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P1: Panel 1

SA and Big Data

Data analytic methods provide the potential to significantly speed and improve the quality of analysis of large volumes of data. This panel will explore the advent of big data and its use to improve situation awareness via information gathering and prioritization, integration and analysis, and projection of future trends. Technical issues associated with the development of effective big data applications will be explored by the panel, including its affect on understanding certainty or confidence in the underlying data or big data products, validation of big data algorithms, support for situation awareness in working with big data systems, and integration of big data with human decision making. This panel is applicable to work in multiple domains including military and commercial systems and will include a consideration of both technical and cognitive engineering issues.

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K2: Keynote

Minsky K-line Memory: Integration of Multi-Strategy Reasoning and Learning

Theories and architectures that consider human/machine processing grounded on multi-strategy reasoning and learning investigate an essential set of questions in "machine intelligence" (biological and/or "silicon").

"You don't understand anything until you learn it more than one way." — Marvin Minsky There are opportunities in the theories of Minsky and others (e.g., Newell, Schank, LeCun, Mitchell and many others). I will consider how Minsky's K-Line Theory of Memory highlights valuable open questions that have impact on our future work. As a simple starting point for my talk consider the following excerpt from Minsky's K-Line paper:

When you "get an idea," or "solve a problem," or have a "memorable experience,'' you create what we shall call a K-line. This K-line gets connected to those "mental agencies" that were actively involved in the memorable mental event. When that K-line is later "activated," it reactivates some of those mental agencies, creating a "partial mental state" resembling the original.

Minsky's Society of Mind (SOM) theories mixed with contributions from Minsky colleagues provide insight for future research.

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The Creation of Siri

Siri was a product of DAPRA's Personalized Assistant the Learns (PAL) project. In particular, it originated in SRI International's effort under PAL, called the Cognitive Assistant that Learns and Organizes (CALO). In this talk, David Gunning (who was the DARPA Program Manager for PAL) will describe Siri's history - how the technology was created, formed into a startup, and acquired by Apple. He will summarize the history of the PAL program, highlighting the key events relevant to the creation of Siri, and summarize the sequence of events, following the PAL program, to create the Siri venture and have it acquired by Apple.

K3: Keynote

Trusting Increasingly Autonomous Cars

Increasingly autonomous cars are transforming what it means to drive, and this transformation is emblematic of changes in other domains: finance, military operations, healthcare, manufacturing, and the home. Driving is a microcosm of autonomy. As in other domains, technology does not substitute for people, but transforms their roles. Increasingly these roles are not as a supervisor of automation, but as a partner in a network of interacting agents. This role suggests a need to re-think the concepts of trust and situation awareness. Most generally, this means considering people's world view and their assumptions regarding the persistence of the natural and moral order that guides the evolution of trust and situation awareness. More specifically, rather than focusing on how automation reliability influences reliance, it may be more productive to focus on how automation collegiality influences cooperation. To promote appropriate trust we need to move beyond creating transparent automation that displays its purpose, process, performance to creating responsive and responsible automation that has controls for aligning its goals, adapting its strategies, and adjusting it behavior. The dimensions of autonomy most relevant for these considerations might not be levels of automation, but depth and breath of span of the control and time constant of interaction. This talk will link these theoretical considerations to research directions and design principles.

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P2: Panel

SA and Robotics

The panel on SA and Robotics is concerned with situation awareness and management issues involved in human-robot interaction. Those systems can range in complexity from a human operator controlling a single robot or a swarm of robots through a traditional interface, to teams of humans and robots freely interacting using natural means such as voice and gestures. Issues include techniques to maintain appropriate human SA given existing sensors and cognitive limitations, algorithms to allocate decision making between human oversight and robotic autonomy, and frameworks to manage collaboration in order to leverage respective strengths of humans and robots. The panel will start with an invited presentation, followed by brief rejoinders by the panel members, then an open discussion involving audience participants.

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