The InfoCanvas: Information Conveyance through Personalized, Expressive Art

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ABSTRACT

This paper describes the design of a highly versatile ambient display, the InfoCanvas. Through a novel interface, people identify information of interest and then "paint" an appealing and meaningful representation of it on a virtual canvas for later communication back to them. This new form of interaction with information allows people to keep tabs on useful, but peripheral, information in a calm, unobtrusive manner.

Keywords

Information awareness, ambient display, peripheral information display, visualization

INTRODUCTION

Existing ambient display tools seek to increase awareness of information through visual, aural, and physical effects[1]. However, most ambient tools are limited to only representing one or two sources of information at a time, and the sources of information are often predetermined or hardwired. Furthermore, the tools typically do not allow end-user configuration and only present the current status of information, not what may have occurred while the user was absent. To overcome these limitations, we are developing the InfoCanvas, which facilitates calm[2], ambient awareness of information with more flexibility and higher bandwidth than existing ambient displays.

OVERVIEW

People have a variety of information they want to maintain peripheral awareness of, such as stocks, weather, traffic, who's online, etc. This type of data is really "convenience information", as it is not absolutely critical, but yet knowing it can be helpful in many different ways. We have a vision of an information display that may be manifested through a large, flat-panel display on an office wall or a picture frame-like display on a desk as shown in Figure 1. The display shows a visually appealing scene, much like a favorite painting or photograph, that through its presentation conveys convenience information to the user. For example, the display might be a countryside scene in which weather represents stock market activity; cars on a

road represent traffic conditions; and the number of flowers in a field corresponds to new email messages. Our vision is that the user will be able to specify the information sources of interest, and then "paint" a scene representing the information, effectively mapping it to the canvas. A canvas can then be run in a display device such as a flat panel LCD, where it will monitor the pertinent information and subtly update itself appropriately.

Figure 1 - The InfoCanvas in a work environment

Our approach is similar to that of the InformativeArt[3] project that uses LCD panels as ambient displays to depict email traffic flow or web site usage. Their displays, however, present only one, predetermined source of information and modify particular aspects of predesigned abstract art. Conversely, allowing end-users to express their own creative designs is a key part of our effort.

PAINTING INFORMATION

There are two steps in painting information on the InfoCanvas: specifying the information to be represented and visually mapping the data to the canvas. For illustrative purposes, we will walk through a specific example, representing stock market conditions through weather on a landscape-like canvas.

Information Sources

The first step in painting information is to identify its source. Currently, InfoCanvas accepts data from email accounts and web pages. Certain "rules" can be applied to each source for extracting and interpreting its data. Rules applied to an email source can monitor the number of

messages, arrival of new messages, new messages from a particular person or with a particular keyword in the subject, and when a reply arrives. Web pages can be monitored for any general update in their content, the presence of a keyword in the content, or a value can be extracted that is associated with a keyword using the KPS Mining Algorithm [4]. Multiple rules can be assigned to a source, with each rule having its own unique representation on the canvas.

In representing the stock market, we identify a page from Yahoo as our data source that presents detail on the Dow Index by copying the URL into a source definition dialog box. We then set an "Extract value associated with keyword" rule and give the keyword "Change". This will find the first instance of the word "Change" in the page and extract the value immediately following it (which is a number that represents the change in the index that day).

Design palette

Once an information source has been identified and the method for extracting data defined, the user can paint a representation for the information on the canvas using the tools available in the "design palette", as shown in Figure 2. The design palette consists of drawing tools and a menu of icons. The drawing tools provide simple painting capabilities, such as paint brushes, lines, circles, and color selection as well as manipulator buttons for defining ways to vary the representation. The manipulators allow the drawing to be scaled, rotated, moved, and colored. This currently only works for numeric data (such as a value associated with a keyword on a web page) where the numeric value is used as the amount to scale, rotate, move, and color. Non-numeric data will simply trigger the representation of the information to be visible when the rule's conditions are satisfied (ex. when new mail arrives). Icons can be dragged onto the canvas from the palette and manipulated to quickly create a representation for the information, relieving the need for any artistic skills. It is up to the user to choose how to represent the information. Complex drawings can be created in third party programs and imported to the set of icons on the palette.
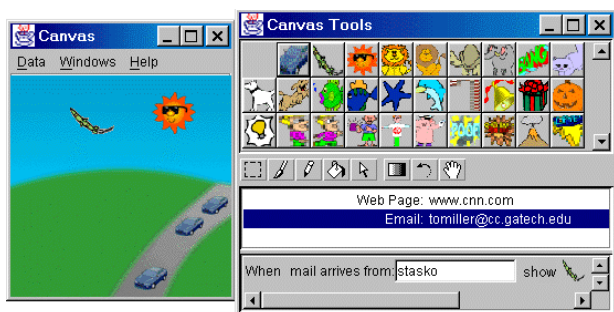

Figure 2 - Screenshot of the canvas and palette

Once the stock market data source is defined, we can paint a sun that will change color based on the numeric value extracted from the data source. First, the paint brush tool is used to draw a sun on the canvas. Then, to make the color vary with the value extracted, we use "hue shift" manipulator. This adjusts the hue of our sun such that it will become more yellow on a good day and reddish on a bad day. Other manipulations could have been used, such as moving the sun along a path or adjusting its opacity to represent the market conditions.

THE CANVAS

All information is painted on top of the backdrop provided by the canvas. Once a scene is deployed, the canvas will monitor the information sources and subtly update its representation. Additionally, it can be scaled to any size, allowing the user as much room as desired upon which to paint their information. Lastly, canvases can be created and shared among users through one file that can be saved and loaded. This also gives the flexibility for one user to switch between different paintings they've created.

STATUS

Initial versions of all the components described here have been implemented and are functional. Email and web data sources are available with basic sets of rules for assisting the user in identifying information of interest. Extracting data from web pages is quite difficult however, and the existing KPS algorithm could be greatly enhanced. The canvas currently provides a rudimentary drawing editor and a palette of icons that can be imported. Running canvases are able to monitor the information they represent by periodically polling the data sources and checking for new or updated information.

We currently are expanding the set of data sources to include physical sensors, calendars, to-do lists, printer queues, and network traffic, as well as more generic rules for building complex representations. We also plan to explore collaborative or shared InfoCanvases. A project team could visualize progress, reminders, and other status items on a shared display. A study to examine patterns of actual usage and identify interface issues is planned as well.

REFERENCES

1. Wisneski, C., et al., "Ambient Displays: Turning Architectural Space into an Interface between People and Digital Information", *Proceedings of the International Workshop on Cooperative Buildings*, (Darmstadt, Germany, Feburary 1998), pp. 22-32.

2. Weiser, M., and Brown, J., "Designing Calm Technology", *PowerGrid Journal*, v1.01, (July 1996), (see: http://powergrid.electiciti.com/1.01).

3. Redstrom, J., Skog, T., and Hallnas, L., "Informative Art: Using Amplified Artworks as Information Displays", *Proceedings of DARE 2000*, (Elsinore, Denmark, April 2000), pp. 103-114.

4. Guan, T., and Wong, K., "KPS: A Web Information Mining Algorithm", *Proceedings of WWW8*, (Toronto, Canada, May 1999).