

Guest Editorial

GIScience Research at the Thirtieth Annual ESRI International User Conference

The nine articles included in this special issue of *Transactions in GIS* were gathered from a special call for abstracts and will be presented at research sessions scheduled for the second day of the Thirtieth ESRI International User Conference. A total of 44 abstracts were submitted and nine were selected by the journal editors for the preparation of full journal articles. Each of the manuscripts has been through the usual journal review process and the final versions included in this special issue have been revised in light of both the reviewer's and editor's suggestions. They cover a wide range of topics and address some of the key concepts and applications of geographic information science from a variety of perspectives. Some address spatial data infrastructures, data models and databases, others address the spatial expression and potential value of blogging and Twitter as social networking tools, and still others address performance issues for participatory GIS and specific functions and applications such as geocoding.

The first article by Ken Field and James O'Brien explores the spatial expression and potential value of micro-blogging and Twitter as a social networking tool. Several examples of 'twitter' maps are introduced that leverage the Twitter API and online map services to locate some component of the 'tweet', and two mashups that support collaborative real-time mapping and the organization and display of information for mass events are used to demonstrate the value of 'cartoblography' – which the authors offer as a framework for mapping the spatial context of micro-blogging.

The second article by Barend Köbben, Rolf de By, Theodor Foerster, Otto Huisman, Rob Lemmens, and Javier Morales describes the use of an approach called SDIlight in the Geoinformatics Master Program of the ITC. The SDIlight approach shows how the principles of purposeful spatial data production and uptake into computerized systems on the one hand and the methodical construction of these systems, applying principles of model-driven architecture, formal specification, and transformational design of SDI nodes on the other hand can be applied in simple and cost-effective ways using free and open source software and open standards to support teaching.

The third article by Vitit Kantabutra, John Owens, Daniel Ames, Charles Burns, and Barbara Stephenson introduces a type of DBMS called the Intentionally-Linked Entities (ILE) DBMS for use as the basis for temporal and historical GIS. ILE, which can be

thought of as a modern and extended implementation of the E/R data model, represents each entity in a database only once, thereby eliminating redundancy and fragmentation. This approach also facilitates the storage of things that are more faithful to the historical records such as gazetteer entries of places with changing, imprecisely known and/or unknown locations.

The fourth article by Linwang Yuan, Zhaoyuan Yu, Shaofei Chen, Wen Luo, Yongjun Wang, and Guonian Lü proposes the use of Clifford algebra to support the construction, retrieval and analysis of spatio-temporal data under a unified spatio-temporal framework. A prototype system CAUSTA (Clifford Algebra based Unified Spatio-Temporal Analysis) is then described and used as a tool to investigate and model the distribution properties and dynamic processes that characterize complex geographical phenomena.

The fifth article by Felicia Akinyemi proposes a conceptual data model for poverty mapping. This article explains why the development of spatial frameworks for multi-dimensional social problems, such as poverty, can be challenging because of the myriad of poverty indicators in use. The entity-relationship approach is adopted and used to develop a conceptual model that identifies the key thematic layers, entities, and relationships and in this way, highlighting the information that is required to assess and monitor poverty.

The sixth article by Matthais Müller, Lars Bernard, and Johannes Brauner proposes a new method for moving code in spatial data infrastructures (which until now have been focused on data exchange and interoperability). A series of web services is proposed to move code as well as data and improve the efficiency, performance behavior, and support for the distributed development of geoprocessing functionality.

The seventh article by Trias Aditya addresses usability issues in participatory mapping activities by exploring group collaboration mechanics and user studies consisting of questionnaire surveys, interviews, group usability testing, scenario assessments, and scaling up experiments. This wide ranging article tackles a variety of important issues, including ways to reconcile and integrate government sponsored and participatory maps and the role of transparent photomaps and the Web in Public Participation GIS.

The eighth article by Daniel Goldberg and Myles Cockburn examines the geocoding process and how it might be strengthened. Three new approaches are offered for choosing the "best" geocode result and the performance of each method is evaluated against two ground truth datasets of nationwide GPS points and the results used to show that any of the three methods improves on current practices in the majority of cases.

The ninth and final article by Chetan Tiwari and Gerard Rushton describes a modular, web-based spatial analysis system that uses GIS, spatial analysis methods, and software services delivered over computer networks to provide: (1) a secure environment for producing maps of disease outcomes from individual-level data while preserving privacy; (2) tools to automate the process of linking environmental data, environmental models, and GIS tasks such as geocoding for the purposes of estimating individual exposures to environmental contaminants; and (3) tools to visualize the spatial patterns of disease outcomes via Web-based mapping interfaces and interactive tools such as Google Earth.

These nine articles, taken as a whole, demonstrate the continued growth of geographic information science, its interdisciplinary roots and linkages, and its expanding international reach. This year's authors hail from Germany, Indonesia, the Netherlands, the People's Republic of China, and the United Kingdom as well as three U.S. states (California, Idaho, and Iowa). Special thanks are owed to the authors and especially those who provided the peer reviews for helping to move these articles from concept (i.e. extended abstracts) to reality (i.e. the final articles) in just a few short months. I trust that you will see how your contributions bore fruit when you read the final versions of these

articles in this third special issue organized around a series of research sessions that is hosted by ESRI and given a prominent place in its International User Conference program.

John P. Wilson
Editor