Exploring personal media: A spatial interface supporting user-defined semantic regions

Hyunmo Kang*, Ben Shneiderman

Department of Computer Science, Human–Computer Interaction Laboratory, Institute for Advanced Computer Studies & Institute for Systems Research, University of Maryland at College Park, College Park, MD 20742, USA

Abstract

Graphical mechanisms for spatially organizing personal media data could enable users to fruitfully apply their conceptual models. This paper introduces *Semantic regions*, an innovative way for users to construct display representations of their conceptual models by drawing regions on 2D space and specifying the semantics for each region. Then users can apply personal categorizations to personal media data using the *fling-and-flock* metaphor. This allows personal media to be dragged to the spatially organized display and automatically grouped according to time, geography, family trees, groups of friends, or other spatially organized display representations of conceptual models. The prototype implementation for *semantic regions*, MediaFinder, was refined based on two small usability tests for usage and construction of user-defined conceptual models.
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1. Introduction

Computer users often deal with large numbers of personal media objects such as photos, music, voice mail, video clips, web pages, emails, and document files. The term "personal media" suggests information sources that are familiar to users (e.g. family photos) and that have a modest number of items (say 100–10,000) so that browsing rather than search is

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*Corresponding author. Tel.: +1 301 405 2725.
 E-mail addresses: kang@cs.umd.edu (H. Kang), ben@cs.umd.edu (B. Shneiderman).

common. The process of browsing ("exploration of a body of information, based on the organization of the collections or scanning lists, rather than by direct searching" [1]) implies visual presentations that support exploration and promote retention. Managing personal media objects is a challenge for most users, who may struggle to understand, interpret, arrange, and use personal media objects. They wrestle with at least three major problems; an ever increasing amount of personal media data, rigid organizing metaphors, and difficulty in rapid data access.

Users understand their personal media by constructing conceptual models of it in their minds. There is no unique or right model. Rather, the models are personal, have meaning for the individual who creates them, and are tied to specific tasks. Even in a simple personal photo library, images can be organized by timelines, locations, events, people, etc. depending on users' conceptual models. Despite the diversity of users' conceptual models, the means available for users to organize and customize their information spaces are extremely poor and driven mostly by storage and distribution models, not by users' needs. Consequently, one of the main challenges in designing a novel user interface for exploring personal media is to make it easier for end-users to construct, represent and apply their conceptual models flexibly for current tasks.

Another challenge in designing a personal media management system is to find ways to enable users to locate personal media objects rapidly. The wide and deep structure of file folder hierarchies as well as the inconsistent and sometimes meaningless file names often makes it difficult for users to find what they are looking for. Human capabilities for spatial cognition [2] can be a solution because they allow rapid information retrieval in 2D graphical user interfaces. Several experiments [3,4] have shown that spatial organizations of information enable users to access data items surprisingly quickly. Furthermore, if the spatial organization of information is based on familiar display representations or users' conceptual models, task performance may improve even more.

Familiar display representations that facilitate comprehension include calendars, timelines, maps, organization charts, floor plans, body diagrams, building layouts, integrated circuit block diagrams, and periodic tables (Fig. 1). Unlike the standard mathematical or statistical visualizations such as histograms, line graphs, pie charts, scatter plots, lists, tables, and grids, most of these representations contain rich semantic information in their visual patterns. For example, organizational charts and genealogy trees include semantic information on the hierarchical structures of groups as well as their relationships. Timelines and calendars represent temporal information concerning events as well as time units.

The semantic combination of display representations and personal media can provide multiple perspectives for different information tasks. For example, suppose that a huge number of digital photos are combined with various display representations. The photos can be combined with a map display to show the distribution of photos according to the place they were taken. They can also be combined with a calendar display to represent the distribution of photos over days, weeks, months, or years depending on the time unit of the calendar. If the photos are about the anatomy of the human body, they can be combined with a human body diagram to specify which picture comes from which part of the human body. If the photos are about paintings taken from a museum, they can be combined with the museum layout diagram to indicate which painting was displayed in which exhibition room, or they can be combined with a timeline of art history to identify the trends of paintings at the time they were created. Likewise, other types of documents as