



IJCAI-09 Keynote and Invited Speakers

Keynote Speaker

Computer Mediated Transactions

Hal R. Varian (University of California, Berkeley and Google, USA)

These days nearly every economic transaction involves a computer in some form or other. What does this mean for economics? Varian argues that the ubiquity of computers enables new and more efficient contractual forms, better alignment of incentives, more sophisticated data extraction and analysis, creates an environment for controlled experimentation, and allows for personalization and customization. He reviews some of the long and rich history of these phenomena and describes some of their implications for current and future practices.

Invited Speakers

Intelligent Tutoring Systems: New Challenges and Directions

Cristina Conati (University of British Columbia, Canada)

Can we devise educational systems that provide individualized instruction tailored to the needs of the individual learners, as many good teachers do? Intelligent Tutoring Systems is the interdisciplinary field that investigates this question by integrating research in Artificial Intelligence, Cognitive Science and Education. Successful intelligent tutoring systems have been deployed to support traditional problem solving activities by tailoring the instruction to the student's domain knowledge.

In this talk, Conati will present a variety of projects that illustrate our efforts to extend the scope of intelligent tutors to both support novel forms of pedagogical interactions (such as example-based and exploration-based learning) and adapt to student's traits beyond knowledge (such as student's metacognitive abilities and affective states). She will discuss the challenges of this research, the results that we have achieved so far and future opportunities.

Machine Learning in Ecosystem Informatics and Sustainability

Thomas G. Dietterich (Oregon State University, USA)

Ecosystem informatics brings together mathematical and computational tools to address scientific and policy challenges in the ecosystem sciences. These challenges include novel sensors for collecting data, algorithms for automated data cleaning, learning methods for building statistical models from data and for fitting mechanistic models to data, and algorithms for designing optimal policies for biosphere management. This talk will describe recent work on the first two of these—new devices for automated arthropod population counting and linear Gaussian DBNs for automated cleaning of sensor network data. It will also give examples of open problems along the whole spectrum from sensors to policies.

Embodied Language Games with Autonomous Robots

Luc Steels (Sony Computer Science Laboratory Paris, and University of Brussels)

Artificial intelligence methods and techniques have reached a high level of sophistication so that we can tackle difficult outstanding problems in science. In this talk, Steels will show how the question of the origins of language can be approached this way. This question has puzzled evolutionary biologists since Darwin and is still considered to be unsolved. He will outline a theory of language evolution by linguistic selection and then report a number of concrete experiments with humanoid robots that attempt to work out and validate this theory. The experiments all center around the notion of a language game, which is a routinized situated interaction that involves some form of language. Robots use linguistic strategies to evolve a communication system to deal with a particular class of language games. Steels will discuss examples of this and also address the question how new strategies can arise and how the robots can autonomously decide which strategies they will collectively use to bootstrap their language.

Rubinstein in the Phase Plane, Madonna in Feature Space: How AI Changes the Way We See (and Hear) and Deal with Music

Gerhard Widmer (Johannes Kepler University Linz and Austrian Research Institute for Artificial Intelligence, Vienna, Austria)

Music has always held a special fascination for computer scientists, and throughout the history of AI one can find examples of AI methods being applied to musical problems — though usually toy problems, musically speaking. In recent years, however, AI has begun to make truly substantial and significant contributions both to the art of music and to music research (i.e., musicology), and it is now even beginning to make an impact in the music market. It is not exaggerated to say that computers and AI will change the way we see and hear and deal with music.

Several aspects of this will be illustrated with examples from Widmer's recent research. On the one hand, we will see how intelligent computers can provide new insights into a very complex and subtle musical art: expressive music performance. For instance, we will see computers making novel discoveries regarding the style of great concert artists. On the other hand, we will briefly look at the first HiFi system ever with on-board musical intelligence. And we will actually see the great Artur Rubinstein in phase space; Madonna in feature space is not so interesting to look at

From Low-level Sensors to High-level Intelligence: Activity Recognition Links the Knowledge Food Chain

Qiang Yang (Hong Kong University of Science and Technology)

Sensors provide computer systems with a window to the outside world. Activity recognition “sees” what is in the window to predict the locations, trajectories, actions, goals and plans of humans and objects. Building an activity recognition system requires a full range of interaction from statistical inference on lower level sensor data to symbolic AI at higher levels, where prediction results and acquired knowledge are passed up each level to form a knowledge food chain. In this talk, Yang will give an overview of activity recognition and explore its relation to other fields, including planning and knowledge acquisition, machine learning and Web search. He will also describe its applications in assistive technologies, security monitoring and mobile commerce.