

# Guest Editors' Introduction: Special Section on the IEEE Conference on Visual Analytics Science and Technology (VAST)

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VISUAL Analytics is an evolving field that, at its core, is directed to the science of analytical reasoning supported by highly interactive visual interfaces. People use visual analytics tools, methods, and techniques in all aspects of science, engineering, business, and government to synthesize data into information and knowledge, derive insight from massive, dynamic, and often conflicting data, detect the expected and discover the unexpected, provide timely, defensible, and understandable assessments, and communicate assessments effectively for action. Visual Analytics requires interdisciplinary research that integrates perspectives from information and scientific visualization with those from cognitive and perceptual sciences, statistics, mathematics, knowledge representation, management, and discovery technologies, decision sciences, and more.

Jim Thomas took a lead in defining the field of Visual Analytics and (with Kristin Cook) coedited a highly influential book in 2005, called *Illuminating the Path*, that presented results of a workshop to outline the scientific and practical challenges of the field. Within the community effort of the VisMaster Coordinated Action, funded by the European Union, this roadmap for Visual Analytics was updated in *Solving Problems with Visual Analytics*, coedited by Daniel Keim, Jörn Kohlhammer, Geoffrey Ellis, and Florian Mansmann in 2010.

The IEEE Conference on Visual Analytics Science and Technology (IEEE VAST), founded in 2006 as the IEEE Symposium on Visual Analytics Science and Technology, is the first international conference dedicated to advances in Visual Analytics Science and Technology. The scope of the conference, colocated with the annual IEEE Visualization Conference, the IEEE Information Visualization Conference, and other visualization events (jointly called VisWeek), includes both fundamental research contributions within Visual Analytics as well as applications of Visual Analytics, including applications in science, engineering, medicine, health, media, business, social interaction, and security and investigative analysis.

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The *IEEE Transactions on Visualization and Computer Graphics* (TVCG) has recognized and honored the importance of Visual Analytics from the beginning, and invites the authors of the best conference papers to submit substantively extended versions of VAST papers to the journal. For these papers, TVCG applies the usual standard in asking for more than 30 percent new material and insights compared to the conference paper. This special section presents the extended versions of the best papers of IEEE VAST 2011, which took place in October 2011 in Providence, Rhode Island. These papers were selected together with the best paper award selection committee, which was composed of three members who reviewed the top papers and their peer reviews. The three selected papers went through the regular and standard reviewing process of TVCG.

The papers presented here reflect the diversity of the growing field of visual analytics. Collectively, the set of papers exemplify three components that are central to visual analytics as a field.

The first paper is "Scalable Analysis of Movement Data for Extracting and Exploring Significant Places" by Gennady Andrienko, Natalia Andrienko, Christophe Hurter, Salvatore Rinzivillo, and Stefan Wrobel and was selected as the 2011 IEEE VAST best paper. The paper presents novel ways for analyzing large-scale spatio-temporal data resulting from tracking movement data. The authors present a visual analytics procedure consisting of four major steps: 1) event extraction from trajectories; 2) extraction of relevant places based on event clustering; 3) spatio-temporal aggregation of events or trajectories; and 4) analysis of the aggregated data. The benefits and limitations of their approach are illustrated by two real-world examples: first, exploring car movements in Milan (Italy), and second, analyzing the flight dynamics in France. Finally, they also demonstrate the scalability of their contribution.

The second paper is "The Longitudinal Use of SaNDVis: Visual Social Network Analytics in the Enterprise" by Adam Perer, Ido Guy, Erel Uziel, Inbal Ronen, and Michal Jacovi and was selected as an "honorable mention paper." Discovering relationships within an enterprise in the sense of finding other people and relevant network connections is a challenging task. This paper analyzes different approaches to mine, aggregate, and infer a social graph from social media inside an enterprise and proposes a visual analytics tool, called SaNDVis, that supports people-centric tasks, such as expertise location and team building inside an

enterprise. One very interesting part of this paper is the longitudinal analysis of SaNDVis, which illustrate that effective integration of visual analytics tools into the user's ecosystem is a critical and challenging task.

The third paper is "How Visualization Layout Relates to Locus of Control and Other Personality Factors" by Caroline Ziemkiewicz, Alvitta Ottley, R. Jordan Crouser, Ashley Rye Yauilla, Sara L. Su, William Ribarsky, and Remco Chang and was also selected as an "honorable mention paper." This paper provides basic research on personality factors influencing interaction with visual analytics approaches. The authors isolate the factor "locus of control" (LOC) in relation to layout of visualizations, which was not done in previous studies. They conducted a user study with four visualizations that gradually shift from a list metaphor to a containment metaphor and compare the participants' speed, accuracy, and preference with their LOC and other personality factors. One of their main findings was that participants with an internal LOC perform more poorly with visualizations that employ a containment metaphor, while those with an external LOC perform well with such visualizations.

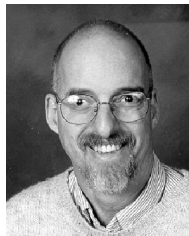
We would like to thank the authors for the effort that went into their submissions, the members of the best paper award selection committee, the program committee, and reviewers for their work in selecting and ordering contributions for the final program as well as for this special issue, and of course, the participants who made the IEEE Conference on Visual Analytics Science and Technology a great success.

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*Guest Editors*



**Silvia Miksch** is an associate professor and head of the Information and Knowledge Engineering research group, Institute of Software Technology & Interactive Systems, Vienna University of Technology. From 2006 to 2010, she was a professor and head of the Department of Information and Knowledge Engineering at Danube University Krems, Austria. In April 2010, she established the awarded Laura Bassi Centre of Expertise "CFAST—Center for Visual

Analytics Science and Technology (Design, Interact & Explore)" funded by the Federal Ministry of Economy, Family and Youth of the Republic of Austria. She has acquired, led, and been involved in several national and international research projects. She has served on various program committees of international scientific conferences and was, for example, conference paper cochair of the IEEE Conferences on Visual Analytics Science and Technology (IEEE VAST 2010 and 2011) at VisWeek and Eurographics/IEEE Conference on Visualization (EuroVis 2012). She has reviewed for several scientific journals, belongs to the editorial board of *Artificial Intelligence in Medicine* (AIM-J, Elsevier), *AI Communications* (AICOM, IOS Press), and the *IEEE Transactions on Visualization and Computer Graphics* (TVCG, IEEE CS) and served as a guest editor for *Artificial Intelligence in Medicine* (Elsevier), the *IEEE Transactions on Visualization and Computer Graphics* (TVCG, IEEE CS), and *Information Visualization* (IV, Palgrave Macmillan/SAGE). Her main research interests are information visualization and visual analytics (in particular, focus+context and interaction methods), process and plan management, interaction design, user-centered design, and time. For more information, see <http://www.ifs.tuwien.ac.at/~silvia/>.



**Matthew Ward** received the BS degree in computer science from Worcester Polytechnic Institute in 1977 and the MS and PhD degrees in computer science from the University of Connecticut in 1979 and 1981, respectively. He is currently a full professor in the Computer Science Department at Worcester Polytechnic Institute (WPI). He was employed as a Member of the Technical Staff in the Robotics and Computer Systems Research Laboratory at AT&T Bell

Laboratories between 1980 and 1984 and as a research scientist at Skantek Corporation until 1986, when he joined the faculty at WPI. His research interests include data and information visualization, visual analytics, scientific data management and analysis, and knowledge-guided image analysis. He has authored or coauthored more than 100 papers and several book chapters in these areas, and has recently completed a textbook on interactive data visualization with coauthors Georges Grinstein and Daniel Keim. He is the chief architect of several public domain visualization packages, most notably XmdvTool, which has been under constant development since 1994. He has served as an associate editor of the *IEEE Transactions on Visualization and Computer Graphics* and is currently an associate editor of the *Information Visualization Journal*. He is a member of the IEEE Visualization Executive Committee and the InfoVis Conference Steering Committee, and is the Conference Chair for the 2013 VAST Conference. He has served on the organizing committees for the IEEE Visualization and Information Visualization Conferences, and the program committees for virtually all major conferences in the area of data and information visualization.