Interactive Visual Analytics and Visualization for Decision Making Minitrack

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The topic of this minitrack, Interactive Visual Analytics and Visualization for Decision Making 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. 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 in applications ranging from motorsports racing to industrial multi-component system design to monitoring of power grids and networks.

The rapid pace and demand of an increasingly more digital world necessarily mandates that analytics play a key role as we increasingly need to make rapid sense of complex and fast changes driven by big, real-time data. We have moved into an era in which being able to “see” the information in the data is no longer optional and sophisticated visualization methods facilitating rapid understanding is a necessary and 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. This minitrack builds upon earlier HICSS minitracks on visual analytics, mobile computing, and digital media at scale, focusing more decision analytics on diverse applications and creating novel means of visually interrogating complex, interdependent data.

One paper selected for this minitrack, “A Visual Decision-Support System using Fingerprint Matrices applied to Cyclical Spatio-Temporal Data from Motorsports,” presents novel means of visually analyzing car racing data using the fingerprint matrix traditionally used to visually characterize bodies of text and musical compositions. While this method is used to

help analysts determine whether forces on a race car change in predictable ways during laps around the track, the methods presented in this paper can also be applied to analyzing seasonal migration routes for animals, fuel economy in delivery routes over the course of a day, and dye absorption during imaging as it cycles through the major arteries in the human circulatory system. A second paper in this minitrack, “Decision support for multi-component systems: visualizing interdependencies for predictive maintenance,” evaluates three key visualization approaches to represent interdependencies in the context of predictive maintenance for multi-component systems using a crowd-sourced design study and rank these approaches based on performance and usability. Modeling and recognizing the interdependencies in complex industrial systems is challenging, and the methods presented in this paper provide evidence-driven methods to identify these interdependencies. The final paper in this minitrack, “Interactive Feature Extraction using Implicit Knowledge Elicitation: Application to Power System Expertise,” presents an interactive approach to create human-readable analytical expressions that describe physical phenomena by their most impactful quantities. The approach is applied to power network monitoring allowing experts to provide insights about their understanding of the problem at various stages of the training process, both within each run and between two runs.

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 in real-world, actionable environments. 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.