

The AAAI-07 Conference

Focal Point for AI Research Worldwide

Sara R. Hedberg

■ AAAI's Twenty-second Conference on Artificial Intelligence (AAAI-07) continued a long-standing tradition of excellence. In this conference wrap-up, Hedberg presents comments from AAAI's president and the AAAI-07 conference cochairs, covers the results of the conference competitions, including a report on the new video competition, and reports on the 2007 innovative applications winners.

AAAI's Twenty-second Conference on Artificial Intelligence (AAAI-07) continued a long-standing tradition of excellence. "The conference was very successful," notes AAAI president Eric Horvitz of Microsoft Research. "The AAAI conference is a focal point for the AI field every year. It is the major gathering internationally for AI research. It brought together several interesting tracks, and thanks to the efforts of the conference committee, several new program as well. As usual, the best parts are people meeting people." This year, the conference was set in the beauty of Vancouver, British Columbia.

"The conference achieved my goals," conference program chair Adele Howe said. "We were able to

highlight exceptional research and bring together the talents of a huge number of volunteers. It is still astonishing to me how hard so many worked to make the conference a success."

The diversity of the program — with 8 invited speakers, 256 technical papers, 22 innovative applications papers, 16 tutorials, 15 workshops, 6 competitions, 4 special tracks, a poster session, intelligent systems demonstrations, and vendor exhibition — allowed the 1,025 attendees to choose from a broad set of offerings.

"Alan Mackworth delivered a great presidential address," commented Horvitz, "on the fundamental changes going on in AI, including multiple agents and actors within the context of his work in robot soccer. The new AI video competition had lots of activity and attention, and the very interesting human versus machine poker match garnered attention. The human beings barely won."

"I have received positive comments from attendees," says Howe, "about the poster session being focused on exceptional papers, and about the video competition. I was surprised and pleased at the enthusiasm surround-

ing the video competition and the person-machine exhibition."

Horvitz noted two emerging trends at the conference and in the AI field. First is the growing interest in the web as a source of both structured and unstructured knowledge. For example, not only was there a special track on AI and the web, but during the robot competition, robots accessed the web to gather information about the objects they were to find in the scavenger huntlike event. Second is the work in scaling AI to be more integrative. Instead of the ongoing great successes of AI researches on "wedges" of AI expertise and reasoning, there's increasing work on delivering more depth and breadth of capabilities such as sensing, learning, and reasoning. "This is very hard," notes Horvitz, "(but already) I see bits and pieces here and there."

Congratulations to AAAI's 2007 Competition Winners!

This year AAAI was host to six widely different competitions that push the capabilities of AI-based systems in a variety of venues. Congratulations to all who competed, representing thousands of hours of dedication and innovation. This year's competitions included the Sixteenth Annual AAAI Mobile Robot Competition, the AI Video Competition, the Trading Agent's Competition, the General Game Playing Competition, the Poker Competition, and the Human Versus Machine Poker Challenge.

Sixteenth Annual AAAI Mobile Robot Competition

This year, the AAAI Mobile Robot Competition included a new research competition designed to push the state-of-the-art in image understanding and automatic acquisition of knowledge from large unstructured databases of images (such as those generally found on the web). The new event honors the AAAI Mobile Robot Competition's tradition of pushing the envelope of what robots attempt. The "Semantic Robot Vision Chal-



The AAAI Mobile Robot Competition and Exhibition.

allenge” put an entirely new twist on the challenge. Robots were given a list of objects to locate and recognize, akin to a scavenger hunt. In and of itself, this is a task that has been the basis of several past events such as picking up tennis balls, and searching for human bodies in the simulated rubble of a collapsed building. What upped the ante for this year’s event was that for the first time, the robots were given an opportunity to search the Web for images of the objects in their list before starting their physical search. The images were used by the bots for pattern recognition. This competition pushed the state-of-the-art of semantic image understanding by requiring that robots make use of the wealth of unstructured image data that exists on the Internet.

Competitors were organized into two leagues—the Robot League and the Software League. In the Robot League, first place was awarded to UBC LCI Robotics from the University of British Columbia. Terrapins (University of Maryland) took second place, and KSU Willie (Kansas State University) was awarded third place. In the Software League, top honors were presented to UIUC (Princeton), while sec-

ond place was awarded to KSU Willie (Kansas State University).

AI Video Competition

For the first time, the conference included a video competition, organized by David Aha and Sebastian Thrun. “Videos are the way of the future,” said Thrun when asked about the competition. “A brief video can often explain something better than a long paper. We also wanted to convey the excitement of AI, and build up a repository of visual reports of fascinating activities in the field. We hope that in a decade, every important AI project will have a video in our collection, and every high-school kid who is interested in AI will consult our videos and get excited.

“Immense creativity went into some of these videos,” he notes. “There were some really well made minitutorials, research explanation, and just fun videos.”

“I was pleased not only with the surprisingly high number of submissions but also their diversity,” adds Aha. “There were 30 submitted and 24 accepted videos. AAAI plans to add them to the video library project now underway.”

The AI Video competition was created with the goal of communicating to the world how much fun AI research and applications can be, while also documenting exciting research and applications that use AI. The rules were simple: compose a short video about an exciting AI project and narrate it in a way that makes it accessible to a broad audience. Winners won Shakeys trophies, named after SRI’s pioneering robot.

The Best Video award for 2007 was presented to Anders Lyhne Christensen, Rehan O’Grady, and Marco Dorigo (Université Libre de Bruxelles, Belgium) for *Morphogenesis: Shaping Swarms of Intelligent Robots*. *Artificial Intelligence: An Instance of Aibo* by Michael Littman (Rutgers University, USA) won Best Short Video, while the Best Student Video award was given to Jeff Balogh, Gregg Dubbin, and Michael Do (University of Central Florida, USA) for *Dance Evolution*.



The Shakey Trophy.

An entry from Linkopings Universitet, Sweden picked up the Best Demonstration Shakey (*Autonomous UAV Search and Rescue*, by Patrick Doherty and Piotr Rudol), while the Best Explanation Award was given to Antal van den Bosch (Tilburg University) for his *Ok-Nearest Neighbor Classification* video. The final Shakey of the night — for the Most Innovative Video — was presented to Jan-Mark Greusebroek and Frank Seinstra (University of Amsterdam, Netherlands) for their video *Color-based Object Recognition*. The organizers plan to hold the event again at AAAI-08 in Chicago.

The Trading Agents Competition

The Trading Agent Competition (TAC) is an international forum designed to promote and encourage high-quality research into the trading agent problem. The top teams from TAC 2007 were (1) Phant Agent (University of Bucharest), (2) Tac Tex (The University of Texas at Austin), and (3) Deep Maise (University of Michigan) for the TAC Supply Chain Management (SCM) Tournament, while IAMwildCat (University of Southampton, UK), PSUCAT (Pennsylvania State University, USA), and CrocodileAgent (University of Zagreb, Croatia) were judged to be first, second, and third-place winners (respectively) in the Market Design competition.

AAAI 2007 General Game Playing Competition

AI researchers have been working on building game-playing systems capable of matching wits with humans for decades. The goal of the General Game Playing Competition was to take this work to the next level—to create an intelligent software system that can, given the rules of any game, automatically learn a strategy for playing the game effectively, without any human intervention. The 2007 AAAI GGP Competition crowned CADIAPlayer, programmed by Yngvi Bjornsson and Hilmar Finnsson (both from Reykjavik University, Iceland), as the new world champion.

2007 Poker Competition

The 2007 poker competition consist-



Eric and Mary Harvitz at the Fellows Dinner Honoring the 2007 AAAI Fellows.



The Opening Reception



The Human Versus Machine Poker Challenge.



Alan Mackworth Delivers His 2007 Presidential Address.

ed of 15 competitors, who represented 7 countries, and 43 softbots. Matches were played on 32 machines running for a month. More than 17 million hands of poker were played. The results of the competition were announced on July 24 at AAAI-07 in Vancouver.

Picking up a first-place award in the No-Limit competition was Teppo Salonen, an individual developer from southern California, whose BluffBot2.0 went undefeated. BluffBot2.0 used a wide variety of betting amounts in the competition, which worked to its advantage. Second place went to GS3 from Carnegie Mellon University (USA), which used automated abstraction equilibrium computation techniques and was a strong competitor in the matches. Rounding out the top three was Hyperborean07 (University of Alberta, Canada) who put forward another solid program to finish third in the competition.

The University of Alberta's (Canada) Hyperborean07 won first and second place in the Limit Online competition, while Carnegie Mellon's (USA) GS3 took third. In the Limit Equilibrium competition, Hyperborean07 took first, IanBot (University of California, San Diego) took second, and GS3 took third.

Human Versus Machine Poker Challenge

AAAI hosted the very first scientific, human-versus-machine challenge in poker. With a real pot of money on the line, two professional world-class poker players, Phil Laak and Ali Esmali, played a duplicate match against two copies of the University of Alberta's Polaris poker program at the AAAI Vancouver conference. It was a tight match. Four sessions were played — and they resulted in one win for the computer, one draw, and two wins for the humans. Polaris “was a tough opponent,” noted Ali Esmali. “To tell you the truth, if I had the chance to face it again, I wouldn't.”

New Innovative Applications

AAAI members are frequently asked questions like, “What's going on in

AI?” and “How can I respond to the question ‘Does AI really work?’” The IAAI applications are excellent examples of high-impact AI systems that can prove to be helpful examples in answering such questions, as they are a sampling of AI-at-work in today’s and tomorrow’s business, science, and government.

Every year since its inception in 1989, AAAI’s Innovative Applications of Artificial Intelligence conference (IAAI) has been the leading conference dedicated to showcasing the ways AI is delivering strategic advantages in businesses, science and government around the globe. Each year, new applications using AI techniques that have quantifiable results (such as saving money or time) receive the prestigious IAAI award. Several years ago, the conference expanded its mission beyond recognizing deployed applications to also include emerging applications still under development that show significant promise in their approach and early results.

This year, 22 papers were accepted for IAAI-07, including a record nine non-US papers (the committee accepted 13 U.S. papers). This is one of many indications of the growing global nature of the AI community. Of far greater significance is the global reach of many of this year’s applications. One winning application, for example, is deployed to 40 mobile operators and millions of subscribers around the world.

Through the years, IAAI has had several award-winning applications, that automate financial underwriting in various ways. For instance, Fannie Mae, the institution formed by the U.S. government in 1938, and privatized in 1968, to help citizens purchase homes, has taken intelligent underwriting to a new level with a web-based system that enables mortgage lenders to build their own automated underwriting applications. Another web-based winner was journal-ranking.com, a global academic journal ranking system from the Hong Kong University of Science and Technology that is now getting a million hits per month.

Since the emergence of data mining technology in the early 1990s, IAAI



Outgoing Past-President Ronald Brachman.

has also recognized a number of innovative data-mining applications. This year, IAAI recognizes the first innovative intelligent application to be deployed on the semantic web. It provides access to a virtual solar-terrestrial observatory — a concatenation of heterogeneous observational datasets that appear as if all resources are organized, stored and retrieved/used in a common way

For those interested in cooperating robots, Kiva Systems (U.S.) has received an award for a production system that coordinates hundreds of cooperating, autonomous robotic vehicles in warehouses.

These are a few examples of the high-impact applications honored at this year’s IAAI conference. A brief description of each application follows. Together they are a sampling of the diversity of AI applications in use and under development.

IAAI-07 Accepted Papers and Winners

Twenty-two applications from ten different subject areas were judged winners in the 2007 IAAI conference. Applications featured in the 2007 conference were in domains such as agents (including agents in virtual environments), business automation, decision support, human computer in-

teraction, information systems, machine learning, medical applications, planning and workflow, and space applications.

Agents

Conference goers learned from the “Coordinating Hundreds of Cooperative, Autonomous Vehicles in Warehouses” presentation by Kiva Systems (US) about the first deployed, commercially available, large-scale autonomous robot system. An emerging agent paper, “A Multi-Agent Approach to Distributed Rendering Optimization” was presented by scientists at the University of Castilla (Spain) and Software Competence Center GmbH, (Austria). They described a novel approach to generating photorealistic 2D digital images from the abstract description of a 3D screen.

Agents in Virtual Environments

“An Integrated Development Environment and Architecture for Soar-Based Agents” was an emerging application presented by scientists at Bar Ilan University (Israel). They described the development and deployment environment for coding agents situated in a complex dynamic virtual world. “RE-TALIATE: Learning Winning Policies in First-Person Shooter Games” was an emerging system presented by researchers at Lehigh University (US).



Incoming President Eric Horvitz Congratulated President Elect Martha Pollack at the AAAI Annual Business Meeting.



Outgoing Past President Ronald Brachman and Outgoing President Alan Mackworth with Executive Director Carol Hamilton.

Business Automation

Business automation has been a favorite topic of AAAI researchers in the past. In 2007, the conference featured two deployed systems. The first is a web-based sales product and service recommender development environment: "The VITA Financial Services Sales Support Environment." The system was developed by researchers at the University of Klagenfurt (Austria), and deployed in Hungary. The second paper, "Custom DU — A Web Based Business User Driven Automated Underwriting System,"

was presented by scientists at Fannie Mae (US).

Decision Support

Two decision support papers were presented at AAAI-07: "MasDISPO: A Multiagent Decision Support System for Steel Production and Control," a deployed application created by researchers at DFKI GmbH (Germany), and "Optimizing Anthrax Outbreak Detection Using Reinforcement Learning," an emerging application created by scientists at McGill University (Canada).

Human Computer Interaction

Forty mobile operators and millions of subscribers around the world use the deployed system created by Changing Worlds Ltd. (Ireland). Researchers from the company presented their paper "Enabling Intelligent Content Discovery on the Mobile Internet" at AAAI-07 in Vancouver. Also presented was "Supporting Feedback and Assessment of Digital Ink Answers to In-Class Exercises," an emerging application that supports a continuous feedback cycle between student and teacher, assessing students' mastery of new material presented in class. CLP consists of a network of Tablet PCs and software for posing questions to students. It interprets their handwritten answers, and aggregates the answers into equivalence classes, each of which represents a particular level of understanding or misconception of the material. The software is being developed by the Massachusetts Institute of Technology Science and AI Laboratory.

Information Systems

Two deployed systems from Hong Kong were presented in information systems. The first, built by researchers at City University of Hong Kong (PRC), "Using AI for e-Government Automatic Assessment of Immigration Application Forms," is a system that speeds government processing of forms. The second system, "Journal-Ranking.com: An Online Interactive Journal Ranking System," is a web site for global academic journals. Built by researchers at the Hong Kong University of Science and Technology, and Red Jasper Ltd., Hong Kong (PRC), the deployed application gets nearly a million hits per month.

Machine Learning

AI has begun to play a critical role in basic science research. "Stochastic Optimization for Collision Selection in High Energy Physics," an emerging application developed by scientists from the University of Texas Austin and the University of California Irvine (U.S.), aids in precision measurements that elucidate the underlying structure of matter produced in high energy particle accelerators. Intel Research presented emerging work on an adaptive

timeout power management technique for mobile appliances that executes in less than one millisecond, and is sufficiently simple to be deployed directly on a microcontroller. Their paper was titled “Adaptive Timeout Policies for Fast Fine-Grained Power Management.”

Researchers from IBM Research and the University of California Santa Cruz presented “Adaptive Trait Tracing with Bayesian Networks,” an emerging application that identifies broadcast encryption keys that have been compromised (“traitor tracing”).

Finally, researchers from General Vision presented “Fish Inspection System Using a Parallel Neural Network Chip and Image Knowledge Builder Application” an application that is deployed on vessels in Norway and Iceland.

Medical Applications

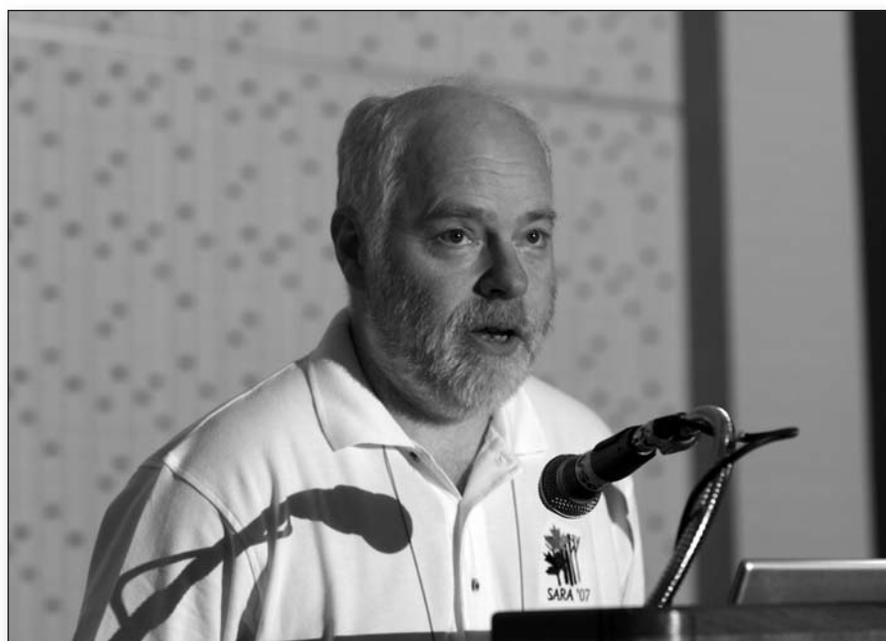
Two medical applications were presented at the Vancouver IAAI conference. The first, “Biomind ArrayGenius and GeneGenius: Web Services Offering Microarray and SHP Data Analysis via Novel Machine Learning Methods,” was a deployed system that provides scientific postgenomic analysis. The system was developed by Biomind, a US company. The second medical application, “Real-Time Identification of Operating Room State from Video” was an emerging system developed by the University of Maryland (US). This system automatically determines the state of an ongoing operation from video for scheduling purposes.

Planning and Workflow

Two emerging applications were described in the planning and workflow domain. The first, “Optimal Multi-Agent Scheduling with Constraint Programming,” was created by researchers at Cornell University (US) and the University of Bologna (Italy). The second paper, “Wings for Pegasus: Creating Large-Scale Scientific Applications Using Semantic Representations of Computational Workflows,” was the product of the University of Southern California, Information Sciences Institute (US). The USC-ISI system computes workflows to manage increasingly heteroge-



AAAI-07 Conference Cochair Adele Howe.



AAAI-07 Conference Cochair Rob Holte.

neous sharing resources such as data repositories, services, instruments, and computing resources.

Space Applications

The IAAI conference featured two space-applications papers. The first, “Machine Learning for Automatic Mapping of Planetary Systems,” described an emerging application that automates geomorphic mapping of

planetary surfaces (previously drawn manually by a domain expert) with an accuracy rate of approximately 91 percent. The paper was submitted by researchers at the Lunar and Planetary Institute, the University of Colorado Boulder, and the University of Houston. The second space application was a deployed system. “The Virtual Solar-Terrestrial Observatory: A Deployed



The Greater Vancouver Area, Viewed from Downtown.

Semantic Web Application Case Study for Scientific Research” is a system that allows virtual access to a highly distributed and heterogeneous set of data, giving the appearance of common organization, storage, and retrieval or use. The application was created by researchers at McGuinness Associates, Stanford University, and the US National Center for Atmospheric Research.

Proceedings

A CD containing all of the AAAI/IAAI papers, as well as a printed proceedings, can be obtained from AAAI Press.

Errant Bot Brings Bit of Fun

The conference also had its lighter moments — intended and otherwise. Bill Cheetham, chair of the IAAI conference, recounts, “One funny thing that I saw (at the conference) showed how AI systems need to be taken out in the real world and tested. There was an AIBO robot that was trained to chase after an orange ball. A student with orange tennis shoes walked nearby. The AIBO left his ball, jumped on the student’s foot, and then chased the student around the

room, jumping on his foot and even trying to climb his leg whenever the robot could catch the student.”

Looking Toward Chicago

The vitality and energy of 2007 will undoubtedly be found at AAAI-08 in Chicago from July 13–17, 2008 at the Hyatt Regency McCormick Place. (For details, see www.aaai.org/aaai08.php). We can look forward to next year’s conference again being, as Eric Horvitz describes it, the “focal point for AI research worldwide.”