Developments in Spatial Data Handling

11th International Symposium on Spatial Data Handling

with 267 Figures and 37 Tables
# Table of Contents

## Plenary of Submitted Papers

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>About Invalid, Valid and Clean Polygons</td>
<td>1</td>
</tr>
<tr>
<td>Peter van Oosterom, Wilko Quak and Theo Tijssen</td>
<td></td>
</tr>
<tr>
<td>3D Geographic Visualization: The Marine GIS</td>
<td>17</td>
</tr>
<tr>
<td>Chris Gold, Michael Chau, Marcin Dzieszko and Rafel Goralski</td>
<td></td>
</tr>
<tr>
<td>Local Knowledge Doesn’t Grow on Trees: Community-Integrated Geographic Information Systems and Rural Community Self-Definition</td>
<td>29</td>
</tr>
<tr>
<td>Gregory Elmes, Michael Dougherty, Hallie Challig, Wilbert Karigomba, Brent McCusker and Daniel Weiner</td>
<td></td>
</tr>
</tbody>
</table>

## Web GIS

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Flexible Competitive Neural Network for Eliciting User’s Preferences in Web Urban Spaces</td>
<td>41</td>
</tr>
<tr>
<td>Yanwu Yang and Christophe Claramunt</td>
<td></td>
</tr>
<tr>
<td>Combining Heterogeneous Spatial Data from Distributed Sources</td>
<td>59</td>
</tr>
<tr>
<td>M. Howard Williams and Omar Dreza</td>
<td></td>
</tr>
<tr>
<td>Security for GIS N-tier Architecture</td>
<td>71</td>
</tr>
<tr>
<td>Michael Govorov, Youry Khmelevsky, Vasily Ustimenko, and Alexei Khorev</td>
<td></td>
</tr>
<tr>
<td>Progressive Transmission of Vector Data Based on Changes Accumulation Model</td>
<td>85</td>
</tr>
<tr>
<td>Tinghua Ai, Zhilin Li and Yaolin Liu</td>
<td></td>
</tr>
</tbody>
</table>
Elevation modelling

An Efficient Natural Neighbour Interpolation ........................................... 97
Hugo Ledoux and Christopher Gold

Evaluating Methods for Interpolating Continuous Surfaces from Irregular Data: a Case Study
M. Hugentobler, R.S. Purves and B. Schneider

Contour Smoothing Based on Weighted Smoothing ................................... 125
Leonor Maria Oliveira Malva

Flooding Triangulated Terrain ...................................................................... 137
Yuanxin Liu and Jack Snoeyink

Vagueness and Interpolation

Vague Topological Predicates for Crisp Regions ........................................ 149
through Metric Refinements
Markus Schneider

Fuzzy Modeling of Sparse Data ................................................................. 163
Angelo Marcello Anile and Salvatore Spinella

Handling Spatial Data Uncertainty Using a Fuzzy Geostatistical Approach for Modelling Methane
Emissions at the Island of Java
Alfred Stein and Mamta Verma
Temporal

A Visualization Environment for the Space-Time-Cube ........................................ 189
Menno-Jan Kraak and Alexandra Koussoulakou

Finding REMO - Detecting Relative Motion .................................................. 201
Patterns in Geospatial Lifelines
Patrick Laube, Marc van Kreveld and Stephan Imfeld

Indexing

Spatial Hoarding: A Hoarding Strategy for Location-Dependent Systems .............. 217
Karim Zerioh, Omar El Beqqali and Robert Laurini

Distributed Ranking Methods for Geographic Information Retrieval .................. 231
Marc van Kreveld, Iris Reinbacher, Avi Arampatzis and Roelof van Zwol

Representing Topological Relationships between Complex Regions by F-Histograms ... 245
Lukasz Wawrzyniak, Pascal Matsakis and Dennis Nikitenko

The Po-tree, a Real-time Spatiotemporal Data Indexing Structure ....................... 259
Guillaume Noël, Sylvie Servigne and Robert Laurini

Uncertainty

Empirical Study on Location Indeterminacy of Localities ................................... 271
Sungsoon Hwang and Jean-Claude Thill
Registration of Remote Sensing Image with Measurement Errors and Error Propagation
Yong Ge, Yee Leung, Jianghong Ma and Jinfeng Wang

Double Vagueness: Effect of Scale on the Modelling of Fuzzy Spatial Objects
Tao Cheng, Peter Fisher and Zhilin Li

Area, Perimeter and Shape of Fuzzy Geographical Entities
Cidália Costa Fonte and Weldon A. Lodwick

Generalisation

Why and How Evaluating Generalised Data ?
Sylvain Bard, Anne Ruas

Road Network Generalization Based on Connection Analysis
Qingnian Zhang

Continuous Generalization for Visualization on Small Mobile Devices
Monika Sester and Claus Brenner

Shape-Aware Line Generalisation With Weighted Effective Area
Sheng Zhou and Christopher B. Jones

Spatial Relationships

Introducing a Reasoning System Based on Ternary Projective Relations
Roland Billen and Eliseo Clementini

A Discrete Model for Topological Relationships between Uncertain Spatial Objects
Erlend Tøssebro and Mads Nygård
Modeling Topological Properties of a Raster Region for Spatial Optimization
Takeshi Shirabe

Sandbox Geography – To learn from children the form of spatial concepts
Florian A. Twaroch and Andrew U. Frank

Urban Infrastructure

Street Centreline Generation with an Approximated Area Voronoi Diagram
Steven A. Roberts, G. Brent Hall and Barry Boots

Determining Optimal Critical Junctions for Real-time Traffic Monitoring for Transport GIS
Yang Yue and Anthony G. O. Yeh

Collaborative Decision Support for Spatial Planning and Asset Management: IIUM Total Spatial Information System
Alias Abdullah, Muhammad Faris Abdullah and Muhammad Nur Azraei Shahbudin

Navigation

Automatic Generation and Application of Landmarks in Navigation Data Sets
Birgit Elias and Claus Brenner

Towards a Classification of Route Selection Criteria for Route Planning Tools
Hartwig Hochmair

An Algorithm for Icon Labelling on a Real-Time Map
Lars Harrie, Hanna Stigmar, Tommi Koivula and Lassi Lehto
Working with Elevation

Semantically Correct 2.5D GIS Data — the.................................509
Integration of a DTM and Topographic Vector Data
Andreas Koch Christian Heipke

Generalization of integrated terrain elevation .........................527
and 2D object models
J.E. Stoter, F. Penninga and P.J.M. van Oosterom

An Image Analysis and Photogrammetric..........................547
Engineering Integrated Shadow Detection
Model
Yan Li, Peng Gong and Tadashi Sasagawa

Semantics and Ontologies

Understanding Taxonomies of Ecosystems: ...........................559
a Case Study
Alexandre Sorokine and Thomas Bittner

Comparing and Combining Different Expert........................573
Relations of How Land Cover Ontologies Relate
Alexis Comber, Peter Fisher and Richard Wadsworth

Representing, Manipulating and Reasoning ........................585
with Geographic Semantics within a Knowledge
Framework
James O’Brien and Mark Gahegan

Data Quality and Metadata

A Framework for Conceptual Modeling of ..........................605
Geographic Data Quality
Anders Friis-Christensen, Jesper V. Christensen
and Christian S. Jensen

xiv
Consistency Assessment Between Multiple Representations of Geographical Databases: a Specification-Based Approach
David Sheeren, Sébastien Mustièr and Jean-Daniel Zucker

Integrating Structured Descriptions of Processes in Geographical Metadata
Bénédicte Bucher

Spatial Statistics

Toward Comparing Maps as Spatial Processes
Ferko Csillag and Barry Boots

Integrating computational and visual analysis for the exploration of health statistics
Etien L. Koua and Menno-Jan Kraak

Using Spatially Adaptive Filters to Map Late Stage Colorectal Cancer Incidence in Iowa
Chetan Tiwari and Gerard Rushton