the backbone of everyday collaboration, where a wealth of valuable information is exchanged by people in brief and impromptu but context-rich meetings [3]. Within CSCW, many researchers strive to support casual interaction between distance-separated collaborators through specially designed groupware systems. Early versions of these systems, such as media spaces and instant messaging systems [4], presented only one or two media channels for supporting interpersonal awareness and resulting interactions. However, more recent systems offer many media channels in an effort to emulate the rich contextual information visible in the everyday world. One such system built in our laboratory is the Notification Collage [2], which lets people post various media elements to a publicly viewable electronic work surface. Media elements include text notes, images, slide shows, web pages, video snapshots, one's computer screen, and so on. The idea is that these rich information sources provide the group with awareness not only of each other's interpersonal state, but of interesting artifacts; the consequence of this awareness will be many casual interactions.

Of course, these kinds of systems need rigorous evaluation. In particular, we are interested in capturing and analyzing temporal histories of multimedia conversations. We know this will not be an easy task. First, because we want to analyze sequences of interactions spanning months, the history (and the amount of data) can become extremely long. Second, because many people are involved, we know the resulting conversational threads will be heavily interleaved, lengthy, and involved. Third, we know that the various media elements have quite different properties. Some are text *vs* image based media. Some are discrete elements (e.g., a single web page thumbnail), while others are bursty (e.g., evolving fragments of a text conversation) or even continuous (e.g., the sequence comprising a video stream).

Surprisingly, there are few tools that help people display and explore temporal histories of multimedia communications [5,6]. Consequently, we developed VisStream, a multimedia conversation capture and analysis tool.

VISSTREAM

VisStream has two major functions: *conversation capture*, and *conversation visualization*. For conversation capture, we instrumented the Notification Collage [2] so we could monitor all activities and conversations contained within its multimedia elements. These elements are then recorded as a temporal stream in a database.

For conversation visualization, VisStream presents the history as a graphical timeline (Figure 1). We chose this approach because the natural ordering of communication occurrences by time also preserves the conversation's context [5,6]. The catch is that there will be far too many media elements to display at full fidelity in this timeline.

Consequently, VisStream offers several visualization, playback and filtering techniques to allow the evaluator to selectively examine the data (see figure 1). On startup, an overview of the entire data set is displayed. Media elements are grouped into rows, where each row contains all media elements created by a particular person. Rows are time-ordered, where new people or already seen people at new locations are added to the bottom. Within a row, individual media elements are time-ordered from left to right. This gives the 'piano role' effect [7], partially seen in Figure 1.

This data is viewable at three levels of detail. First, an overview displays individual media elements very compactly (a few pixels each; see top row in Figure 1). The evaluator would use this overview to visually discover and study communication patterns and trends. Second, evaluators can selectively zoom into selected portion of the data set, where individual elements or rows can be expanded at will. For example, the figure shows a case where several rows have been expanded by selecting the checkboxes at their far left. Third, evaluators can get details of one or more media elements on demand by selecting them; a full-sized version of selected media elements then appears on an actual Notification Collage display, shown in a somewhat squashed form at the right of the figure.

Next, VisStream offers playback capabilities, where one can position a timeline (the vertical line in the figure) and 'play' the conversation back on the Notification Collage via the video-player style buttons located at the lower middle part of the figure.

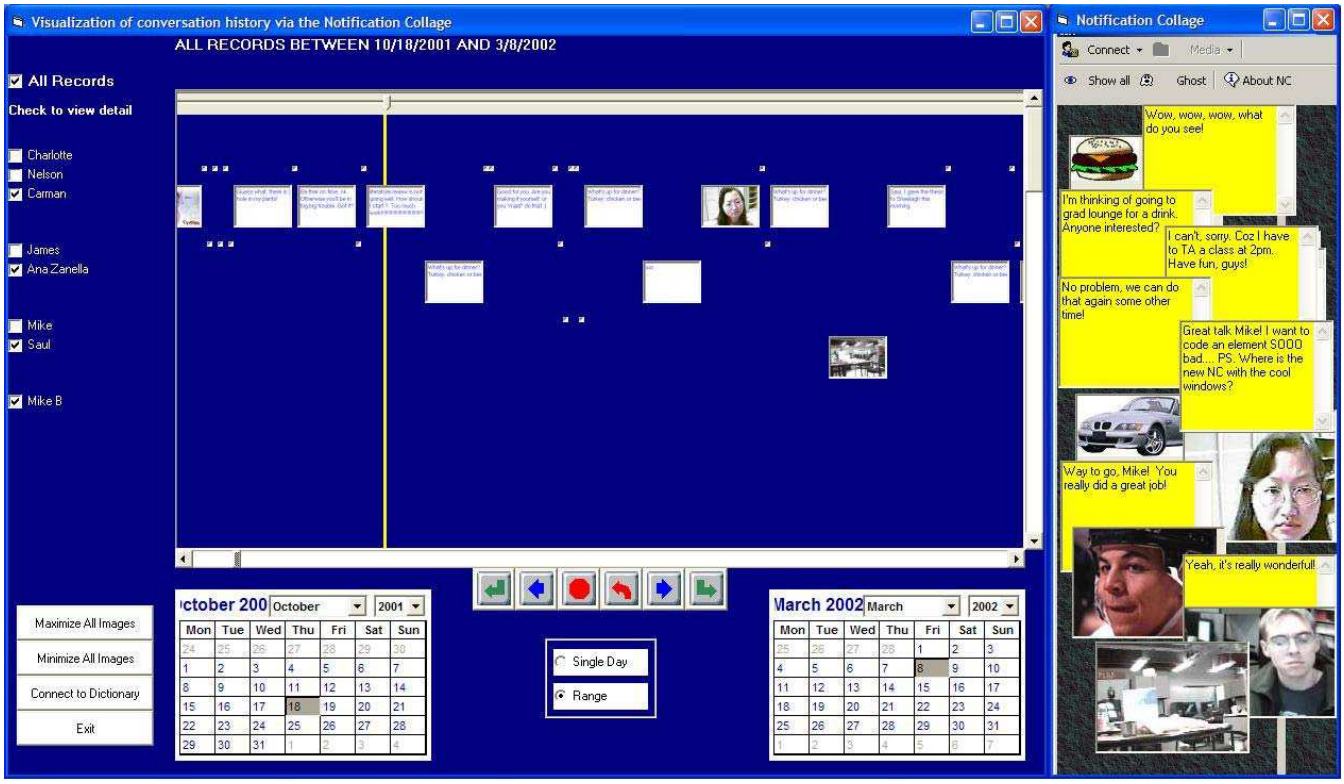

Figure 1. A snapshot of VisStream

Finally, media elements are dynamically filtered in several ways that encourage homogeneous decomposition—the process of repeatedly partitioning the same attribute to narrower ranges of the attribute values [1]. One can select a particular time period for examination by the calendar and day controls visible in the lower part of the figure. Media elements outside this range are removed from view. As well, selecting rows (i.e. people and particular media streams) also affect what appears in the Notification Collage playback window; unselected rows are not displayed in it.

Collectively, these techniques allow one to detect broad patterns in the data, zoom in on particular regions to gain a better understanding of what is going on, remove uninteresting threads by filtering, get details on demand, and playback selected and filtered conversation segments at various speeds.

CURRENT STATUS

VisStream is a prototype built in Visual Basic. While all the described features are working, it is still under active development. We are now designing a usability study; we have collected some conversational data, and will examine how people can use VisStream to navigate through and discover conversational patterns. We also plan to use VisStream for other conversational systems, such as Instant Messenger logs and even email archives.

ACKNOWLEDGEMENTS

We thank Sheelagh Carpendale, Michael Rounding, and other Grouplab members for their feedback on this project.

REFERENCES

1. Goldstein, J. and Roth, S.F. (1994), Using Aggregation and Dynamic Queries for Exploring Large Data Sets. *Proc ACM CHI '94*.
2. Greenberg, S. and Rounding, M. (2000), Notification Collage: Posting Information to Public and Personal Displays, *Proc ACM CSCW 2000*.
3. Kraut, R., Egido, C. (1988), Patterns of Contact and Communication in Scientific Research Collaboration, *Proc ACM CSCW'88*.
4. Nardi, B.A., Whittaker, S. and Bradner, E. (2000), Interaction and Outeraction: Instant Messaging in Action. *Proc ACM CSCW 2000*.
5. Owen, R.N., Baecker, R.M. and Harrison, B. (1994), Timelines, a tool for the gathering, coding and analysis of usability data, *Proc ACM CHI '94*.
6. Plaisant, C., Heller, D., Li, J., Shneiderman, B., Mushlin, R. and Karat, J. (1998), Visualizing medical records with LifeLines, *Proc ACM CHI '98*.
7. Smith M., Cadiz, J.J. and Burkhalter, B. (2001), Conversation Trees and Threaded Chats, *Proc ACM CSCW 2001*.

Poster Design.
The poster will be an annotated storyboard of VisStream, showing its various features. We expect the system's visual properties will make an effective display. We also plan to have a laptop with VisStream running on it during the meet and greet session.

Prior History.
This paper reports early work. It has not been submitted to other conferences, nor has it been previously published.