

GIScience Research at the 2016 Esri International User Conference

The first seven articles in this issue of *Transactions in GIS* were gathered from a call for abstracts and will be presented in three research sessions scheduled on the third day of the 2016 Esri International User Conference to be held in San Diego, California. A total of 28 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 seven research articles included in this issue have been revised in light of both the reviewer's and the editor's feedback.

The seven 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 describes how spatial signatures can be specified for geographic features and used to describe the similarities and differences across two or more gazetteers; the second proposes a network neighborhood analysis framework for directed flow networks; the third proposes an intelligent geospatial processing unit for image classification based on Geographic Vector Agents (GVAs); the fourth proposes a crowdsensing mobile-device platform that empowers citizens to collect and share information about their surrounding environment via embedded sensor technologies; the fifth shows how publications in a research library can be linked to associated datasets exposed either directly or only through metadata on Esri's Open Data platform; the sixth proposes a hybrid model for modeling territorial control in violent armed conflicts; and the seventh and final article employs a spatial fuzzy multi-criteria evaluation model to document the severity of agricultural land losses to urbanization in China. All seven 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 Rui Zhu, Yingjie Hu, Krzysztof Janowicz and Grant McKenzie, describes how gazetteers differ in terms of their overall coverage, underlying data sources, provided functionality and geographic feature type ontologies, which all conspire to make data integration and federated query difficult. This article proposes a new approach based on spatial statistics to derive spatial signatures for geographic feature types and shows how these spatial signatures can be deployed to better understand the similarities and differences across the DBpedia Places, GeoNames, and Getty Thesaurus of Geographic Names (TGN) gazetteers.

The second article, by Jiangfeng She and Xingong Li, proposes a network neighborhood analysis framework for directed network flows. This new framework extends the raster map algebra to networks and provides a consistent analytical framework for the raster, network, and vector data models. A section of the National Hydrography Dataset (NHD) is used to show how this new framework can be used to: (1) delineate neighborhoods on networks; and (2) calculate a variety of descriptive statistics within these neighborhoods.

The third article, by Kambiz Borna, Tony Moore and Pascal Sirguy, proposes an intelligent geospatial processing unit for image classification based on geographic vector agents (GVAs). The article shows how GVAs combine the best aspects of pixel- and object-based methods in a distinctive form of geographic automata characterized by elastic geometry, dynamic internal structure, neighborhoods, and their respective rules. The new approach is used to model a set of objects on a subset IKONOS image and LiDAR DSM datasets and the results show that the GVA approach achieved a 2% improvement in accuracy compared to a conventional geographic object-based image analysis (GEOBIA) approach.

The fourth article, by Blake Regalia, Grant McKenzie, Song Gao and Krzysztof Janowicz, proposes a crowdsensing platform for citizens to collect and share information about their surrounding environment via embedded sensor technologies. A series of use cases on a university campus is used to show how this information can be collected and analyzed to determine the activities that specific places (i.e. libraries, sports facilities) can support at different times using an ad-hoc sensor network free of proprietary instrumentation.

The fifth article, by Sara Lafia, Jon Jablonski, Werner Kuhn, Savannah Cooley and Antonio Medrano, proposes a framework to spatially enable data discovery in a setting that supports mapping and analysis in a GIS while connecting the data to publications about them housed in a research library. The results demonstrate a simple form of linking data to publications through spatially referenced metadata or persistent identifiers, and show how this linking can be used to add value to research products and increase their discoverability across disciplinary boundaries on Esri's Open Data platform.

The sixth article, by Ran Tao, Daniel Strandow, Michael Findley, Jean-Claude Thill and James Walsh, proposes a new geospatial approach that performs network analysis on a hybrid transportation network with both actual road data and hexagon fishnet-based artificial road data representing on- and off-road movements respectively, to model territorial control in violent armed conflicts. This model is successfully used to measure territorial control of armed groups in Sub-Saharan Africa, where inferior transportation infrastructure is the norm, during a series of civil wars documented in the Uppsala Conflict Data Program's Georeferenced Event Database (UCDP-GED).

The final article, by Weihe Wendy Guan, Kang Wu and Fei Carnes, uses a two-stage workflow to reveal the severity of agricultural land losses to urbanization in China. A spatial fuzzy multi-criteria evaluation model was used with a series of physical variables (i.e. accumulated temperature, sunshine, precipitation, hydrology, elevation and soil properties) to determine agricultural feasibility in the first stage and this layer was then combined with nightlight images for the period 1992–2013 to determine the spatiotemporal variation of urban encroachment on feasible agricultural land across China in the second stage.

These seven 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. the role of gazetteers, ontologies and spatial statistics in modern information infrastructures; various forms of spatial analysis and modeling, including neighborhood analysis for directed flow networks, the use of geographic automata to support image analysis, the derivation and use of hybrid transportation networks, and the fusion of GIS and image data; crowdsensing and embedded sensor networks; and linked-data driven spatial discovery). Special thanks are owed to the authors and especially to those who provided the peer reviews that helped to move seven 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 ninth issue of *Transactions in GIS* organized around three research sessions hosted by Esri and given a prominent place in its International User Conference program.

John P. Wilson
Editor-in-Chief