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. 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, visual analysis support tools, embedded visual analytics for production quality manufacturing and visual decision-support tools to model and analyze the spread of infectious diseases.

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. Additionally, this minitrack provides a more complete understanding of human cognition for visually guided decision making, and explicit support for multi-criteria decision making in the design of user interfaces. Directly responding to needs that have arisen during the current COVID-19 global pandemic, this minitrack will include work on visual frameworks for decision making and modeling in infectious diseases and the development of an epidemic modeling framework for AI-guided decision making for policymakers during COVID-19.

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. 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, "Towards a Task-based Guidance in Exploratory Visual Analytics," proposes a visual analysis system that guides users through the data analysis process by observing their current behavior, becoming more familiar with their decision making strategies and, over time, trying to infer the task of the user to make visually guided recommendations. In a similar vein, the paper, "Understanding the Role of User Interface for Multi-Criteria Decision-Making in Supporting Exploratory Usage of Information Systems," integrates the manner by which people weigh the relative importance of multiple decision criteria to assess decision candidates into the explicit design and support of user interfaces (UIs), providing and characterizing the design space of UI in MCDM. A third paper, "Visual Data Analysis of Production Quality Data for Aluminum Casting," presents the interactive visual data analysis tool called ADAM that supports production data exploration in the aluminum industry and demonstrates the effectiveness of this tool using real production data and insights gained from the use of this tool by domain experts.

In response to the current climate surrounding the COVID-19 global pandemic, the minitrack includes two papers. The first, "Multimodal Epidemic Visual Analytics and Modeling," presents a framework for

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simulating disease spread that includes multimodal factors in the epidemic model itself and networks of possible spread routes. The system allows users to understand and interrogate factors that dictate outcomes in disease spread, for example, environmental conditions, such as population, transportation, weather condition, and transmission rate. The final paper in our minitrack, "PanViz 2.0: Intregating AI into Visual analytics to adapt to the novel challenges of COVID-19," presents PanViz 2.0, a visual analytics application that combines epidemic models and AI-driven analytics to infer the best-fit parameters to enable the adaptation to ongoing pandemics at multiple spatial aggregations (nation-wide, state level, and county level).

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.