

Invited Talk Abstracts

General Conference Invited Talks

Work Practice Simulation of Complex Human-Automation Systems in Safety Critical Situations: The Brahms Generalized Überlingen Model

William J. Clancey

(Senior Research Scientist, Florida Institute for Human and Machine Cognition)

Today's commercial aircraft use a "traffic alert and collision avoidance system" (TCAS) that dictates to pilots how to control the aircraft; it was validated without studying systematically how an air traffic controller's activities could interfere with its operation. One result was a collision over Überlingen Germany in 2002, which is now generally interpreted as exemplifying how conflicts of authority arise between people and automation. Brahms-GÜM is a multiagent simulation of work practices in air transportation; it models how distributed groups of pilots and air traffic controllers interact with TCAS and other automated systems in safety-critical, time-pressured encounters. Brahms-GÜM is general, enabling what-if analysis of alternative work system configurations (including the Überlingen scenario) and thus facilitating design of different operations concepts. Brahms-GÜM demonstrates how interactions may be unpredictable when aspects of the work system are missing or malfunctioning, making an everyday complicated system into one that is cognitively complex and thus out of human control. The project is also providing a test-bed for applying model-checking methods to verifying and validating work system designs.

Prediction in Complex Networks: The Impact of Structure on Learning and Prediction

Jennifer Neville

(Associate Professor in the Departments of Computer Science and Statistics, Purdue University)

The recent popularity of online social networks and social media has increased the amount of information available about users' behavior — including current activities and interactions among friends and family. This rich relational information can be exploited to predict user interests and preferences even when individual data is sparse, as the relationships are a critical source of information that identify potential statistical dependencies among people. Although network data offer several opportunities to improve prediction, the characteristics of real world datasets present a number of challenges to accurately incorporate relational information into machine learning algorithms. In this talk, I will discuss the effects of sampling, parameter tying, and model roll-out on the properties of the resulting statistical models — which occurs through a complex interaction between local model properties, global network structure, and the availability of observed attributes. By understanding the impact of these interactions on algorithm performance (for example, learning, inference, and evaluation), we can develop more accurate and efficient analysis methods for large, partially-observable social network and social media datasets.

Symbiotic AI: An Approach to Artificial Intelligence Using First-Person Sensing

Thad Starner

(Professor in the School of Interactive Computing, Georgia Institute of Technology)

If we make a wearable computer, like Google's Glass, that sees as we see and hears as we hear, might it provide new insight into our daily lives? Going further, suppose we have the computer monitor the motion and manipulations of our hands and listen to our speech. Perhaps with enough data it can infer how we interact with the world. Might we create a symbiotic arrangement, where an intelligent computer assistant lives alongside our lives, providing useful functionality in exchange for occasional tips on the meaning of patterns and correlations it observes? At Georgia Tech, we have been capturing "first person" views of everyday human interactions with others and objects in the world with wearable computers equipped with cameras, microphones, and gesture sensors. Our goal is to automatically cluster large databases of time-varying signals into groups of actions (for example, reaching into a pocket, pressing a button, opening a door, turning a key in lock, shifting gears, steering, braking, and others) and then reveal higher level patterns by discovering grammars of lower level actions with these objects through time (such as, driving to work at 9 AM every day). By asking the user of the wearable computer to name these grammars (for example, morning coffee, buying groceries, driving home), the wearable computer can begin to communicate with its user in more human terms and provide useful information and suggestions ("If you are about to drive home, do you need to buy groceries for your morning coffee?"). Through watching the wearable computer user, we can gain a new perspective for difficult computer vision and robotic problems by identifying objects by how they are used (turning pages indicates a book), not how they appear (the cover of Foley and van Dam versus the cover of *Wired* magazine). By creating increasingly more observant and useful intelligent assistants, we encourage wearable computer use and a cooperative framework for creating intelligence grounded in everyday interactions.

Special Track Invited Talks

Applied Natural Language Processing Track:

Opportunities and Challenges to Semantic Similarity

Vasile Rus

*(Associate Professor in the Departments of Computer Science and the
Institute for Intelligent Systems, University of Memphis)*

Semantic similarity has been increasingly adopted in the recent past as a viable, scalable alternative to the full-understanding approach to natural language understanding. I will present in this talk an overview of opportunities and challenges to semantic similarity with an emphasis on methods, data, and tools. A series of methods we developed over the past decade will be summarized. These methods and others have been integrated in a semantic similarity toolkit called SEMILAR (www.semanticsimilarity.org) which has been widely adopted by thousands of users since its launch in summer of 2013 at the Annual Meeting of the Association for Computational Linguistics. Furthermore, I will illustrate some drawbacks of current data sets that hamper a fair comparison among existing methods. Several suggestions will be made to improve the building of future data sets for assessing approaches to semantic similarity.

Case-Based Reasoning Track:

Diversity in Case-Based Planning: From Diverse Plans to Diverse Characters and Stories

Alexandra Coman

(Assistant Professor in the College of Engineering, Ohio Northern University)

The ability to generate multiple, meaningfully-diverse solutions to planning problems contributes to artificial autonomous agents' behaving intelligently (by approaching tasks in a number of different ways), appearing intelligent (by exhibiting behavior variation), and, if not necessarily appearing human, at least appealing to humans (by surprising, intriguing, enchanting). Diverse plans can embody varied strategies and approaches to solving a problem, reflecting different priorities (such as caution versus willingness to explore in an adversarial game setting), and catering to variation in circumstances, preferences and needs. I describe a case-based approach to generating diverse plans, compare it to a generative-planning approach to the same task, and present an application of diversity-aware planning: simulating personality-trait variation in non-player characters in computer games and other virtual environments.

Semantic, Logics, and Information Extraction in AI Track:

Kirtas: A Rule-Based System for Subjectivity Analysis in the Reported Speech

Almoatasem Alrahabi

(Lecturer in Computer Science and ICT for Education, University of Paris-Sorbonne-Abu Dhabi)

We present a new system for annotating and indexing multilingual texts in order to identify the subjectivity expressions in the reported speech. The system allows the user to search for quotes or words of a particular person, and categorize semantically these quotes according to the position of the person who reports in relation to what is reported. Kirtas has been tested with very good results on French and Arabic.

Uncertain Reasoning Track:

Network-Based Approaches to Plausible Reasoning with Ranking Functions

Gabriele Kern-Isberner

(Professor at the University of Dortmund, TU Dortmund, Germany)

Spohn's ordinal conditional functions (OCF), also called ranking functions, offer a convenient methodology for plausible reasoning that is very popular for realizing non-monotonic reasoning and belief revision. In particular, Pearl's system Z for inductive reasoning from knowledge bases is defined in terms of ranking functions. In this talk, we go beyond system Z and present a method that is more tailor-made for the proper handling of conditional beliefs and provides a schema for both plausible reasoning and iterated belief revision, giving rise to so-called c-representations and c-revisions, respectively.