

## GIScience Research at the 2013 Esri International User Conference

The first five articles included in this issue of *Transactions in GIS* were gathered from a call for abstracts and will be presented in two research sessions scheduled for the second day of the 2013 Esri International User Conference to be held in San Diego, California. A total of 18 abstracts were submitted and nine were selected by the journal editors for preparation of full journal articles. Each of the manuscripts has been through the usual journal peer review process and the final versions of the five research articles included in this special issue have been revised in light of both the reviewer's and editor's feedback.

The five articles selected for publication cover a wide range of topics and address some of the key concepts and applications of geographic information science from a variety of perspectives. Hence, two of the articles describe volunteered geographic information (VGI) and ways to measure or assess data quality, one describes the use of cell phone data to explore how physical mobility and virtual connectivity connect people in everyday life, one explores alternative ways to build human-computer interfaces to support various forms of spatial analysis, another reflects on efforts to add a social presence to ongoing work to develop a virtual platform for a new, more interactive, and collaborative environment to catalogue and interactively add to the UCGIS Geographic Information Science & Technology (GIS&T) Body of Knowledge, and all five highlight, in one way or another, the value of contemporary spatio-temporal analysis.

The first article, by Dennis Zielstra, Hartwig Hochmair, and Pascal Neis, describes the results of a longitudinal analysis of road data for the U.S. by comparing the development of OpenStreetMap (OSM) and U.S. Census TIGER/Line data since the initial TIGER/Line 2005 import into OSM was accomplished in 2008. The authors conducted this analysis for the 50 U.S. states, the District of Columbia, and 70 urbanized areas. The results show how, in almost all tested states and urbanized areas, OSM missed roads for motorized traffic when compared with TIGER/Line street data, but significantly added to the pedestrian-related network data compared with the corresponding TIGER/Line data. The authors concluded their article by noting that the quality of OSM road data in the U.S. could be improved through new OSM editing tools allowing contributors to trace current TIGER/Line data.

The second article, by Michael DeMers, Anna Klimaszewski-Patterson, Rebecca Richman, Sean Ahearn, Brandon Plewe, and Andre Skupin, builds on their ongoing efforts to develop a virtual platform for a new, more interactive and collaborative environment, to catalogue and interactively add to the UCGIS Geographic Information Science & Technology (GIS&T) Body of Knowledge (Ahearn et al. 2013) by developing a multi-user virtual user environment that will add social presence to the experience. The authors describe the successes and failures of using Second Life as the initial platform for this work, illustrate the available interactions and limitations, and discuss ongoing efforts to move beyond Second Life for this development by leveraging the power of virtual crowd sourcing within competitive gaming environments, such as Unity, to allow for the creation of on-demand virtual 3-D visualizations of GIS&T concepts in a digital Exploratorium.

The third article by Guoray Cai, Bo Yu, and Dong Chen proposes a design approach for GIS interfaces and functionalities based on the notion of “analytical intent”. They replaced the

ArcGIS desktop interface with a conversational interface and enabled mixed-initiative user-system interactions at the level of analytical intentions. Their initial experiment focused on the subset of GIS functions that are relevant to “finding what’s inside” (as described by Mitchell 1999), but they argue that the general principles will apply to other types of spatial analysis as well. Their work is forward-looking given the ways in which it demonstrates the feasibility of delegating some spatial thinking tasks to computational agents and highlights some future research questions that may prove to be key to building a better theory of spatial thinking with GIS.

The fourth article, by Hansi Senaratne, Arne Broering, and Tobias Schreck, used reverse viewshed analysis to assess the location correctness of visually generated VGI. These authors determined location correctness by checking the visibility of the point of interest (POI) from the position of the visually generated VGI (observer point) using a collection of Flickr photographs that pointed to a certain POI through their textual labeling. They then conducted a reverse viewshed analysis for the POI to determine if it lay within the area of visibility from the observer points (or not). The authors concluded this article by noting how attributes such as profile completeness, together with location correctness might serve as a weighted score to assess credibility.

The final article, by Song Gao, Yu Liu, Yaoli Wang, and Xiujun Ma, explores the patterns embedded in the networks of phone-call interaction and phone-users’ movements, by considering the geographical context of mobile phone cell calls. The authors adopted an existing agglomerative clustering algorithm based on a Newman-Girvan modularity metric and proposed an alternative modularity function incorporating a gravity model to discover the clustering structures of spatial interactions using a mobile phone dataset from one week in a city in China. Their results show that a high correlation existed between phone-users’ movements in physical space and phone-call interaction in cyberspace, such that people tend to travel and communicate within relatively small and specific areas throughout the course of their everyday lives.

These five articles, taken as a whole, illustrate the breadth and depth of geographic information science scholarship and best practices across a variety of collaborative disciplines (e.g. computer science, geography, information science, and urban planning) and application domains (e.g. GIS&T education, data capture, data management, data quality, human-computer interactions, spatial analysis and spatial decision support). Special thanks are owed to the authors and especially those who provided the peer reviews that helped to move five of the nine articles sent out for peer review from extended abstracts to reality in just a few short months. I trust that all involved will see how these contributions bore fruit when you read the final versions of the articles in this sixth issue of *Transactions in GIS* organized around a series of research sessions that are hosted by Esri and given a prominent place in its International User Conference program.

John P. Wilson  
*Editor*

## References

- Ahearn S C, Icke I, Datta R, DeMers M N, Plewe B, and Skupin A 2013 Re-engineering the GIS&T Body of Knowledge. *International Journal of Geographical Information Science* 27: in press  
 Mitchell A 1999 *Esri Guide to GIS Analysis: Volume 1, Geographic Patterns and Relationships*. Redlands, CA, Esri Press