

## GIScience Research at the 2015 Esri International User Conference

The first six articles in this issue of *Transactions in GIS* were gathered from a call for abstracts and will be presented in two research sessions scheduled on the third day of the 2015 Esri International User Conference to be held in San Diego, California. A total of 22 abstracts were submitted and nine were selected by the journal editors for preparation as full journal articles. Each of the manuscripts has been through the usual journal peer review process and the final versions of the six research articles included in this special issue have been revised in light of both the reviewer's and the editor's feedback.

The six articles selected for publication cover a wide range of topics and address some of the fundamental concepts and applications of geographic information science from a variety of perspectives. The first documents the need for better metrics and models for measuring dynamic interactions in ecology; the second describes how sensors and mobile devices in cars can be used by the drivers to gather geographic information so we can learn more about driving patterns and the accompanying environmental impacts; the third proposes some new methods for quantifying and communicating the uncertainty associated with spatial data; the fourth describes how semantics-enabled and Linked-Data-driven geoportals can improve the discovery of geographic information resources; the fifth describes some of the user interaction patterns and experiences with Harvard's open source WorldMap online mapping application; and the sixth and final article offers an assessment of the geographic information science and technology (GIS&T) workforce demands across Europe, a survey conducted as part of a larger effort to update the first edition of the GIS&T Body of Knowledge (BoK) (DiBiase et al. 2006). All six articles highlight, in one way or another, the steadily increasing value of geographic information and the burgeoning role of geographic information science as an enabling science across a growing number of disciplines and application domains.

The first article, by Jennifer A Miller, borrows from the null hypothesis approach commonly used in community ecology and compares six currently used dynamic interaction metrics using data on five brown hyena dyads in northern Botswana. The results show how the characterization of the dynamic interactions varies widely depending on the specific metric and null model that is chosen. This work is timely, given the fundamental shift in the types and volumes of animal movement data now being collected, and the results demonstrate why further research on methods for measuring and interpreting spatial dynamic interactions is urgently required.

The second article, by Arne Bröring, Albert Remke, Christoph Stach, Christian Autermann, Matthes Rieke and Jakob Möllers, describes the *enviroCar* platform for collecting geographic data acquired from automobile sensors and openly providing those data for further processing and analysis. The approach uses a low-cost On-Board Diagnostics (OBD-II) adaptor and an Android smartphone to gather and share various kinds of sensor data. This particular article, which builds on the authors' previous work, focuses on the description of the spatio-temporal RESTful Web Service interface and the underlying data model that was specifically designed for handling the mobile sensor data.

The third article, by Jennifer Bauer and Kelly Rose, proposes a new Variable Grid Method (VGM) for simultaneously communicating spatial patterns and trends as well as the uncertainty associated with the data and their analysis. The article describes the VGM approach and illustrates how it provides critical information about the relationship between uncertainty and spatial data in order to support the increasing utilization of spatial information across a wide range of research and other applications.

The fourth article, by Yingjie Hu, Krzysztof Janowicz, Sathya Prasad and Song Gao, describes some new work to first, address the topic heterogeneity created by multiple metadata standards and second, improve semantic search in Linked-Data-driven geoportals. The Labeled Latent Dirichlet Allocation (LLDA) natural language processing method was adopted and trained using standardized metadata from Data.gov to harmonize the metadata topics and a human participants experiment was then used, with the thematic and geographic matching features constructed from the textural metadata descriptions to train a regression model and improve the semantic search capabilities. The authors evaluated the new methods by implementing their semantics-enabled and Linked-Data-driven geoportals prototype using a sample dataset drawn from Esri's ArcGIS Online.

The fifth article, by Weihe Wendy Guan, Alenka Poplin and Benjamin G Lewis, reports on the results of a survey of 290 among the 8,000 registered users of WorldMap, an open source online mapping application that seeks to lower the barriers for scholars who wish to visualize, analyze, organize, present and publish mapped information, in which they described their backgrounds and activities, purposes, experiences, and preferences regarding the system itself. The study was motivated and based on a user-centered design approach and the results not only provide guidance for future WorldMap improvements, but also shed light on the broader requirements of online GIS users.

The final article, by Gudrun Wallentin, Barbara Hofer and Christop Traun, offers an assessment of the geographic information science and technology (GIS&T) workforce demands across Europe that was conducted as part of a larger effort that is currently underway to update the first edition of the GIS&T BoK. The workforce demands, gathered using a Europe-wide online questionnaire and a series of complementary expert interviews, pointed to the continuing relevance of the GIS&T BoK as a comprehensive reference for the geospatial domain in Europe but one in need of updating given the shift from primary data acquisition to the handling of abundant spatial data in everyday work and the growth in the importance of programming and applications development and web-related aspects since the first edition of the GIS&T BoK was published in 2006.

These six articles, taken as a whole, illustrate the breadth and depth of geographic information science scholarship and best practices across a variety of settings (e.g. linked-data-driven geoportals; citizen science, sensors and volunteered geographic information; online GIS and mapping platforms; workforce needs and trends; and new methods for measuring and interpreting dynamic interactions in ecology and for quantifying and communicating the uncertainty associated with spatial data and analyses). Special thanks are owed to the authors and especially to those who provided the peer reviews that helped to move six 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 eighth issue of *Transactions in GIS* organized around two research sessions hosted by Esri and given a prominent place in its International User Conference program.

John P. Wilson  
*Editor*

## Reference

- DiBiase D, DeMers M, Johnson A, Kemp K, Luck A T, Plewe B, and Wentz E 2006 *Geographic Information Science and Technology Body of Knowledge*. Washington DC, Association of American Geographers and University Consortium for Geographic Information Science