

MediaFinder: An Interface for Dynamic Personal Media Management with Semantic Regions

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ABSTRACT

Computer users deal with large amounts of personal media often face problems in managing and exploring it. This paper presents *Semantic Regions*, rectangular regions that enable users to specify their semantics or mental models, and the *MediaFinder* application, which uses *Semantic Regions* as the basis of a personal media management tool.

Keywords

Personal Media Management, Dynamic Queries, Spatial Information Organization, Fling-and-flock, User Interfaces

INTRODUCTION AND RELATED WORK

Personal media, such as images, audio clips, voice mail, videos, web pages, emails, are difficult to manage and explore because the tools for users to organize and customize their information spaces are inflexible and driven mostly by storage and distribution models, not user's mental models. A file system provides only a single-inheritance structure. Personal media items can only be in one place at a time, and so can occupy only one spot in the semantic structure. Secondly, the structure by which files should be organized is dependent on the task, but the file system hierarchy remains fixed and rigid.

A variety of approaches have been proposed for supporting more flexible document management. LifeStreams [2] uses a timeline as the major organizational metaphor for managing document spaces. The Semantic File System [3] introduces a "virtual directory", which is integrated into a file system to interpret virtual directory names as queries. Presto [1] is a prototype document management system that interacts with documents through user-level attributes.

In this paper, we present an innovative approach, *Semantic Regions*, based on two facts; the variety of users' mental models toward personal media data and the effectiveness of spatial organization of information. Human beings understand the world by constructing models of it in their minds. There is no unique or right model; rather the mental model is personal, has meaning for the individual who creates it, and is tied to a specific task. For example, in personal photo libraries, photo collections can be organized

by timelines, locations, events, people, etc. depending on users' current mental models. Several prior experiments already have shown that spatial organizations of information enable users to access data items surprisingly quickly [4]. Even greater improvements in task performance are possible, if the spatial organization uses familiar display representations such as a map, calendar, timeline, genealogy tree, organizational chart, and so on.

We believe that spatial organization of information based on the semantics of personal media and the users' mental models will increase performance and satisfaction.

MEDIAFINDER

The *MediaFinder* is a prototype interactive tool built to investigate the use of *Semantic Regions* for exploring and managing personal media data. The initial prototype was built on top of PhotoFinder [5] to manage the photo data.

Semantic Regions (Organization)

Semantic Regions are rectangular regions drawn directly on a 2D canvas. Users can specify the shapes, sizes, and positions of the regions and form a meaningful layout (Fig. 1). Creation of *Semantic Regions* is straightforward: users simply click on the desired starting point of the semantic region and drag the pointer to the desired location of the opposite corner. Once the semantic region is created the semantics of each region can be specified with the combination of the attributes of personal media objects.

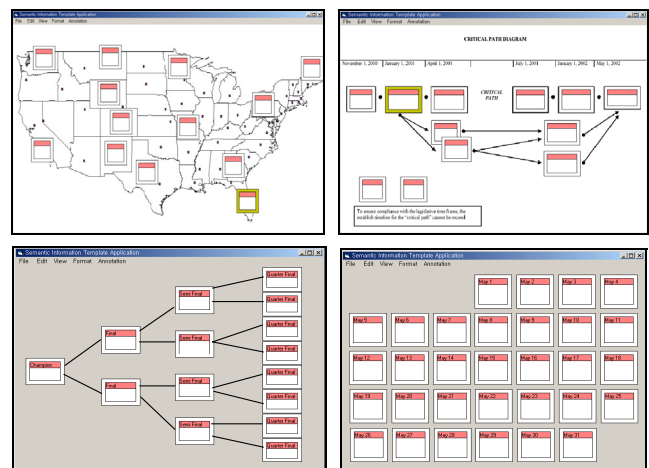


Figure 1. *Semantic Regions* Examples: (a) Map (b) Critical Path (c) Organization Chart (d) Monthly Calendar

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CHI 2003, April 5-10, 2003, Ft. Lauderdale, Florida, USA.

ACM 1-58113-637-4/03/0004

Fling-and-Flock Metaphor (Data Binding)

When a collection of personal photos is dragged from PhotoFinder onto *MediaFinder*, photos are automatically placed in the appropriate regions based on the annotations (Fig. 2). This metaphor is called *fling-and-flock*, that is, users fling the objects and the objects flock to the regions. If the photos don't satisfy any of the semantics of regions, they are collected in the remaining items region located at the top of *MediaFinder* window. The current regions can be saved to be applied to other personal media data sets later.

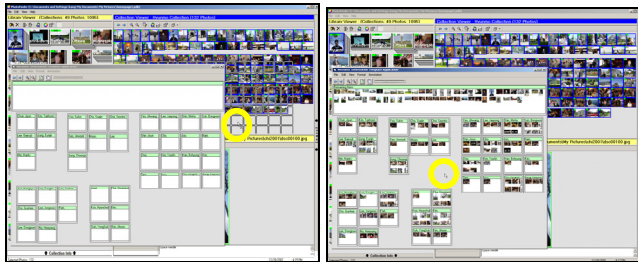


Figure 2. Fling-and-Flock Metaphor: (a) Photos are dragged from PhotoFinder (b) Photos are automatically placed in the appropriate regions based on the semantics

Combine Mental Models (Meaning Extraction)

Users can combine a few heterogeneous mental models simultaneously to observe the relationships among them. In Fig. 3, three mental models, US map, year calendar, and my friends group are combined together, and bound to photos through the fling-and-flock metaphor.

A photo can be contained in multiple regions as long as it satisfies the semantics of regions, which enables flexible organization. When the mouse is over the title of the region (yellow circle), all the regions containing any of the items in the region are highlighted red. In this example, users can easily answer the question like “When did I visit California and whom did I meet there ?” by positioning the mouse on the title of California region.

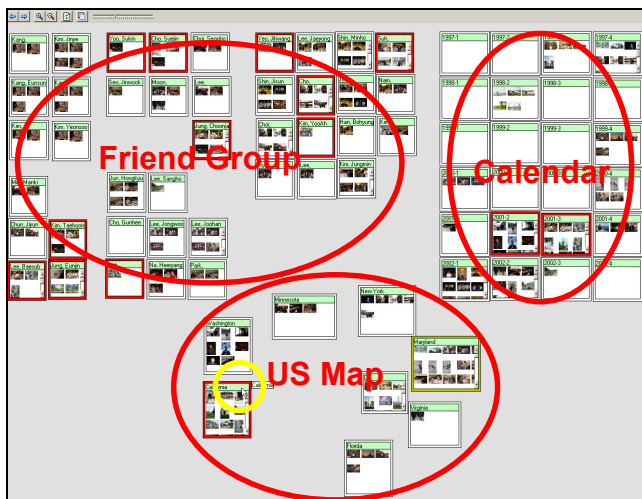


Figure 3. Three mental models, friend groups, quarter year calendar, and US map are combined together.

Search and Navigation

MediaFinder supports boolean (AND, OR, NOT) operations to facilitate search and navigation. In Fig. 4, to see all the photos taken in the first quarter of years between 1997 and 2002, the first column of each row is selected to apply OR operation. A new region is created over the selected regions to contain the photos in this group.

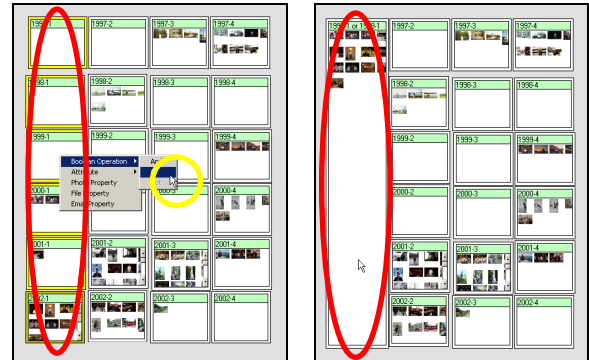


Figure 4. (a) Select and apply OR operation to the regions (b) New region created over the selected regions

Indexing

Semantic Regions can also be used for indexing personal media objects. If users select personal media objects in one region and drag them to another region, the attribute values of the selected objects are updated with those specified in the dragged region.

DISCUSSION AND CONCLUSIONS

Users can collect the semantics of personal media by automatic online creation (e.g. metadata from digital camera), offline extraction (e.g. face recognition, document keyword extraction, video indexing, etc.), accessing other sources (e.g. web DB services like freeDB and imDB), manual creation through advanced tools (e.g. direct annotation in PhotoFinder), and manual type-in. *MediaFinder* provides an encouraging proof of concept for the *Semantic Regions* and spatial data management.

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