Interactive Visual Analytics and Visualization for Decision Making Making Sense of a Growing Digital World

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The topic of this minitrack, Interactive Visual Analytics and Visualization for Decision Making – Making Sense of a Growing Digital World, supports human decision making through interaction with data and statistical and machine learning processes, with applications in a broad range of situations where human expertise must be brought to bear on problems characterized by massive datasets and data that are uncertain in fact, relevance, location in space and position in time. Current applications include environmental science and technologies, natural resources and energy, health and related life sciences, precision medicine, safety and security and business processes. This year we are highlighting a broad range of analytic tasks to improve human decision-making such as decision support frameworks, data farming, eye-tracking for air traffic control operations, visual analytics dashboards to improve manufacturing and industrial operations, and a novel geovisualization for enhanced spatial maps.

Key research challenges of interest in this area include studies of visual analytics and decision support for industrial organizations including the integration of domain knowledge and better understanding of opportunities to improve efficiency in complex manufacturing, a more complete understanding of human cognition for users interacting with online material, cross-correlating air traffic control operations by using long-range eye-tracking, and novel visual representations for geospatial mapping.

The rapid pace and demand of an increasingly digital world necessarily mandates that analytics play a key role as we need to make rapid sense of complex and fast changes driven by big, real-time data. We are moving into an era in which being able to "see" the information in the data will no longer be optional and sophisticated visualization methods facilitating rapid understanding will be a critical piece of the "competitive edge". The focus in this minitrack goes beyond analytics to include rich, powerful visualization techniques for turning data into actionable information. These rich, interactive visual analytic environments offer even greater power and promise to solve big data problems for data that is "big" in any of the dimensions of variability, velocity, or volume.

This minitrack builds upon earlier HICSS minitracks on visual analytics, mobile computing, and digital media at scale, focusing more decision analytics in various applications from business to science, public safety, and policy. One paper selected for this minitrack, "Route Packing: Geospatially-Accurate Visualization of Route Networks," introduces a novel, validated geovisualization technique for simultaneous display of routes on a geographic map while preserving geospatial layout, identity, directionality, and volume of individual routes. A second paper, "Comparison of Attention Behaviour Across User Sets through Automatic Identification of Common Areas of Interest," presents a method for cross-correlating areas of interest between sets of users performing long-duration eye-tracking experiments with operational air traffic controllers simulating remote multi-tower air traffic control scenarios. Our third paper, "Industrial Production Process Improvement by a Process Engine Visual Analytics Dashboard," illustrates a visual analytics dashboard integrating process models to enable shopfloor engineers to apply their domain knowledge to identify opportunities for process improvement, while our fourth paper, "Visual Analysis for Spatio-Temporal Event Correlation in Manufacturing," presents a visual analytics approach to investigate spatio-temporal relations between events in manufacturing in an effort to better understand cause-effect relations by examining error logs in industrial assembly lines. A fifth paper, "Visualization and Interaction for Knowledge Discovery in Simulation Data," introduces knowledge discovery in simulation data that enhances data farming by using data mining methods for data analysis to uncover patterns and causal relationships in the models of planning, operating and monitoring manufacturing and logistics. The final paper, "The Use of Embedded Interaction Mechanisms for Low-Level Analysis Tasks," reports

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the findings from a user study conducted to investigate the use of interactions embedded in information visualizations, exploring what interaction mechanisms are used to complete a given task or set of tasks, offering insight into how users interact with online information.

These papers show a wide range of applications of visualization and analytics in complex decision making environments and provide valuable insights into the design, production, and deployment of visual analytics applicable to most decision and discovery tasks across a broad spectrum of applications. Moreover, they clearly demonstrate effective ways to harness and tame big data for discovery, insight, management, and action. We hope you will join us for interesting presentations and lively discussions on new visual analytics techniques and solutions for our evolving landscape of societal problems requiring rapid and reliable decision making.