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Geographic Information Science

8th International Conference, GIScience 2014
Vienna, Austria, September 24-26, 2014
Proceedings

Preface

The 2014 8th International Conference on Geographic Information Science continued the highly successful GIScience series of conferences. GIScience regularly brings together more than 200 international participants from academia, industry, and government organizations to discuss and advance the state-of-the-art in the field of geographic information science. Since 2004, the biennial conference has alternated between locations in North America and Europe. Following a highly successful GIScience 2012 in the heart of the American Midwest, at Columbus, Ohio, GIScience 2014 was located in the heart of Europe, hosted by Vienna University of Technology, Austria.

Since its inception in 2000, the biennial GIScience conferences have adopted a twin-track program, soliciting the submission of the latest work in progress, through the extended abstracts track (up to 1500 words); and the highest quality completed research, through the full papers track (up to 15 pages). The full papers contained in these proceedings are complemented by the separate extended abstract proceedings distributed at the conference.

The twin-track program is ideally suited to the diversity of disciplines that converge on GIScience, which include (but are not limited to) geography, cognitive science, computer science, engineering, information science, linguistics, mathematics, philosophy, psychology, social science, and (geo)statistics. The combination of full papers and extended abstracts has a proven record of delivering an exciting conference program that is both fast-moving and high quality.

For GIScience 2014, 84 full paper submissions were received. Each paper was thoroughly reviewed by at least three independent members of the international Program Committee. Based on these reviews, supplemented by careful metareviews from the program chairs, 23 papers were selected for presentation, corresponding to an acceptance rate of 27%. 155 further extended abstracts submissions were received, 52 (30%) of which were accepted for short oral presentations.

The accepted full papers provide a snapshot of the breadth of active research topics in the vibrant and maturing field of GIScience. Typically for conferences in the GIScience series, the accepted full papers showcase a mix of basic research connected with the latest hot topics (such as user-generated content, linked data, big data, and text-based navigation systems) as well as important advances in more long-established topics (such as spatial algorithms, qualitative spatial reasoning, spatial analysis, spatial cognition, geovisualization, and geo-ontologies).

This year, however, the excitement of the conference was mingled with great sadness following the tragic deaths of two treasured members of the GIScience Conference community: Prof. Peter Fisher on 20 May 2014 and Prof. Carolyn Merry on 3 June 2014. Pete and Carolyn were both active, serving GIScience Program Committee members, with Pete having been a Program Committee

member since the very first GIScience conference in 2000. Pete and Carolyn will be greatly missed, and their lives are remembered in brief tributes from the GIScience Program Committee in the following pages of these proceedings. Indeed, the geographic information science community more broadly will remember in 2014 the lives of Roger Easton, Cliff Kottman, Doug Nebert, and Roger Tomlinson, four other influential contributors to the field who sadly died this year.

The contributions of such influential figures continue to be reflected in the many contributions of others in the field, including those who helped make GIScience 2014 a success. The conference could not have happened without the work of the local organizers Gerhard Navratil and Eva Maria Holy. We would also like to thank Paolo Fogliaroni for his tireless work and support not only as the workshop and tutorial chair but also for assistance with the conference web site. Our thanks go to Thomas Linton at the Vienna University of Technology who provided technical support. We would also like to thank Ross Purves for his time spent sharing his experience with the EasyChair reviewing process, helping to maintain continuity across the different GIScience conference years. Of course we are deeply grateful to the GIScience Program Committee for their considered and thorough reviews, as well as those additional reviewers who also contributed their expertise. We would like to thank all the authors who contributed to the conference by submitting papers and extended abstracts. Most importantly, we would like to thank all those who came to GIScience, presenters and delegates, without whose contributions there would be no conference.

August 2014

Matt Duckham
Edzer Pebesma
Kathleen Stewart
Andrew Frank

Prof. Peter Fisher

“When Pete served as the external opponent on my PhD exam in Stockholm, Sweden, he completely transformed what could have been a nerve-wracking ordeal into one of the most significant academic conversations and learning experiences of my career. Through this conversation I also think he managed to show many of my colleagues the science behind the GIS they mostly saw as a tool.”

Ola Ahlqvist

“Pete’s work on fuzzy viewsheds was inspirational to me at the beginning of my career, as it was my first introduction to an approach to framing spatial uncertainty of spatial features in continuous space. He was one of the senior scholars I was most excited to meet at the NCGIA International Young Scholars Summer Institute in 1995. Despite relatively infrequent interactions, I count Pete Fisher as an intellectual hero and mentor, and suspect that I am not alone in doing so.”

Dan Brown

“I first observed Peter Fisher as a red-bearded newcomer at AUTO-CARTO London, bringing a similar articulate critique of the then-popular “Expert System” to AUTO-CARTO 8. Here was a kindred spirit with no fear of opposing received opinion. We could discuss random topics such as the etymology of the Arabic terms applied to sand dunes. I was present in the deep amphitheatre in Utrecht (AGILE 2011) as Peter handed over the editorship of IJGIS, exhibiting a deft mastery of the range of the field as well as a time for others to take charge. I did not know that event would be my last observation of the trajectory of a dedicated scholar, and a key contributor to a community of scholarship in GIScience.”

Nick Chrisman

“I first met Pete in the fall of 2001, at a project meeting of a newly started European framework project. Being in the first months of my PhD, how could I not have been impressed by this strong red-bearded English man who also happened to be a lead researcher in the field I was getting into? I came to know Pete better through the years of this project and quickly realized the wonderful man he was, accessible to students, generous of his time, and passionate about his research field. Pete was an inspiration for me and for many others. Thank you for sharing your time and passion Pete, you will stay well alive in our memories!”

Rodolphe Devillers

“The first time I met Pete in person was in 2005 in his office at Leicester University. I explained to him my tentative research proposal for a PhD that I hoped to start after finishing my Masters at Leicester. It was not a very good research proposal. I remember Pete was supportive and generous with his time; kind and gentle in his manner; at the same time as being unambiguous and direct in his criticism of my idea. I count myself lucky to have had the opportunity many more times over the subsequent years to be grateful for Pete’s admirable capacity for combining clear and critical scientific thinking with simple human kindness.”

Matt Duckham

“I’m writing this on the train from Leicestershire to London. I remember working on the VFC project with Pete and we used to have meetings with Dave Unwin and Jonathan Raper at Birkbeck. We would take this train down to London and all chat excitedly and noisily about the project and the work we had done. I remember being quite proud of the fact that we were all arguing passionately about the difference between ambiguity and vagueness (or something). Pete would do so at great volume, and only now do I realise just how much this activity must have disturbed the regular commuters. Since the VFC days the rail companies have established a QuietZone on each train - which is where I am now sitting, peacefully reflecting in silence. Pete was never a QuietZone. Rather he was an IdeasZone and always the focus of noisy activity. I do wonder whether his animated booming discussion of uncertainty had an impact on the rail companies?”

Jason Dykes

“Pete Fisher’s fundamental geovisualization research has inspired me and many like-minded colleagues since the early 90s in significant ways. His trail-blazing research on uncertainty visualization, animation, sonification, and virtual reality continues to drive our research programs in cartography, geovisualization, and geovisual analytics, for example, under the umbrella of the International Cartographic Association’s Geovisualization and Cognitive Visualization Commissions. ”

Sara Fabrikant

“Pete is a very sad loss, we need more ‘larger than life’ people in academia, and he was certainly that. I very much enjoyed his obvious passion, joy, laughter(!) and intensity, as well as enjoying his research. He was a wonderful journal editor too, for IJGIS. He also had the cojones to publish an article by a disreputable colleague of mine (Prof. McNoleg), for which we are both very grateful.”

Mark Gahegan

“Pete was a familiar and often audible figure at GIS conferences. There are many occasions when on hearing that distinctive laugh, I would think ‘Oh good, he’s

here!’ and gravitate towards the oracle, in the sure knowledge of challenging, insightful, interesting, sometimes rude and always entertaining conversation.”

Chris Jones

“Peter Fisher created an exquisitely fine balance between family and academia, always ready to enjoy both, and to mix both to the full. Academically he will be long remembered for his marathon contribution as editor of IJGIS and the various activities that spun off that commitment, including the Classics from IJGIS book of 2007. Among his many ground breaking papers are the series on simulating uncertainty in various GIS operations, and the series on fuzzy sets, heaps, and fuzzy-fuzzy sets. He was instrumental in establishing GIS as a specialty at Kent State, building on the GIS tradition at Leicester, and later putting City University on the GIS map. Pete could always be trusted to have a novel and interesting perspective on whatever topic he chose to pursue, and we can only imagine what other great ideas might have emerged in his presentations, publications, and conversations if his life had not been so tragically cut short.”

Michael F. Goodchild

“I worked closely with Pete for nearly twenty years, initially as the Western Pacific Regional Editor of IJGIS. It was a strange relationship as we met very infrequently but corresponded frequently by email. I do recall a visit that he, Jill and family made to Canberra however. Pete spent ages poring over my bookshelves, grunting approvingly when he came across P.G. Wodehouse. I asked if he wanted to borrow something and he replied that bookshelves were the best way of getting to know someone. Their contents were very revealing! I still don’t know what he made of my eclectic collection. P.G. Wodehouse sits alongside trashy Sci-Fi, crime fiction and oddments like G.K. Chesterton and Compton McKenzie. When I stayed with him, I slept in a room with extensive, and an equally eclectic collection. It might explain how we worked so happily together for so long.”

Brian Lees

“Unsure what to do with a Geography degree, in 1984 I applied for a 6 month research post in ‘automated cartography’ at Kingston University where Pete was working with Graeme Wilkinson. The work progressed well, and three years later I had a passport to Academia—a land full of fruity folk. 30 years on and I’m still having fun, except in June of this year GIScience lost one of its fruitier fruits. I will always remember that quizzical face, and the bounding laughter!”

William Mackaness

“I was a very junior faculty member when I met Pete. He breezed into a workshop I was attending with a big swoosh and a trail of eager grad students. He said only

‘Yes, I’ll give you that; you nailed the critics of GISscience.’ He was permanently imprinted on me from that day on.”

Nadine Schuurman

“I met first Pete in the early 90s, when among other things we talked about founding the GISRUK series of conferences and were partners on a European project on spatial uncertainty. I will remember Pete as a kind, generous, fun-loving guy, with a huge laugh and a sharp mind. He was a wonderful successor to Terry Coppock as editor of IJGIS. I’ll miss him.”

Mike Worboys

Prof. Carolyn Merry

A brief but heartfelt salute to Carolyn Merry, 1950–2014

- a distinguished teacher and researcher in the field of GIScience
- former Professor and Chair of the Department of Civil, Environmental and Geodetic Engineering at The Ohio State University
- helping connect GIScience to Civil Engineering
- former president of ASPRS, UCGIS, and ASCE

But also ...

- a dedicated, loyal, and warm person;
- always interacting with the very highest integrity;
 - approachable, and supportive, especially to junior faculty;
 - an inspiring role model;
 - a great force for good.

We are all better for having known and worked with her!

Dawn Wright, Nina Lam, Jeremy Mennis, Tom Cova, and Francis Harvey

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Table of Contents

Information Visualization

Map Schematization with Circular Arcs	1
<i>Thomas C. van Dijk, Arthur van Goethem, Jan-Henrik Haunert, Wouter Meulemans, and Bettina Speckmann</i>	
Travel-Time Maps: Linear Cartograms with Fixed Vertex Locations	18
<i>Kevin Buchin, Arthur van Goethem, Michael Hoffmann, Marc van Kreveld, and Bettina Speckmann</i>	
3D Network Spatialization: Does It Add Depth to 2D Representations of Semantic Proximity?	34
<i>Sara Irina Fabrikant, Sara Maggi, and Daniel R. Montello</i>	

Spatial Analysis

Uncertainty Analysis of Step-Selection Functions: The Effect of Model Parameters on Inferences about the Relationship between Animal Movement and the Environment	48
<i>Paul Holloway and Jennifer A. Miller</i>	
Logic Scoring of Preference and Spatial Multicriteria Evaluation for Urban Residential Land Use Analysis	64
<i>Kris Hatch, Suzana Dragičević, and Jozo Dujmović</i>	
Spatial Weights: Constructing Weight-Compatible Exchange Matrices from Proximity Matrices	81
<i>François Bavaud</i>	
Spatial Graphs Cost and Efficiency: Exploring Edges Competition by MCMC	97
<i>Guillaume Guex</i>	

User-Generated Content

Geosemantic Network-of-Interest Construction Using Social Media Data	109
<i>Sophia Karagiorgou, Dieter Pfoser, and Dimitrios Skoutas</i>	
Data Quality Assurance for Volunteered Geographic Information	126
<i>Ahmed Loai Ali and Falko Schmid</i>	

Semantics and Models

Re-Envisioning Data Description Using Peirce’s Pragmatics	142
<i>Mark Gahegan and Benjamin Adams</i>	
Fields as a Generic Data Type for Big Spatial Data	159
<i>Gilberto Camara, Max J. Egenhofer, Karine Ferreira, Pedro Andrade, Gilberto Queiroz, Alber Sanchez, Jim Jones, and Lubia Vinhas</i>	
Linked Data - A Paradigm Shift for Geographic Information Science	173
<i>Werner Kuhn, Tomi Kauppinen, and Krzysztof Janowicz</i>	
An Ontology Design Pattern for Surface Water Features	187
<i>Gaurav Sinha, David Mark, Dave Kolas, Dalia Varanka, Boleslo E. Romero, Chen-Chieh Feng, E. Lynn Usery, Joshua Liebermann, and Alexandre Sorokine</i>	

Wayfinding and Navigation

An Indoor Navigation Ontology for Production Assets in a Production Environment	204
<i>Johannes Scholz and Stefan Schabus</i>	
Wayfinding Decision Situations: A Conceptual Model and Evaluation . . .	221
<i>Ioannis Giannopoulos, Peter Kiefer, Martin Raubal, Kai-Florian Richter, and Tyler Thrash</i>	
Understanding Information Requirements in “Text Only” Pedestrian Wayfinding Systems	235
<i>William Mackaness, Phil Bartie, and Candela Sanchez-Rodilla Espeso</i>	
Automatic Itinerary Reconstruction from Texts	253
<i>Ludovic Moncla, Mauro Gaio, and Sébastien Mustière</i>	
Integrating Sensing and Routing for Indoor Evacuation	268
<i>Jing Wang, Stephan Winter, Daniel Langerenken, and Haifeng Zhao</i>	

Spatial Algorithms

Significant Route Discovery: A Summary of Results	284
<i>Dev Oliver, Shashi Shekhar, Xun Zhou, Emre Eftelioglu, Michael R. Evans, Qiaodi Zhuang, James M. Kang, Renee Laubscher, and Christopher Farah</i>	

Location Oblivious Privacy Protection for Group Nearest Neighbor Queries	301
<i>A.K.M. Mustafizur Rahman Khan, Tanzima Hashem, Egemen Tanin, and Lars Kulik</i>	
Practical Approaches to Partially Guarding a Polyhedral Terrain	318
<i>Frank Kammer, Maarten Löffler, Paul Mutser, and Frank Staals</i>	
Spatial Relations	
Oriented Regions for Linearly Conceptualized Features	333
<i>Joshua A. Lewis and Max J. Egenhofer</i>	
RCC*-9 and CBM*	349
<i>Eliseo Clementini and Anthony G. Cohn</i>	
Author Index	367