



INTRODUCTION

Visual analytics science and technology

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It is an honor to welcome you to the first theme issue of *Information Visualization (IVS)* dedicated entirely to the study of visual analytics. It all started from the establishment of the U.S. Department of Homeland Security (DHS)-sponsored National Visualization and Analytics CenterTM (NVACTM) at the Pacific Northwest National Laboratory in 2004. In 2005, under the leadership of NVAC, a team of the world's best and brightest multidisciplinary scholars coauthored its first research and development agenda, *Illuminating the Path*, which defines the study as 'the science of analytical reasoning facilitated by interactive visual interfaces.' Among the most exciting, challenging, and educational events developed since then was the first IEEE Symposium on Visual Analytics Science and Technology (VAST) held in Baltimore, MD in October 2006. This theme issue features seven outstanding articles selected from the IEEE VAST proceedings and a commentary article contributed by Jim Thomas, the director of NVAC, on the status and progress of the Center.

The seven selected IEEE VAST papers, which cover a wide range of topics, represent the state-of-the-art and future trends in visual analytics science and technology. The paper authors were asked to add more background information for a multidisciplinary audience, present detailed descriptions of how their systems are constructed and/or evaluated, include new examples and results, and explain the implications and impacts of their work to a wider readership. These papers then went through a vigorous review process by a panel of experts before they were recommended for acceptance. In the end, the revised papers show significant changes and exceed the high-quality standard set by the journal.

'Interactive wormhole detection and evaluation' by Weichao Wang and Aidong Lu presents an interactive visualization technique to detect wormhole attacks in a wireless network. A user study on the visualization technique is included to show the effectiveness of the design.

A second network-related paper of this theme issue is 'NetLens: iterative exploration of content-actor network data' by Hyunmo Kang, Catherine Plaisant, Bongshin Lee, and Benjamin B. Bederson. The paper presents NetLens – an interactive tool to analyze graph data by visualizing multiple simple coordinated views of ordered lists and histogram overviews of the underlying graphs.

'ScentIndex and ScentHighlights: productive reading techniques for conceptually reorganizing subject indexes and highlighting passages' by Ed H. Chi, Lichan Hong, Julie Heiser, Stuart K. Card, and Michelle Gumbrecht describes a visual analytics technique to interactively navigate a digitized book, organize its entries, and skim its contents. The study shows that humans can grasp the contents of a paper book more effectively when using the interactive system.

Paul E. Keel introduces a visual analytics environment for the support of collaborative sensemaking activities in 'EWall: a visual analytics environment for collaborative sense-making.' The tool allows users to navigate information and share responsibility with minimal verbal communication.



Stephen G. Eick, Justin Mauger, and Alan Ratner evaluate the performance of various computational linguistics algorithms such as confusion matrices and DOC Curves and report their findings in 'A visualization testbed for analyzing the performance of computational linguistics algorithms.' The goal is to develop new methods to obtain better semantic understanding of unstructured multilingual text.

Jörn Schneidewind, Mike Sips, and Daniel A. Keim describe the new 'pixnostics' approach to automatically select the right data parameter setting for a visual analytic task in 'An automated approach for the optimization of pixel-based visualizations.' Real-world data sets are used to demonstrate the benefit of the work.

Finally, Chris Weaver, David Fyfe, Anthony Robinson, Deryck Holdsworth, Donna Peuquet, and Alan M. MacEachren describe a visual analytics tool to explore the visitation patterns of guests of two historical hotels in 'Visual analysis of historic hotel visits.' The tool is designed to study spatial and temporal characteristics of human behavior in social networks.

The articles presented in this theme issue represent some of the best work that the diverse community has offered to date. The authors' insights and wisdom will certainly influence our thinking and shape our future as the needs of the community continue to evolve. As of this writing, the second IEEE VAST symposium is being organized and will be held in Sacramento, CA in October 2007. More new visual analytics research centers are being established at universities and research institutes in Canada, Europe, and the Far East. All indications are that this revolutionary R&D topic will continue to grow and succeed for years to come. Finally, we gratefully acknowledge the contribution of our paper reviewers and to Chaomei Chen, Editor-in-Chief of *IVS*, for his enthusiastic support and assistance.

Reference

- 1 Thomas JJ, Cook KA. (Eds.) *Illuminating the Path: The Research and Development Agenda for Visual Analytics*. IEEE Computer Society Press, Los Alamitos, CA; 2005.

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