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

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Visual Analytics is a relatively new and 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, 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. Jim Thomas passed away in 2010 and the field will miss his vision and leadership. Fortunately, his initiatives have led to many challenging and ongoing activities, which steadily increase the size and impact of the field.

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.

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 2010, which took place in October 2010 in Salt Lake City, Utah. These papers were selected together with the best paper award selection committee, which was composed of five 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: attention to integration of visual interface and visualization methods with computational methods to derive insight from large volumes of data, application of methods to challenging analytical problems for which computational methods alone are unlikely to be sufficient, and attention to users and how to support them not just in seeing patterns and relationships, but in carrying out an analysis process.

The first paper is "Visual Readability Analysis: How to Make Your Writings Easier to Read" by Daniela Oelke, David Spretke, Andreas Stoffel, and Daniel A. Keim, and was selected as the 2010 IEEE VAST best paper. The authors developed a set of readability features for text documents and introduced a visual tool for analyzing readability, with the goal of helping users improve the readability of their work. The paper tackles a very important problem at the intersection of the fields of education, computational linguistics, and text visualization. Several case studies are presented that show the wide range of applicability of the proposed VisRA tool. Additionally, an in-depth evaluation assesses the quality of the measure and investigates how well users do in revising a text with the help of the tool.

The second paper is "Identifying Place Histories from Activity Traces with an Eye to Parameter Impact" by Gennady Andrienko, Natalia Andrienko, Martin Mladenov,

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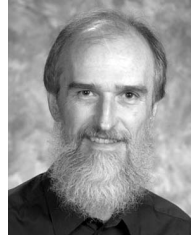
Michael Mock, and Christian Pölitz. The paper addresses a very timely and relevant problem, extracting useful knowledge from large volumes of activity data. The authors suggest a suite of visual analytics methods for reconstructing past events from these activity traces. They demonstrate the utility of their contribution on two large real data sets, mobile phone calls in Milano during nine days and flickr photos made on the British Isles over a five-year time span.

The third paper is "Co-Located Collaborative Visual Analytics around a Tabletop Display" by Petra Isenberg, Danyel Fisher, Sharoda A. Paul, Meredith Ringel, Morris Kori Inkpen, and Mary Czerwinski. The paper presents a user study directed to an artifact for collaborative analytical reasoning with a particular focus on problem solving strategies of pairs of co-located actors using large multi-touch display. It is an important contribution to understand technology-enhanced collaboration and how it is connected to analytical reasoning tasks. One particular contribution is a set of eight different collaboration styles that was developed based on the empirical analysis and a prior study by Tang et al. (2006). This set is comprehensive and very likely to serve as common ground for further studies in this area, thus facilitating comparability in terms of a backbone for a body of research.

Together, these papers illustrate the growing sophistication of the interdisciplinary research field of Visual Analytics. They represent successful integration of perspectives from visualization with concepts and methods from computational linguistics, applied psychology, text readability, GIScience, geostatistics, HCI, and CSCW. We look forward to seeing future research that leverages advances and strategies for integration of methods that are presented in these papers.

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

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Silvia Miksch is an associate professor and head of the Information and Knowledge Engineering Research Group at the 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 "CVAST 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 has 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), *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/.