Special Issue on Spatiotemporal Modeling and Analysis

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Localization technologies such as navigation systems or mobile phones have steadily conquered our everyday life over the past fifteen years. We have become used to knowing exactly where we are. The challenge of today is to know where the *others* are and where they are going. How often have we wished for a small device telling us whether to hurry or whether to keep our pace when we were late for a bus - possibly the bus was delayed as well? How often have we yearned for a navigation system telling us a different detour than everybody else? Clearly, the answers to these questions require intelligent systems which know about the schedule of an individual as well as of the current and future status of the whole system. It requires intelligent modeling and analysis methods to extract such information from spatiotemporal data.

This special issue provides an overview of current developments in spatiotemporal data mining, focusing in particular on trajectory data. Besides the overview article, the contribution of M. Sester et al. is a good starting point. It describes methods at the basis of trajectory data analysis, namely the detection of stops, the classification of the mode of transportation as well as the detection of typical paths. The articles by H.-P. Kriegel et al., N. Andrienko et al. and S. Rinzivillo et al. present methods to analyze global movement behav-

ior. H.-P. Kriegel et al. provide an efficient algorithm for traffic density prediction. N. Andrienko et al. provide insights into episodic movement data by detecting typical situations of presence and flows of moving objects using methods from visual analytics. S. Rinzivillo et al. bring together methods from trajectory analysis and complex network analysis in order to delineate geographic areas which are highly connected by personal movement. A quite different area of spatiotemporal modeling is touched in the last technical contribution by J. F. Sima and C. Freksa. It presents a cognitive model for mental imagery, i.e. how the human mind represents and processes spatial information.

In addition, this special issue contains two project reports. The first report by T. A. Runkler et al. gives insight into current developments on localization of objects and on distributed pattern matching in wireless sensor networks at Siemens Corporate Technology. The second report by D. Janssens et al. introduces the European FP7 project DATSIM, which has the aim to develop a highly detailed spatiotemporal microsimulation methodology for human mobility, grounded on massive amounts of big data.

Finally, the special issue features two interviews with Josep Domingo-Ferrer, Chris Clifton and Yücel Saygin on privacy aspects when analyzing spatiotemporal data.

We wish to thank Daniel Sonntag for his commitment to this special issue as supervising KI editor. In addition, we thank all authors and interviewees, who contributed with their expertise to this issue and were so readily willing to spent a lot of effort on it. Finally, we wish to thank all reviewers for their valuable comments and suggestions.

We hope you enjoy reading!

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1 Content

1.1 Fachbeiträge

- Monika Sester, Udo Feuerhake, Colin Kuntzsch and Lijuan Zhang: *Revealing Underlying Structure and Behaviour from Movement Data*
- Hans-Peter Kriegel, Matthias Renz, Matthias Schubert and Andreas Züfle: *Efficient Traffic Density Prediction in Road Networks Using Suffix Trees*
- Natalia Andrienko, Gennady Andrienko, Hendrik Stange, Thomas Liebig and Dirk Hecker: *Visual Analytics for Understanding Spatial Situations from Episodic Movement Data*
- Salvatore Rinzivillo, Simone Mainardi, Fabio Pezzoni, Michele Coscia, Dino Pedreschi and Fosca Giannotti: *Discovering the Geographical Borders of Human Mobility*
- Jan Frederik Sima and Christian Freksa: *Towards Computational Cognitive Modeling of Mental Imagery - The Attention-Based Quantification Theory*

1.2 Projekte

- Thomas A. Runkler, Rudolf Sollacher and Andrei Szabo: *Learning and Self-organization for Spatiotemporal Systems*
- Davy Janssens, Fosca Giannotti, Mirco Nanni, Dino Pedreschi and Salvatore Rinzivillo: *Data Science for Simulating the Era of Electric Vehicles*

1.3 Interview

- Interview with Josep Domingo-Ferrer and Chris Clifton on *Privacy in Spatiotemporal Data Analysis*
- Interview with Yücel Saygin on *Privacy in Spatiotemporal Data Analysis*

2 Service

2.1 Books

- *F. Giannotti and D. Pedreschi (Eds.)*. Mobility, Data Mining and Privacy. Geographic Knowledge Discovery. Springer, 2008
- *H. J. Miller and J. Han*. Geographic Data Mining and Knowledge Discovery, Second Edition. CRC Press, 2009
- *S. Shekhar and R. R. Vatsavai*. Spatial and Spatiotemporal Data Mining. Chapman & Hall/CRC, forthcoming

2.2 Journals

- GeoInformatica: http://www.springerlink.com/content/100268/?MUD=MP
- IJGIS (International Journal of Geographical Information Science): http://www.tandf.co.uk/journals/tgis
- JOSIS (Journal of Spatial Information Science): http://www.josis.org
- Transactions in GIS: http://eu.wiley.com/WileyCDA/WileyTitle/productCd-TGIS.html
- TRR (Transportation Research Record): http://www.trb.org/Main/Blurbs/154702.aspx

2.3 Conferences and Workshops

- ACM GIS (Int. Conf. on Advances in Geographic Information Systems): http://www.sigspatial.org
- AGILE (Int. Conf. on Geographic Information Science): http://www.agile-online.org
- EDBT (Int. Conf. on Extending Database Technology): http://www.edbt.org
- Geoinformatik: http://www.geoinformatik2012.de
- GIScience (Int. Conf. on Geographic Information Science): http://www.giscience.org
- ICDM (Int. Conf. on Data Mining): http://cs.uvm.edu/~icdm
- KDD (SIGKDD Conf. on Knowledge Discovery and Data Mining): http://www.sigkdd.org
- MobiSys (Int. Conf. on Mobile Systems, Applications, and Services): http://www.sigmobile.org/mobisys
- Pervasive: http://pervasiveconference.org
- SSTD (Int. Symp. on Spatial and Temporal Databases)
- SSTDM (Int. Workshop on Spatial and Spatiotemporal Data Mining): http://www.ornl.gov/sci/knowledgediscovery/sstdm-12
- TRB (Transportation Research Board Annual Meeting): http://www.trb.org
- Ubicomp (Int. Conf. on Ubiquitous Computing): http://www.ubicomp.org
- VAST (IEEE Conf. on Visual Analytics Science and Technology): http://visweek.org
- VLDB (Int. Conf. on Very Large Databases): http://www.vldb.org

2.4 Tools

- M-Atlas: `http://www.m-atlas.eu`
- MATSim: `http://www.matsim.org`
- SECONDO: `http://dna.fernuni-hagen.de/Secondo.html`
- V-Analytics: `http://www.geoanalytics.net/V-Analytics`