W04: Web-Based Information Visualization (WebVis'99)

Workshop Organizer

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Preface

Aim of the Workshop

Information visualization can be defined as the use of computer-supported, interactive, visual representations of abstract data to amplify cognition (Card et al. 1999). The research discipline *Information Visualization* combines aspects of scientific visualization, human-computer interaction, data mining, imaging and graphics. It focuses on information that is often abstract. This means that information often has no natural and obvious representation. A key research problem is to discover adequate visual metaphors for making information more accessible and to understand which analytical tasks they support. The largest information space is perhaps the World Wide Web, which contains millions of pages. Information visualization in this domain enables users to get information quickly, to put it in a meaningful shape, and to make decisions in a relatively short time. Web-based information visualization describes visualization applications that use the Web as an information source, a delivery mechanism for visualization, or both (Rohrer, Swing 1997).

The aim of this workshop is to bring together researchers and practitioners who are working in key technology areas of information visualization in order to discuss recent research findings and address complementary research and development issues. Of particular interest are contributions describing different visualization techniques to make use of the information available on the Web or how to harness Web-techniques for information visualization.

Topics of the Workshop

The following gives a short overview of the different contributions to this workshop. They have been clustered in topics representing key technology areas in the field of Web-based information visualization.

Navigating the Web

In the first paper titled: "Mapping and Browsing the Web in a 2D Space", Huang, Lai, and Zhang view the whole Web as one huge and partially unknown graph. They present then a new on-line exploratory visualization technique to maintain and display a subset of this graph incrementally. Their 'Visual Web Browser' consists of three major components: a fast accessible linkage server, a filtering mechanism, and an on-line animated visualization. The framework of these components provides the user with a dynamic graphical map for guiding the Web journey. The paper: "Designing WWW Site Map Systems" by Pilgrim and Leung provides an alternative visualization of the structure of a Web site with the aim to alleviate many of the usability problems associated with Web navigation. The paper examines some underlying design issues relating to Web site maps and then presents an implementation of an experimental Web site map system demonstrating the application of these principles. This 'SiteTree' system displays a hierarchical abstraction of the Web site providing basic filtering and visualization controls including novel *landmark* functionality. The paper provides also a basis for future development of Web site map tools by clarifying existing research and identifying important design issues. Another paper in this topic by Cugini and Scholtz with the title: "VISVIP: 3D Visualization of Paths through Web Sites" presents a tool called 'VISVIP', that allows Web site developers to visualize the paths taken through the Web site by the subjects of usability experiments. The developers can dynamically customize and simplify the graphical layout of the Web site, and select which subjects' paths to view. The developers can also control an animated representation of a subject's progress through the Web site. The third dimension of the 3D display is used to represent the time spent on each page visit. The graph layout provided by 'VISVIP' can be governed by either the Web site topology or by the structure of the subject's path.

Searching the Web

The paper by Mann with the title: "Visualization of WWW-Search Results" presents research contributions and how Web search results can be displayed in more meaningful visual forms. Based on an exhaustive examination of the literature in the field of information visualization, different approaches have been selected. They have been integrated in an existing meta-search engine to build a prototype for further experimental studies. The proposed visualization approaches belong to four possible areas for visualizing search results: on the document set level (all found documents), on the single document level, for Web-site-mapping and for the visualization of the content of a thesaurus to support the query formulation and query refinement. The presented research activities show some assumptions for possible improvements of the visualization of Web search results for an existing meta-search engine.

The paper by Govindarajan, and Ward titled:"GeoViser — Geographic Visualization of Search Engine Results" focuses on the problem of finding and visually presenting the geographic location associated with the Web documents retrieved via a search engine. The research aims to aggregate geographic locations of the retrieved documents to find the clusters/outliers. The authors look at ways of spatially visualizing these results on a map using glyphs and other techniques. The main contribution of this paper is the idea of discovering the geographic location of Web pages obtained via a search engine query and visualizing the results by placing them on a map in an attempt to convey spatial attributes such as location and distance. Current search engines ignore the existence of such geographic meta-data and therefore are unable to process queries that are inherently geo-spatial in nature. The presented system GeoViser integrates this functionality to supplement the current capabilities of a search engine.

Experimental Web Environments

In the paper: "TeleZone, Architecture for an open Virtual Community" Hörtner and Berger present an experimental Web environment called TeleZone. TeleZone is a nexus of virtual and real spaces. A robot enables a "community" to bring about the TeleZone by means of cooperative self-organization. TeleZone is a crystallization point for the emergence of a community whose discourses and activities are reflected not only virtually, but also directly and physically in the development of the installation. TeleZone will become an architectural-theoretical forum of discourse in which concepts of network-linked architecture will be put to the test. The physical TeleZone is positioned beneath a robot arm and occupies an area of 2 x 2 meters, which is divided into small parcels. Building materials are small plastic blocks (voxels), which are represented at the TeleZone Web-site as three-dimensional elements. The users of the Web use a special editor on the TeleZone Web site, to build there own structures with voxels, which then are precisely positioned and fixed in place by the robot.

The paper: "The Limitations of Interactive Multiuser 3D Environments in the WWW" by Oliveira, Todesco, and Araujo describes and discusses the implementation and evaluation of a Web environment named SVRT (Shared Virtual Reality Tool), which supports the sharing of virtual environments among multiple users through the integration of tools and mechanisms of the Web. With the emergence and integration of the languages VRML and Java, the number of available shared virtual environments on the Web is increasing. However, due to the slow progress of the VRML language and the actual browsers lack of conformance to its complete specification, the development of successful 3D environments faces many limitations: from high latency to low presentation quality, small number of users supported, etc. The evaluation of the SVRT using common browsers, for a small number of participants, through multicasting communication, shows that latency is, on average, 200 ms, i.e., the achieved latency is below 300 ms — a value considered acceptable in the literature for loosely synchronized applications.

User Interfaces Based on Web-Technology

While methods for searching large digital libraries have experienced tremendous improvements recently, user interfaces to such collections still have a far way to go. Most user interfaces to digital libraries present themselves as various forms of sorted lists, providing metadata information on the documents in textual form. This prohibits intuitive understanding of document archives or Web search results.

In the paper, "A Metaphor Graphics Based Representation of Digital Libraries on the World Wide Web: Using the libViewer to Make Metadata Visible", Rauber and Bina present the libViewer. LibViewer is a Java-based user interface to digital libraries using metaphor graphics to display information on the elements in a digital library in an intuitively understandable way. Metadata on digital libraries based on the Dublin Core Initiative is mapped onto a set of metaphors to allow instant recognition and orientation in an unknown document collection, facilitating interactive retrieval and exploration.

In the paper, "Web-Based Modeling Techniques Providing Interactive Views of Geographical Data with VRML", Rossi and Spagnuolo describe the approach adopted for embedding a surface-modeling module into the Web environment. The work has been developed within the scope of the on-going EC project THETIS aimed at the definition of an advanced and integrated system for transparent access and visualization of coastal zone management tools via the Web. Traditional Web browsers, equipped with suitable plug-ins, are likely to become the next-generation interfaces to GIS systems or, better, to networks of distributed "virtual-GIS" components. The surface-modeling module described in this paper is aimed at providing a high-fidelity model of the whole morphological aspects of coastal areas, defined as a Delaunay triangulation, constrained to structural lines and coastline. The result is a simple-to-use user interface to a remotely located data and models server, which will be integrated into the THETIS project for demonstrating the effectiveness of the Web-based solution.

References

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