

A Fisheye Text Editor for Relaxed-WYSIWIS Groupware

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ABSTRACT

Participants in a real-time groupware conference require a sense of awareness about other people's interactions within a large shared workspace. Fisheye views can afford this awareness by assigning a focal point to each participant. The fisheye effect around these multiple focal points provides peripheral awareness by showing people's location in the global context, and by magnifying the area around their work to highlight interaction details. An adjustable magnification function lets people customize the awareness information to fit their collaboration needs. A fisheye text editor illustrates how this can be accomplished.

Keywords

Groupware, fisheye views, awareness, visualization.

INTRODUCTION

Real-time distributed groupware typically provides a shared virtual workspace where people can see and manipulate work artifacts. Many systems now follow a relaxed "what-you-see-is-what-I-see" (*relaxed-WYSIWIS*) model, where people can have different viewports into the workspace. The problem is that groupware workspaces do not yet afford the richness of interaction available in their physical counterparts. In particular, it is more difficult to maintain a sense of *workspace awareness*: the up-to-the-minute knowledge about another person's interactions with the shared workspace [1]. In groupware, people's normal mechanisms for tracking what goes on around them, such as peripheral vision and quick glances, are ineffective since the required information may be absent from the display. People can lose the sense of awareness that is essential for coordinating interaction, such as where others are operating and what they are doing.

One solution supplies users with two separate windows: a full sized viewport, and a *radar overview* that presents an active miniature of the workspace. Radar views typically overlay boxes atop the miniature to indicate other participant's viewport [1]. However, radar views introduce

a seam between local and global contexts. To gather awareness information, people must attend to and mentally integrate two displays that differ in both scale and physical location. As well, the actions shown in the miniature may not be useful due to the loss of resolution and detail.

Applying fisheye visualization techniques to groupware can remove this seam. In conventional fisheye systems, multiple focal points magnify regions of personal interest within the global context [3]. A groupware fisheye twists this notion by assigning a focal point to each participant. Consequently, a person's view into the shared workspace will contain magnified regions showing others' work areas, seamlessly integrated into the global context. These regions provide awareness of the details of others' actions. If the magnification function is adjustable, a person can even customize the awareness information to suit their particular collaboration needs in the shared workspace.

A FISHEYE TEXT EDITOR USED BY ONE PERSON

A fisheye view is a visualization technique that provides both local detail and global context in a single display. It takes its name from camera lenses that distort a scene to provide very wide angles of view. In a computational fisheye, the user chooses one or more points of focus where they wish to see local detail [3]. These areas are visually emphasized, with the surrounding regions de-emphasized by graphical scaling, filtering, or clustering.

The editor in Figure 1 uses a fisheye lens to present a text document. Most of the text is shown at a very small font, which gives the person a sense of the document's global structure. The user views local detail by selecting a focal point in the document with the mouse or scrollbar. Fisheye effects are customized through a novel *lens widget*—users can resize the background text, and modify the shape of the lens that magnifies text around their focal point.

A GROUPWARE FISHEYE TEXT EDITOR

While valuable for single-user information visualization, fisheye views can be extended to support workspace awareness in groupware as well. The fisheye text editor above is actually a groupware application constructed in a groupware toolkit [2]. As groupware, the editor lets multiple people view the same document. People join into it through a session manager (Figure 2, top right). Although

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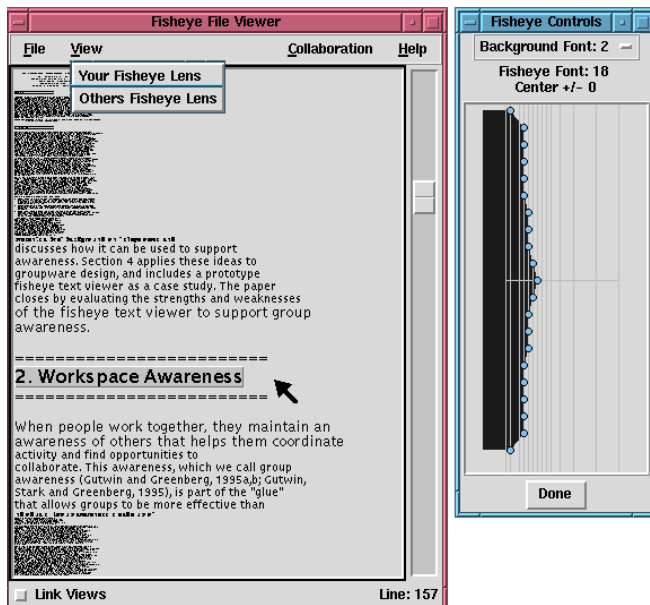


Figure 1. The fisheye text viewer with one user

the same document is visible on all displays, views are relaxed-WYSIWIS: each person can set their own focal point and customize the fisheye effect.

Support for workspace awareness involves representing each participant's focus in the document. First, location information and user identification is presented by marking others' focal points with an assigned color. Second, the text around other participants' focal points is also magnified. Figure 2 shows three focal points with corresponding magnified regions; the center region belongs to the user and the surrounding two represent the other participants. Their locations in the global context and the details of their work are clearly visible.

As people move between loosely and tightly coupled collaborations, their awareness requirements will change. Because display space is at a premium, a person should be able to allocate screen space for their own work or for the display of awareness information, as required. In the fisheye editor, a person can customize the amount of awareness detail by altering the magnification function applied to others' focal points, by changing the background magnification, and by linking their views.

- If only location information is desired, one can turn off the magnification of other participants' focal points. Others' locations remain visible through color, but no extra screen space is used.
- For finer-grained awareness, the detail visible can be progressively increased by growing the magnification around the other participant's focus, as well as the extent of the region being magnified.
- When people are working far apart in the document, a "split window" effect can bring them closer together.

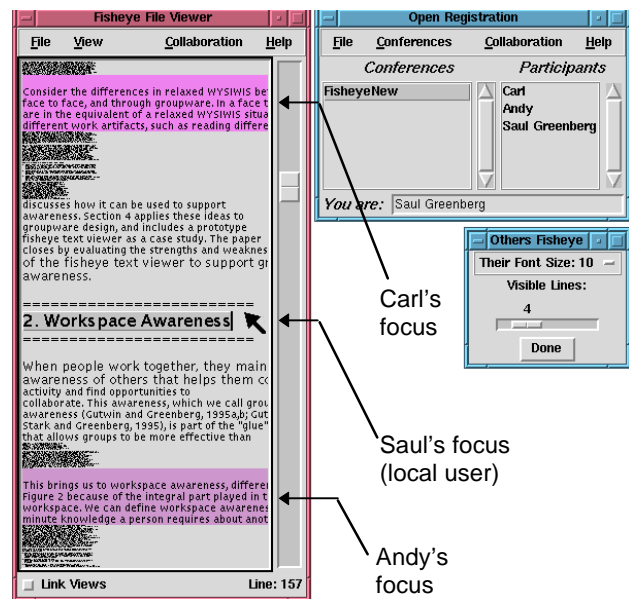


Figure 2. The viewer showing three participants.

The background font is made invisible, thus displaying only the regions surrounding each focal point.

- For tightly-coupled collaboration, people can link their views, which lets all participants share a common focal point. If any user changes the focus, it will be changed on all other displays as well.

DISCUSSION AND SUMMARY

There is more to awareness than knowing other's location and actions, and an appraisal of the fisheye editor against an awareness framework [1] has identified other requirements that need to be addressed. For example, because people need to be aware of others' movements and gestures in the workspace, we have added telepointers to the system. We also need a better way of identifying who belongs to a given focal point, as color is not a particularly good cue. However, the basic fisheye concept seems sound.

We believe that fisheye views are a good approach to help people maintain workspace awareness. This remains to be confirmed by user-based studies.

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