

Missed Perceptions: AI versus the Funding Agencies

James Hendler, *University of Maryland & DARPA*

The relationship between the AI community and the funding establishment has often been very strained. In this talk, Hendler examines the reality of this and explore what we, as

individuals and as a community, can do to improve our interaction with funding agencies.

Modeling High-Dimensional Data Distributions by Combining Simple Experts

Geoffrey Hinton, *University College London, UK*

It is possible to combine multiple non-linear probabilistic models of the same data by multiplying the probability distributions together and then renormalizing. This is a very efficient way to model data that simultaneously satisfies

many different constraints. Hinton will describe an efficient way to fit a “Product of Experts” to data and show that this produces excellent models.

Design and Analysis of Heuristic Evaluation Functions

Richard E. Korf, *University of California, Los Angeles*

Korf will discuss recent progress in heuristic search, which has lead to optimal solutions to Rubik's Cube and the 5x5 TwentyFour Puzzle, problems with state spaces of size 10^{19} and 10^{25} , respectively. Korf will also present a new theory

that allows us to accurately predict the performance of heuristic search algorithms.

Artificial Intelligence and Mobile Robots: Successes and Challenges

David Kortenkamp, *NASA Johnson Space Center/Metrica Inc.*

Mobile robots pose a unique challenge to artificial intelligence researchers. In recent years, successes in mapping and navigation have led to new challenges in human-robot interaction, multiple robots, mobile manipulation and learning.

Kortenkamp's talk will discuss these successes and challenges within the context of the AAAI-2000 Mobile Robot competition.

Human-level AI's Killer Application: Interactive Computer Games

John E. Laird, *University of Michigan*

Over the last 30 years, there has been little progress in developing AI systems that integrate the varied intellectual capabilities of humans. In this talk, Laird proposes that inter-

active computer games can provide the unifying application area for research and development of integrated human-level AI.

Machines Reasoning about Machines

J. Strother Moore, *University of Texas at Austin*

Can machines reason about machines? The answer is “yes” and the question is of more than just philosophical interest. Today's microprocessors are extraordinarily complex ma-

chines; manufacturers are turning to mechanized reasoning tools to help them analyze sophisticated designs. These tools have their roots in early AI research.

Unconventional Vision Sensors

Shree K. Nayar, *Columbia University*

What can be perceived by a human or computed by a machine from an image is fundamentally restricted by the captured data. Current imaging systems are severely limited in spatial resolution, field of view, and dynamic range. In this talk, Nayar presents new vision sensors that provide unconventional forms of visual information. The first part of the talk focuses on the use of catadioptrics (lenses and mirrors) for capturing unusually large fields of view. Nayar describes several methods for obtaining single viewpoint and multi-

viewpoint images. The second part of the talk addresses the problem of acquiring high dynamic range images using a low dynamic range detector. Nayar presents two approaches for extracting the desired extra bits at each pixel; the first one uses multiple images while the second uses just a single image. Several interactive demonstrations of our results will be shown. These results have implications for digital photography, immersive imaging, image based rendering, 3D scene modeling, and advanced interfaces.

The Games Computers (and People) Play

Jonathan Schaeffer, *University of Alberta*

The development of high-performance game-playing programs has been one of the major successes of AI research. The results have been outstanding but, with the one notable exception (Deep Blue), they have not been widely disseminated. Schaeffer's talk will discuss the past, present and future of the development of game-playing programs.

The research emphasis in the past has been on high performance for two-player perfect-information games. The research emphasis of the present encompasses multi-player imperfect/non-deterministic information games. And what of the future? There are some surprising changes of direction occurring that will result in games being more of an experimental testbed for mainstream AI research.

Eye Movements and Spoken Language Comprehension: Bridging the Language-as-Action and Language-as-Product Traditions

Michael K. Tanenhaus, *University of Rochester*

Eye movements allow one to monitor real-time language processing in natural situations at a remarkably fine temporal grain. Tanenhaus will present an overview of research using this approach focusing on (1) word recognition in

continuous speech and (2) the role that contextually-dependent representations play in reference resolution and syntactic ambiguity resolution.

Conceptual Indexing: Practical Large-Scale AI for Efficient Information Access

William A. Woods, *Sun Microsystems Laboratories*

Finding information is a problem shared by people and intelligent systems. Wood's talk describes an experiment combining both human and machine aspects in a knowledge-based system to help people find information in text. This system is the first to demonstrate a substantial improvement in information retrieval performance by using linguistic and

world knowledge. It is also an example of practical subsumption technology on a large scale and with domain-independent knowledge. Results from this experiment are relevant to general problems of knowledge-based reasoning with large-scale knowledge bases.