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

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The first industrial revolution used water and steam power to mechanize production. The technological revolution or the second industrial revolution used electric power to create mass production. Both of these transformed the way people worked and lived, making people wealthier and facilitating migration to cities. The third industrial revolution, marked by digital technologies, access and manufacturing, uses electronics and information technology to automate production. On the immediate horizon, the fourth industrial revolution is characterized by a fusion of technologies that is blurring the lines between the physical, digital and biological spheres. Unlike the previous three, the fourth industrial revolution is evolving at an exponential pace, disrupting almost every industry on a global landscape, inevitably leading to profound impact on business, government, health, and people. The rapid pace and demand of an increasingly more digital world necessarily mandates that analytics will 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 interactive, integrated visualization and analytics methods facilitating rapid understanding will be a critical piece of the "competitive edge." In response, the focus of this minitrack is on Interactive Visual Analytics and Visualizaiton for Decision Making that has 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. Examples include environmental science and technologies, natural resources and energy, health and related life sciences, precision medicine, safety and security (aircraft safety, law enforcement, antiterrorism, disaster relief) and business processes. We are now seeing applications in public health, business intelligence, the digital economy, financial analysis, data-driven policy and decision-making, social sciences, and other domains.

Key research challenges of interest in this area include studies of visual analytics and decision support, interactive performance related to serving up information with time-dependent relevance, and collaborative analysis using visual information systems. 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, natural disasters, public safety, and policy.

Papers in this minitrack cover the range of topics from optimizing worker paths on factory shop floors to exploring parts of speech models for domain adaptation.

One paper selected for this minitrack, "Visual Interactive Comparison of Part-of-Speech Models for Domain Adaptation," presents an interactive visualization approach to allow analysts to rapidly determine tagging errors in parts of speech made by natural language processors. While natural language processors have gotten increasingly more sophisticated to correctly parse language in modern newspapers, magazines and journal articles, they are lagging behind when applied to more domain specific writings and older, historical documents. The graphical approach provides a schematic representation of the tagged speech and allows the analyst to view and compare different taggings and provides a valuable starting point for analyzing documents that do not fit within mainstream document repositories.

A second paper, "Toward Technology Transfer Evaluation Criteria," proposes guidelines on the transition of novel technology to industry. The authors introduce a model for technology transfer with the intent to increase the likelihood of success to maximize what is inevitably a sizeable investment made by those wishing to transition and harden technology from concept to production. The authors demonstrate their model/guidelines on real-world

industrial examples in the area of CAD and interactive visualization.

A third paper, “BlueCollar: Optimizing Worker Paths on Factory Shop Floors with Visual Analytics,” presents a visual analytics approach that supports factory layout planners to explore and optimize existing factory layouts by visually examining paths that factory employees need to take based on their work. Planners can interactively manipulate the layout and iteratively improve the layout by relocating elements in the floorplan, allowing them to see the tradeoffs between layout and worker’s paths, thus providing visual metrics for efficiency and performance improvement.

These papers show a wide range 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.

Looking back over the evolution of visual analytics for decision making, as shown in past mini-tracks, it is clear that the uses of visual decision analytics has grown and spread to more fields and we see this trend continuing at an accelerated rate. As more data becomes available in every aspect of decision making, the role and importance of interactive visual decision analytics will become critical in effective and efficient decision making.We hope you will join us for interesting presentations and lively discussions on new visual analytics techniques and solutions for our evolving landscape of problems requiring rapid and reliable decision-making.