Proceedings of the 9th International Conference on Geocomputation

The Art and Science of Solving Complex Spatial Problems with Computers.

National Centre for Geocomputation
National University of Ireland, Maynooth
3-5 September 2007

Edited by Urška Demšar

Urška Demšar (ed.)

Geocomputation 2007

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Foreword

Céad Míle Fáilte!

On behalf of the international and local organising committees and the National Centre for Geocomputation at the National University of Ireland, Maynooth, I would like to welcome you to the Geocomputation 2007 conference. This is the 9th international conference in the Geocomputation series and it is a great pleasure to host it in Ireland for the first time.

In 2007, a record number of 145 contributions on all aspects of Geocomputation were submitted to the review process. Each contribution was subject to a double review from external reviewers and members of the local organising committee. After a strict selection process, 103 contributions were accepted for an oral presentation at the conference and 23 as posters. The authors of 12 contributions on the topics of Agent-Based Modelling and Cellular Automata were invited to extend their papers for a special issue of the *Computers, Environment and Urban Systems* journal. Eleven other contributions were recommended for submission to *Transactions in GIS* after an appropriate extension into a full paper. These e-proceedings contain pdf files of all accepted contributions (oral presentations and posters), which are arranged into folders according to the sessions in which they are presented.

Organising a conference of this size requires a substantial effort from a number of people. I would therefore first like to thank all the authors who submitted their contributions to the review process, thereby providing a solid base for a quality academic programme.

Next I would like to thank the members of both the international and the local organising committees for all their contributions to the organisational process. Special gratitude goes to Ann-Marie Burke, Orla Dunne, Rhona Bradshaw and Elizabeth Mathews from NCG for their tireless efforts. I would also like to acknowledge the help of external reviewers who kindly consented to review submissions and provided helpful comments.

Finally, this conference would not have been possible without sponsors. At the time of writing (July 27, 2007) I would like to acknowledge support from the following organisations and companies: first and foremost Science Foundation Ireland (SFI) whose generous grant enabled us not only to bring internationally prominent scientists as keynote speakers to the conference and organise a competition for the best presentation and the best poster, but who also provided a substantial subsidy in the registration fee for all students and participants from Irish industry. The National University of Ireland, Maynooth, kindly provided the venue and the infrastructure for the event. The participants will be introduced to Irish culture, dance and music thanks to the support from Fáilte Ireland. The Glenroyal Hotel in Maynooth contributed to the conference dinner. Elsevier supported the competition for the best presentation and the best poster at the conference.

On behalf of all the organisers I hope that you will enjoy this event and take back with you pleasant memories of your visit to Maynooth.

Urška Demšar
Geocomputation 2007 co-Chair

Geocomputation 2007 co-Chairs

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Academic Programme

Monday, 3 Sept 2007

9:20	**Opening ceremony**		
9:30	**Keynote address:** **Geovisual Analytics and the Need for Geocomputation** **Prof. Menno-Jan Kraak** International Institute for Geo-Information Science and Earth Observation (ITC), Enschede, NL Sponsored by 		
10:20	**Coffee break** – John Hume Building, 1st floor		
10:50	**1A Remote sensing 1**	**1B Algorithms and architecture 1**	**1C Applications: environment 1** **Semantics, concepts, ontologies 1**
12:30	**Lunch** – Pugin Hall, NUIM South Campus		
14:00	**2A Applications: environment 2**	**2B Applications: urban modelling 1**	**2C Remote sensing 2**
15:20	**Coffee break** – John Hume Building, 1st floor		
15:50	**3A Semantics, concepts, ontologies 2**	**3B Spatio-temporal modelling** **Data mining**	**3C Applications: urban modelling 2**
17:30	Free time		
19:30 - 22:00	**Welcome reception with a buffet dinner** – Pugin Hall, NUIM South Campus		

Tuesday, 4 Sept 2007

9:15	**4A Agent-based modelling 1**	**4B Applications: environment 3**	**4C Spatial statistics 1**
10:40	**Coffee break** – John Hume Building, 1st floor		
11:10	**5A Spatial networks**	**5B Agent-based modelling 2**	**5C Spatial statistics 2 - GWR**
12:30	**Lunch** – Pugin Hall, NUIM South Campus		
14:00	**Keynote address:** **ICA Research Agenda on Cartography and Geoinformation Science** **Prof. Kirsi Virrantaus** Laboratory of Geoinformation and Positioning Technology, Helsinki University of Technology, Espoo, FI Sponsored by 		
14:50	**Poster session**		
15:20	**Coffee break** – John Hume Building, 1st floor		
15:50	**6A Geovisualisation and Geovisual Analytics**	**6B Algorithms and architecture 2**	**6C Applications: environment 4**
17:30	Free time		
19:30 - 22:00	**Conference dinner** – Glenroyal Hotel, Maynooth		

Wednesday, 5 Sept 2007

9:15	7A	**Evolutionary computing** **Fuzzy modelling**	7B	**Cellular automata**	7C	**Spatial statistics 3**
10:40	**Coffee break** – John Hume Building, 1st floor					
11:10	8A	**Applications: health**	8B	**Agent-based modelling 3**	5C	**Spatial statistics 4**
12:30	**Closing ceremony**					

Monday, 3 Sept 2007, 10:50-12:30

1A – Remote sensing 1

1A1 George Ch. Miliaresis:
Delineation & Representation of Linear Megadunes from CSI-SRTM DEM

1A2 J.A. Corter and P.L. Guth:
Unsupervised Classification of Submarine Landslides

1A3 Máirtín. P. Mac Siúrtáin:
The Roy Bose simultaneous confidence interval approach to multivariate multitemporal pairwise comparisons within and between objects

1A4 Delfina Neves, Cláudio Carneiro:
Semi-automatic Use of High Resolution Images and Digital Elevation Models for Counting and Identification of Forest Trees

1A5 C. Bielski, J. Grazzini and P. Soille:
The Little Algorithm that Grew: Scaling the Morphological Image Compositing Algorithm to meet the Challenges of Processing Large Image Data Sets

1B – Algorithms and architecture 1

1B1 A.T. Murray, T.C. Matisziw, D. Tong and H. Wei:
GeoComputational Approaches to Coverage Maximization in Service Facility Siting

1B2 Chris Brunsdon:
Path Estimation from GPS Tracks

1B3 M.E. O'Kelly, Michael Niedzielski:
Computing and calibrating disaggregated spatial interaction models

1B4 P. Lewis, T. McCarthy, A. Winstanley and A. S. Fotheringham:
Software algorithm for decoding GPS from spatially encoded video

1B5 Ningchuan Xiao
Considering Diversity in Spatial Decision Support Systems

1C – Applications: environment 1 & Semantics, concepts, ontologies 1

1C1 Jennifer A. Miller:
Using simulated data to explore the effects of spatial structure, sampling strategy, and statistical methods on species distribution models

1C2 B. Radford, N. Goldberg, K. Holmes, K. van Neil, and G. Kendrick:
Can general models of marine biota be applied broadly for accurate and affective habitat mapping?

1C3 Seamus Coveney, Stewart Fotheringham, Martin Charlton and John Sweeney:
Dual-frequency GPS survey for validation of a regional DTM and for the generation of local DTM data for sea-level rise modelling in an estuarine Salt Marsh.

1C4 Allan Third, Brandon Bennett and David Mallenby:
Automatic Grounding of Vague Geographic Ontology in Data

1C5 S. Steiniger and P. Taillandier
Improving Map Generalisation of Buildings by Introduction of Urban Context Rules

Monday, 3 Sept 2007, 14:00-15:20

2A – Applications: environment 2

2A1 Edward Nash, Jans Bobert, Karl-Otto Wenkel, Wilfried Mirschel and Ralf Wieland:
Geocomputing Made Simple: Service-Chain Based Automated Geoprocessing for Precision Agriculture

2A2 V.I. Adamchuk, D.B. Marx, A.T. Kerby, A.K. Samal, L.K. Soh, R.B Ferguson and C.S. Wortmann:
Guided Soil Sampling for Enhanced Analysis of Georeferenced Sensor Based Data

2A3 G. L. Heritage and A. Chappell:
Estimating hydraulic and aerodynamic roughness using illumination and shadow of digital elevation models

2A4 H. S. Hansen:
Land-use modelling in a transnational context

2B – Applications: urban modelling 1

2B1 Rich Harris:
Modelling school catchments, choices and ethnic segregation: a geocomputational approach

2B2 B. Barboni and U. Schiavoni:
The breaking points in the "green corridors" due to new Master Plan of Rome

2B3	Meredith D, Charlton M. , Foley R. and Walsh J.: *Identifying Travel to Work Areas in Ireland: A Hierarchical Approach using GIS*
2B4	Atsushi Nara and Paul M. Torrens: *Fractal Analysis of Pedestrian Egress, Behavior and Efficiency*
2C – Remote sensing 2	
2C1	Victor Mesev: *Integrative spatial-spectral-temporal remote sensor models of urban configuration and sustainability*
2C2	Gong Jian-Ya: *The developing Actuality of Photogrammetry and Remote Sensing Technology in China*
2C3	Yin Shou-Jing and Chen Xiao-Ling: *Reducing Boundary Effects in Image Texture Segmentation Using Weighted Semivariogram*
2C4	Zhiyong Jiang and Chen Xiao-Ling: *Research on remote sensed image Classification Based on morphological feature extraction*

Monday, 3 Sept 2007, 15:50-17:30

3A – Semantics, concepts, ontologies 2	
3A1	Barbara Hofer: *How to Identify Types of Spatial Processes - An Example*
3A2	James D. McCarthy and Phil A. Graniero: *Reasoning-Ready Sensor Data*
3A3	Ola Ahlqvist: *The geo-attribute space: a general space-time-property representation*
3A4	Ningchuan Xiao, Ola Ahlqvist and Mei-Po Kwan: *Public Participation GIS for the General Public?*
3A5	Tawan Banchuen: *The Geographical Analog Engine: Weighted Euclidean and Semantic Similarity Measures for U.S. Cities*
3B – Spatio-temporal modelling & Data mining	
3B1	Olga Špatenková, Urška Demšar and Jukka Krisp: *Self-Organising Maps for exploration of spatio-temporal emergency response data*
3B2	Harvey J. Miller and Scott A. Bridwell: *Time geographic fields: A continuous velocity theory for time geography*
3B3	T. K. T. Le, R. J. Abrahart and N. J. Mount: *M5 Model Tree applied to modelling town centre area activities for the city of Nottingham*
3B4	M-T. Kechadi, M. Bertolotto, S. Di Martino and F. Ferrucci: *A 2-Pass Data Mining Technique for Spatio-Temporal Datasets*
3B5	Ian Turton, Mark Gahegan and Anuj Jaiswal: *Geographic Information Retrieval from Disparate Data Sources*
3C – Applications: urban modelling 2	
3C1	Victor Lobo, Pedro Cabral and Fernando Bação: *Self Organizing Maps for Urban Modelling*
3C2	Alex Hagen-Zanker: *Quantification and classification of urban change patterns*
3C3	C. Chalkias and S. Kalogirou: *Estimating Light Pollution in Suburban Areas with complex Topography*
3C4	G. Borruso, V. Iacoviello and A. Porceddu: *GIS and geostatistics for modelling urban times in neighbouring border cities*
3C5	Dr. Sharaf Al-kheder, Dr. Naif Hadad, Leen Fakhoury and Suha Baqaen: *Spatial Modeling and Assessment of the Interaction between Modern and Heritage Urban Landscapes with GIS - A case study of Irbid city, Jordan*

Tuesday, 4 Sept 2007, 9:15-10:40

4A – Agent-based modelling 1

4A1 Moira L. Zellner and Thomas L. Theis:
New Frameworks for Urban Sustainability Assessments: Linking Complexity, Information and Policy

4A2 S. Dragićević:
Embedding spatial agents into irregular cellular automat a models of urban land use change to improve scenario exploration and decision making

4A3 N. Jabeur and P.A. Graniero:
Agent-Based Clusters to Virtually Manage Spatially Distributed Sensors

4A4 David Bennett and Wenwu Tang:
Representing Complex Adaptive Spatial Systems

4B – Applications: environment 3

4B1 J.A. Downs and M.W. Horner:
Network-Based Kernel Density Estimation for Home Range Analysis

4B2 Brenton S. Chatfield:
Uncovering the Secrets of Rare Species: Can Community Level Modelling Help?

4B3 D. L. McGinnis, C. Anderson, M. W. Williams and D. A. Bennett:
Multifaceted Geocomputation to Support Ecological Modelling in Yellowstone

4B4 Magda Biesiada, Marie-Josée Fortin and Trisalyn Nelson:
Spatial Distribution of Mountain Pine Beetle in the Morice Timber Supply Area in Western British Columbia between 1995 and 2002

4C – Spatial statistics 1

4C1 Yichun Xie and Xinyue Ye:
Multi-category Tempo-Spatial Pattern Analysis (McTSPA)

4C2 P. C. Kyriakidis and M. F. Goodchild:
Geostatistical Alternatives for Incorporating Covariates in Areal Interpolation

4C3 T. Cheng , J. Wang and X. Li:
The Support Vector Machine for Nonlinear Spatio-Temporal Regression

4C4 T. Hengl, B. Bajat, H.I. Reuter and D. Blagojević:
Geostatistical modelling of topography using auxiliary maps

Tuesday, 4 Sept 2007, 11:10-12:30

5A – Spatial networks

5A1 D. M. Mountain, J. L. Y. Tsui and J. F. Raper:
Modelling accessibility via transportation networks based upon previous experience: a Geographically Weighted Regression approach

5A2 Sanjay Rana:
Novel Structural Analyses of Surface Networks

5A3 A. C. Olden and G. E. Taylor:
Heuristically Driven Random Walks Across Large Scale Graphs

5A4 S. Porta and V. Latora:
Correlating street centrality with commerce and service location in cities

5B – Agent-based modelling 2

5B1 Sk. Morshed Anwar, Lael Parrott and Danielle Marceau:
Multi-agent modelling of whale-watching excursions in the Saguenay St. Lawrence Marine Park (SSLMP) in Quebec, Canada

5B2 Y. Li, A. J. Brimicombe and C. Li:
Agent-Based Services for Validating Multi-Agent Models

5B3 B. M. Wu, M. H.Birkin and P. H. Rees:
Bringing agents into the spatial microsimulation

5B4 Andrew Crooks, Christian Castle and Michael Batty:
Key Challenges in Agent-Based Modelling for Geo-Spatial Simulation

5C – Spatial statistics 2 – GWR

5C1 Graham Squires and Richard Kingston:
Exploring housing patterns and dynamics in low demand neighbourhoods using Geographically Weighted Regression

5C2	Caroline Crowley and Jim Walsh: *A Local Regression Analysis of Irish Farm Census Data*
5C3	Ricardo Crespo, Stewart Fotheringham and Martin Charlton: *Application of Geographically Weighted Regression to a 19-year set of house price data in London to calibrate local hedonic price models*
5C4	Daniel J Grose, Richard Harris, Chris Brundson and Dave Kilham: *Grid Enabling Geographically Weighted Regression*

Tuesday, 4 Sept 2007, 15:50-17:30

6A – Geovisualisation and Geovisual Analytics	
6A1	D. Andrieu, C. Kaiser, A. Ourednik and J. Lévy: *Advanced cartogram construction using a constraint based framework*
6A2	Stephane Joost and Abram Pointet: *A dedicated Geographic Exploration Interface for the monitoring of worldwide Farm Animal Genetic Resources*
6A3	G. Andrienko and N. Andrienko: *Implementing Visual Analytics Methods for Massive Collections of Movement Data*
6A4	Alex Singleton, Maurizio Gibin and Paul Longley: *Exploratory Cartographic Visualisation of Health and Higher Education the through Google Maps API*
6A5	Suwen Wang, Robert Beiko and Stephen Brooks: *Collapsible 3D Terrains for GIS Visualization*
6B – Algorithms and architecture 2	
6B1	Jesse Blum, Kenneth J. Turner and Sandy Winterbottom: *Cumulative Viewshed Analysis using GRID Computing*
6B2	J. K. McGrath, J. P. O'Kane, K. J. Barry and R. C. Kavanagh: *Channel-adaptive Interpolation for Improved Bathymetric TIN*
6B3	B.G. Lees, Q.K. Yang and D.L. Jupp: *Re-scaling Terrain Variables*
6B4	Tonny J. Oyana: *A Geospatial Implementation of a Novel Delineation Clustering Algorithm Employing the K-means*
6B5	Peter Mooney and Adam Winstanley: *Applying Recommendation Algorithms to Collections of Geospatial Metadata*
6C – Applications: environment 4	
6C1	A. Chappell and C. T. Agnew: *The need for spatial uncertainty in climate data: an example from west African Sahelian rainfall (1930-1990)*
6C2	Zhang Li and Chen Xiao-Ling: *Spati-temporal Changes of NDVI and Their Relations with Precipitation and Temperature in Yangtze River Catchment from 1992 to 2001*
6C3	Zhang Ting, Tang Guo-an, Liu Xuejun, Zhou Yi and Jia Dunxin: *Spatial pattern of channel network in Jiuyuangou drainage basin*
6C4	Y. S. Choi, H. D. Park and C. Sunwoo: *Multi-Criteria Evaluation and Least Cost Path Analysis for Optimal Haulage Routing in Open-Pit Mines*
6C5	Abdolrassoul S. Mahiny: *Patch Metrics as Surrogates of Structural Complexity of Remnant Vegetation*

Wednesday, 5 Sept 2007, 9:15-10:40

7A – Evolutionary computing & Fuzzy modelling	
7A1	R. A. Wadsworth: *Zen and the Art of GIS: Visualising what can't be seen*
7A2	Dajun Dai and Tonny J. Oyana: *A genetic algorithm for spatiotemporal cluster detection and analysis*
7A3	H. Schernthanner: *Fuzzy Logic Method for Landslide Susceptibility Mapping, "Rio Blanco", Nicaragua*
7A4	G. A. Mason and R. D. Jacobson: *Fuzzy Geographically Weighted Clustering*
7B – Cellular automata	
7B1	Roger White and Inge Uljee: *Multi-Scale Modelling of Population and Land Use with a Variable Grid CA*
7B2	N. L. Moreno and D.J. Marceau: *Performance assessment of a new Vector-based Geographic Cellular Automata Model*
7B3	Yaolong Zhao and Yuji Murayama: *A Constrained CA Model to Simulate Urban Growth of the Tokyo Metropolitan Area*
7B4	Shawn W. Laffan, Eugene Lubarsky, Michael P Ward and Linda D. Highfield: *A geographic automata system for modelling disease outbreaks in wild and unfenced animal populations*
7C – Spatial statistics 3	
7C1	Nicholas Nagle: *On block bootstrapping areal data*
7C2	J. F. Conley, I. J. Turton and M. N. Gahegan: *Using Image Moment Invariants to Distinguish Classes of Geographical Shapes*
7C3	Jacopo Grazzini, Pierre Soille and Conrad Bielski: *On the use of geodesic distances for spatial interpolation*
7C4	R. Kerry and M. A. Oliver: *The Effects of Underlying Asymmetry and Outliers in data on the Residual Maximum Likelihood Variogram:A Comparison with the Method of Moments Variogram*

Wednesday, 5 Sept 2007, 11:10-12:30

8A – Applications: health	
8A1	Karyn Morrissey, Graham Clarke, Dimitris Ballas and Cathal O'Donoghue: *Accessibility to Health Care in Rural Ireland*
8A2	G.P. Malanson: *Cellular Landscapes and Infectious Disease*
8A3	Ronan Foley and Martin Charlton: *Modelling Changing Hospital Service Accessibility in Ireland 1999-2006*
8A4	Howard Johnson and Mel McIntyre: *Health Atlas Ireland*
8B – Agent-based modelling 3	
8B1	I. Benenson, K. Martens and S. Birfir: *Parking in the City: The Model as a Tool for Policy Evaluation*
8B2	Walid (Oualid) Ali and Bernard Moulin: *MultiAgent GeoSimulation of human behaviors in micro-scale geographic environments: The case of the shopping behavior in a mall*
8B3	Oswald Devisch, Theo Arentze, Aloys Borgers and Harry Timmermans: *Employing agents to develop integrated urban models - numerical results from residential mobility experiments*
8B4	Nicolas Malleson: *Agent-Based Modelling and Crime in Leeds*
8C – Spatial statistics 4	
8C1	Devis Tuia, Christian Kaiser, A. DaCunha amd M. Kanevski: *Socio-economic cluster detection with Spatial Scan Statistics. Case study: services at intra-urban scale*
8C2	Yilin Liu and David Jarrett: *Spatial Statistical Modelling of Traffic Accidents*

Poster session, Tuesday, 4 Sept 2007, 14:50-15:20

Posters

P01 J. Negreiros, A. C. Costa, M. Painho , J. Santos and I. Lopes:
Geostatistical Analysis: Software Flashpoint

P02 Georg Gartner:
Smart Environments and LBS to support pedestrian navigation

P03 B. Melo and C. L. Nascimento Jr:
Forecasting Using the Mixture of Local Expert Models

P04 Qiu Bingwen:
Land use change simulation model based on MCDM and CA and its application

P05 Pavel Děrgel, Petr Fuks and Lucie Hrubá:
Traffic simulation environment for Multi-Agent systems based on GIS

P06 Ellen-Wien Augustijn-Beckers and Rolf A. de By:
Towards routine large-scale, discrete spatial event simulations

P07 P.L. Guth:
Global SRTM Geomorphometric Atlas

P08 A. J. Heppenstall, A.J. Evans and L.M. See:
Non-linear behaviour, emergence, and complexity in geographical systems

P09 T. Neutens, T. Schwanen, F. Witlox and Ph. De Maeyer:
Towards a Measure of Joint Space-Time Accessibility: Conceptualization and Theoretical Framework

P10 R. Zhumagulova, D. M. Mountain and C. Rhin:
Evaluating location-based functionality from the perspective of the user: a case study from the Greenwich Observatory

P11 T. K. Remmel and A. H. Perera:
Geospatial Techniques for a Multi-Resolution Assessment of Post-Fire Boreal Vegetation Residual Patterns

P12 Thierry Joliveau and Sanjay Rana:
Using Urban Viewsheds for Embedding Geographical Context in Photograph Databases of Urban Areas

P13 L. Hashemi Beni, M. A. Mostafavi and M. L. Gavrilova:
Moving Objects Management in a 3D Dynamic Environment

P14 R. Thibaud, P.L. Guth, P. Alessio and S. Méline:
TCP Interface To Access the MICRODEM GIS Engine

P15 Jian Wang, G.H. Gan,Yong Xu and Z.Q. Wang:
Geography Cartography Service: A Case Study of On-Demand Geo-Computing

P16 K. W. Holmes, B. Radford and K. P. Van Niel:
Marine versus terrestrial predictive mapping: Geographic modelling constraints of working underwater

P17 C. Plazanet and V. Silva:
Vector Approaches to Urban Morphogenesis Modelling

P18 Y. Hu, A.R. Watkinson and A.A. Lovett:
Land Use Change Modelling Using Markov Chain and Neural Network: Potentialities and Limitations

P19 Mohammad Saeed Zaeri, Jamal Shahrabi and Mahmood Pariazar:
Using Spatial Data Analysis in Distribution System Design

P20 Y. H. Zeng and Z.H.Tian:
An automatic updating method for geospatial data with lightweight network GIS

P21 Gordon Green, Sean Ahearn, Ryan Carney and Alan McConchie:
Deriving Cellular Automata Rules for Areas at Risk of West Nile Virus Infection

P22 Amir Bonyad:
A new geocomputational algorithms for forest classification and mapping using satellite remote sensing data

P23 Yuefeng Liu, Xin Zhang and Huabo Sun:
Complete Route Computing for Non-drivers Based on Public Transport Network and Pedestrian Network

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