

Interactive Visual Analytics for Knowledge Integration and Decision Intelligence

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Interactive Visual Analytics for Knowledge Integration and Decision Intelligence seeks to find ways to develop visualization environments and methods for their use that will support human analysis and decision making with interaction with data and statistical and machine learning processes. Visual analytics provides a way to address problems and opportunities that are characterized by complex data that may be uncertain in fact, relevance, location in space and position in time. Knowledge integration comes into play when multiple datasets from different sources must be evaluated and integrated into the decision-making process. Decision intelligence focuses on the decision-making process itself, examining how individuals and groups chose among alternatives in making plans for action. As defined by Gartner, DI “brings together the best of applied data science, social science, and managerial science into a unified field that helps people use data to improve their lives, their businesses, and the world around them.”

Applications of this approach include many areas where decision-making must consider complex situations, conflicting data, and priorities. Examples include environmental science and technologies, natural resources and energy, health, and related life sciences. safety and security and many business processes. This year we are examining new approaches to integrating data from neural activity into human factors and discussing ways in which organizations from different sectors can partner to provide value for both industry and academia. 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 safety and efficiency in aircraft design.

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 and ways to better support the decision-making process.

This minitrack builds upon earlier HICSS minitracks on visual analytics, mobile computing, and digital media at scale, focusing more decision analytics on various applications from business to science, and public safety. Our first paper seeks to find ways to use machine learning analysis of EEG data to better assess the cognitive load of a task on analysts and decision-makers. They compare this measure to the human-factors standard for cognitive load estimation, the NASA-TLX. The second paper gives a retrospective account of an exemplary research collaboration between two universities in Canada and Boeing, a large and technologically sophisticated industry partner, on a focused research effort to integrate visual analytics into Boeing’s manufacturing and safety analysis processes. Multiple departments and fields of study relating to analysis, visualization, and decision-making participated in this process, and funding from multiple government agencies supported this effort. Our third paper aims to contribute novel transparency enhancing grounded theory model illustrations annotated with discussion and suggestions that others can adapt for their purposes.

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.