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The Geospatial Web

**How Geobrowsers, Social Software and
the Web 2.0 are Shaping the Network Society**



Springer

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Foreword

The most important attribute of geospatial platforms is their unique potential to aggregate a multitude of public and private geographic data sets, providing access to data from government agencies, industry and the general public. NASA and other organizations have a wealth of planetary science data – representing the output from thousands of satellites in earth-orbit, and from dozens of costly missions to other planets. Benefits derived from both the data and visual interfaces to access the data represent a significant return on investment for the public. Integrating geospatial data with semantic and collaborative Web technology multiplies the public benefits and represents the main focus of this book.

The user interfaces of geobrowsers are designed for the layperson, giving convenient access to all kinds of geographically referenced information. Geobrowsers hide the technical details related to finding, accessing and retrieving such information. The daunting challenge of the Geospatial Web is to seamlessly integrate and display vastly different information modes. Nowadays, it is not enough to simply display a map of some region; additional dynamic information modes need to be displayed and put into context – from weather sensor readings and live aerial video feeds to daily news updates, photo collections and video archives.

The open-source community plays a crucial role in driving the development of the Geospatial Web. Collaborative efforts have provided a large number of add-ons for popular platforms. In the case of NASA World Wind, several of these external modules have been integrated into the core system. Participants in open-source projects identify, track and resolve technical problems, suggest new features and source code modifications, and often provide high-resolution data sets and other types of user-generated content.

This book presents the state-of-the-art in geospatial Web technology. It gradually exposes the reader to the technical foundations of the Geospatial Web, and to new interface technologies and their implications for human-computer interaction. Several chapters deal with the semantic enrichment of electronic resources, a process that yields extensive archives of Web documents, multimedia data, individual user profiles and social network data. The following chapters then demonstrate the use of geospatial technologies for managing virtual communities, and for monitoring, analyzing and mapping environmental indicators. Finally, the last four chapters address service-oriented architectures, and describe how distributed Web services facilitate the integration of knowledge repositories with geospatial platforms and third-party applications.

I congratulate the authors for their excellent and timely work. The book is not only a comprehensive, interdisciplinary collection of current research; it also introduces visionary concepts and outlines promising avenues for future research.

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Preface

Contrary to early predictions that the Internet will obsolete geography, the discipline is increasingly gaining importance. In a 1998 speech at the California Science Center, former U.S. Vice President Al Gore called for replacing the prevalent desktop metaphor with a “multi-resolution, three-dimensional representation of the planet, into which we can embed vast quantities of geo-referenced data” (Gore 1998). After the successful introduction of three-dimensional geospatial platforms such as NASA World Wind,¹ Google Earth² and Microsoft Live Local 3D,³ achieving the vision of a *Geospatial Web* seems more realistic than ever.

Dubbed the “holy grail of mapping” (Levy 2004), these geobrowsers aggregate and project layers of metadata onto scale-independent spherical globes. They are an ideal platform to integrate (i) cartographic data such as topographic maps and street directories, (ii) geotagged knowledge repositories aggregated from public online sources or corporate intranets, and (iii) environmental indicators such as emission levels, ozone concentrations and biodiversity density. By integrating cartographic data with geotagged knowledge repositories, the Geospatial Web will revolutionize the production, distribution and consumption of media products.

The appearance of geobrowsers in mainstream media coverage (see Chapter 1) increases public acceptance of geospatial technology and improves geospatial literacy, which today exists only among a small portion of highly educated people (Erle et al. 2005). Geospatial literacy includes the ability to understand, create and use geospatial representations for Web navigation, narrative descriptions, problem-solving and artistic expression (Liebhold 2004). In light of the explosive growth and diminished lifespan of information, geospatial literacy is becoming increasingly important, as the thought that needs to be followed in information discovery tasks is often spatial in nature (McCurley 2001). Geobrowsing platforms support such information discovery tasks by allowing users to switch between or integrate a large number of heterogeneous information services.

The 25 chapters contained in this edited volume summarize the latest research on the Geospatial Web’s technical foundations, describe information services and collaborative tools built on top of geobrowsers and investigate the environmental, social and economic impacts of knowledge-intensive applications. Supplemental material including author biographies and bibliographic resources is available from the book’s official Web site at

www.geospatialweb.com

The book emphasizes the role of contextual knowledge in shaping the emerging network society. Several chapters focus on the integration of geospatial and semantic technology to extract geospatial context from unstructured textual resources; e.g., to automatically identify and map the most relevant content for customized news services. Hybrid models combine such automated services with the advantages of individual and collaborative content production environments – for example by integrating “edited” material from newspapers and traditional encyclopedias with “evolving” content from collaborative Wiki applications.

Automatically annotating content acquired from these different sources creates knowledge repositories spanning multiple dimensions (space, time, semantics, etc.). Geospatial exploration systems will improve the accessibility and transparency of such complex repositories.

Keen competition between software and media companies surrounds the provision of geospatial exploration systems. The platforms are evolving quickly, gaining new functionality, data sources and interface options in rapid succession. But the currently available applications only hint at the true potential of geospatial technology. The Geospatial Web will have a profound impact on managing individual and organizational knowledge. It will not only reveal the context and geographic distribution of a broad range of information services and location-based resources but also help create and maintain virtual communities by matching people of similar interests, browsing behavior or geographic location.

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