Registration Brochure

**Sixteenth National Conference on
Artificial Intelligence (AAAI-99)
Eleventh Conference on
Innovative Applications of Artificial Intelligence
(IAAI-99)**

Omni Rosen Hotel ■ Orange County Convention Center ■ Orlando, Florida

Sponsored by the American Association for Artificial Intelligence
ncai@aaai.org • www.aaai.org

Please Join Us!

Hey AI Scientist! You Made It Through AI Winter! Where Are You Going Now???

We hope it's AAAI-99 at Disney World!

Spring is here! Far from the AI winter of the past decade, it is now a great time to be in AI—jobs in academia, the government sector, and industry are increasing, funding for AI related technologies is on the rise, and—most exciting of all—technological advances outside of the AI field are presenting new challenges to our field and new opportunities for us to be involved in the scientific revolutions of our time. This year's meeting is aimed at catching this wave and helping us to gain momentum for AI as our field prepares for the next millennium.

The conference will start with exciting workshops and free tutorials, and transition into a technical conference which will include such highlights as Pat Winston's talk "Why I Am Optimistic," an invited talk by Nils Nilsson entitled "AI Rising," a panel on "AI Spring" chaired by Kris Hammond, and "challenge talks" where experts will help us learn about some of the critical scientific challenges where AI can have a huge impact, including the Human Genome project, Space Exploration, new information technologies, and quantum computing, to name but a few. In addition, we con-tinue some of AAAI's most popular features such as the robotics competition, integrated software system demonstrations, and this year's mentoring tutorial, "How Not to Give a Research Talk" by Eugene Freuder.

The program committee, the AAAI staff, the AAAI Executive Council, and all the rest of us involved in creating this conference have been working hard to make this our best year ever. We look forward to seeing you there!

– Jim Hendler
– Devika Subramanian
AAAI-99 Program Cochairs

P.S. Need more incentive? Bring your kids and make this a family conference! Check out our innovative CHIkids@AAAI—an exciting childcare concept that will let your school-aged children participate in the conference and learn about what you do and how you do it!

IAAI-99 is THE Place to Learn about AI's Success!

Please Join Us for IAAI-99, Monday–Wednesday, July 19–21
The Eleventh Annual Conference on Innovative Applications of Artificial Intelligence (IAAI-99) is *the* place to be to learn about AI's successes through *deployed real world example applications* and *emerging AI technologies and applications*. IAAI-99 continues the IAAI tradition of presenting case studies of deployed applications with measurable benefits whose value depends on the use of AI technology. In addition, IAAI-99 augments these case studies with papers and invited talks that address emerging areas of AI technology or applications. IAAI is organized as an independent program within the National Conference, with coordinated schedules to allow attendees to move freely between IAAI and National Conference sessions. IAAI and the National Conference are jointly sponsoring several invited talks that fit the theme of both programs.

AI applications developers will benefit from learning about new AI techniques that will enable the next generation of applications. Basic AI research will benefit by learning about challenges of real-world domains and difficulties and successes in applying AI techniques to real business problems. IAAI-99 will address the full range of AI techniques including knowledge-based systems, natural language, etc.

IAAI-99 *continues the tradition of showcasing the deployed applications on the first day,* Monday, July 19. The papers are case studies that provide a valuable guide to designing, building, managing, and deploying systems incorporating AI technologies. These applications provide clear evidence of the impact and value that AI technology has in today's world.

Papers in the emerging applications and technologies track describe efforts whose goal is the engineering of AI applications. They inform AI researchers about the utility of specific AI techniques for applications domains and also inform applications developers about tools and techniques that will enable the next generation of new and more powerful applications.

This year's papers address applications in the military, airport operations and management, telecommunications networks and management, spacecraft operations and satellite missions, medicine, vehicle assembly and routing, natural languages, music, diagnosis, customer support, robotics, electronic commerce, and more. AI techniques include, among others, planning, constraints and scheduling, intelligent agents, simulation, expert systems, and knowledge acquisition.

We invite you to contribute to the dialog between basic and applied AI by joining us for IAAI-99!

- Ramasamy Uthurusamy, Program Chair
& Barbara Hayes-Roth, Program Cochair

Festivities

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AAAI-99 Opening Reception

The AAAI-99 opening reception will be held Monday, July 19 from 5:30–7:00 PM in the Junior Ballroom of the Omni Rosen Hotel. This event will provide the traditional opportunity for attendees to socialize prior to the beginning of the first day of technical sessions. A variety of hors d'oeuvres and a no-host bar will be available. Admittance to the reception is free to AAAI-99 registrants. A $15.00 per person fee ($5.00 for children) will be charged for spouses and other nontechnical conference registrants.

AI Festival

The AI Festival will be held Wednesday, July 21 from 6:00–10:00 PM in Exhibit Hall A1 of the Orange County Convention Center. This popular event, first held at AAAI-98, gives attendees the opportunity to stroll among numerous exhibits and demonstrations—the Mobile Robot Competition and Exhibition, the Intelligent Systems Demonstrations, and the Student Posters—enlivened by informal supper and conversation. Admittance to the reception is free to AAAI-99 registrants. A $20.00 per person fee ($5.00 for children) will be charged for spouses and other nontechnical conference registrants.

AAAI-99 / IAAI-99 Conference Committees

AAAI-99 Program Cochairs
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Bart Selman, Cornell University

Workshop Chair and Cochair
David Leake, Indiana University
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Keynote Addresses

Why I Am Optimistic

Patrick Henry Winston,
Artificial Intelligence Laboratory,
Massachusetts Institute of Technology

From the engineering perspective, artificial intelligence is a grand success. Today, most big systems are built with elements that are readily traced to research done by the field's practitioners. From the scientific perspective, however, achievements have been small, and the goal of understanding human intelligence, from a computational point of view, remains elusive. Nevertheless, to an optimist, the current state of artificial intelligence seems analogous to that of biology in 1950: on the engineering side, antibiotics had been discovered, developed, and applauded; on the science side, many prominent biologists said the field was dead, and little more of value could be done. But then, along came Watson and Crick, and their discovery of DNA's structure launched a fifty-year period of fantastic progress.

Is artificial intelligence ready for its own analog to the discovery of DNA? Have we been looking under the wrong lamp posts? Is there a new paradigm that will revitalize the field? Or must we resign ourselves to 300 years of slow progress?

It is time to rekindle the original enthusiasm that actuated the pioneers. We should squarely, bravely, and optimistically confront the problems that block our understanding of human intelligence and prevent our construction of programs with human-level intelligence and beyond.

This time, however, we must exploit an abundance of neglected clues accumulating not only in artificial intelligence, but also in allied fields, such as systems neuroscience and developmental psychology. These clues will help us to unlock the secrets of intelligence, and likely lead to the conclusion that our sophisticated vision and language faculties are not mere I/O channels. Instead, our vision and language faculties embody powerful computational and engineering ideas that account for much of our intelligence.

Patrick Henry Winston is the Ford Professor of Artificial Intelligence at the Massachusetts Institute of Technology, where he directed the Artificial Intelligence Laboratory for 25 years. Winston's publications include major textbooks and edited collections. He is the author of *Artificial Intelligence and Lisp* (with Berthold K. P. Horn) and the *On To* series of programming language textbooks, which includes books on C, C++, Smalltalk, and Java (with Sundar Narasimhan). His academic work focuses on a major new research and educational initiative, the Human Intelligence Enterprise, which brings together ideas from many allied fields in the pursuit of understanding human intelligence. In the world of commerce and service, he is chairman and cofounder of Ascent Technology, Inc., a company that produces sophisticated scheduling systems that are in use throughout the world in major airlines and airports. He is a past president of AAAI and currently chairs the Naval Research Advisory Committee, the Department of the Navy's science advisory board.

AI Rising

Nils J. Nilsson,
Robotics Laboratory, Stanford University

Nilsson will analyze and discuss what AI has learned in the last fifty years and make some predictions about the next fifty.

Nils J. Nilsson is the Kumagai Professor of Engineering (Emeritus) in the Department of Computer Science at Stanford University. He received his Ph.D degree in electrical engineering from Stanford in 1958. He spent twenty-three years at the Artificial Intelligence Center of SRI International working on statistical and neural-network approaches to pattern recognition, coinventing the A* heuristic search algorithm and the Strips automatic planning system, directing work on the integrated mobile robot, Shakey, and collaborating in the development of the Prospector expert system. He has published five textbooks on artificial intelligence. Nilsson returned to Stanford in 1985 as the chairman of the Department of Computer Science, a position he held until August 1990. Besides teaching courses on artificial intelligence and on machine learning, he has conducted research on flexible robots that are able to react to dynamic worlds, plan courses of action, and learn from experience. Nilsson served on the editorial boards of *Artificial Intelligence* and the *Journal of Artificial Intelligence Research.* He was an area editor for the *Journal of the Association for Computing Machinery.* He is a past-president and Fellow of the American Association for Artificial Intelligence and is also a Fellow of the American Association for the Advancement of Science. He was a founding director of Morgan Kaufmann Publishers, Inc. In 1993, he was elected a foreign member of the Royal Swedish Academy of Engineering Sciences.

Courtesy, Orlando Convention and Visitors Bureau

Invited Presentations

Game Playing: The Next Moves

Susan L. Epstein, Hunter College and The Graduate School of The City University of New York

As people do it, game playing addresses critical AI issues: learning, planning, resource allocation, and the integration of multiple streams of knowledge. Epstein highlights recent developments in game playing, describes some cognitively-oriented work, and poses three new challenge problems for the AI community.

Thinking on our Feet: Wearable Computing and Artificial Intelligence

Steven K. Feiner, Columbia University

As computers decrease in size and increase in power, they are beginning to move off our desks and onto our bodies. Feiner will describe research in developing wearable user interfaces that mix different displays and interaction devices, and discuss some of the ways that they can exploit AI techniques.

How Common Sense Might Work

Kenneth D. Forbus, Northwestern University

This talk describes how a combination of analogical and first-principles reasoning, relying heavily on qualitative representations, might provide a computational model of common sense reasoning. Forbus discusses the psychological and computational support for this approach, and illustrates how it can be used in building new kinds of multimodal interfaces and educational software.
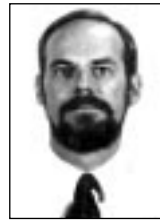
AI and Space Exploration: Where No Machine Has Gone Before

Kenneth M. Ford, Institute for Human and Machine Cognition, University of West Florida, and NASA Ames Research Center

Humans are quintessentially explorers and makers of things. These traits, which identify us as a species and account for our survival, are reflected with particular clarity in the mission and methods of space exploration. This is an exciting time to be a computer scientist at NASA—our work is at the crossroads of these two human traits—we are making computational machines to extend human reach further than ever before.

Real-time Applications of Computer Vision: Computer Assisted Neurosurgery and Visual Monitoring of Activities

W. Eric L. Grimson, Artificial Intelligence Laboratory, Massachusetts Institute of Technology

Recent advances in computational power, coupled with constraints enforced by real-world applications, have led to two real-time vision systems: an image-guided neurosurgical system, now in daily use; and a monitoring system that learns common activity patterns by visual observation over extended periods, and automatically detects unusual events.

Decrypting the Human Genome

Jill P. Mesirov, Whitehead Institute/ MIT Center for Genome Research

There has been a recent explosion in the need for computational support in molecular biology. This has been driven by new laboratory technologies which generate biological data at a more rapid pace than ever before. The exploitation of this large amount of data by biologists and medical scientists requires contributions from many areas of computer science.

Mesirov will present a few key examples where computing has made a major impact in today's genomic research, and also point out some interesting opportunities for the future. The examples will be drawn both from structural genomics (determining the actual sequence of the genome) as well as functional genomics (decoding the sequence to understand gene function).

Quantum Computation and AI

Lee Spector, Hampshire College

Recent research suggests that quantum mechanical computers will be able to outperform classical computers in dramatic ways. Spector will introduce quantum computation to the non-physicist and will illustrate connections between quantum computation and AI. AI is already helping to explore the power of quantum computation, and quantum computation may someday provide a new foundation for AI.

Invited Panels

Intelligent Systems in Biopharmaceutical R&D: Challenges and Approaches

Organized by Chris Fields, PE Informatics
Panelists: Vijay Sikka, PatternRx, Inc. and
Susan Burgess, Structural Bioinformatics, Inc.

The development of automated, high-throughput instrumentation and robotics has driven a transition in biopharmaceutical R&D toward bulk data acquisition followed by automated analysis and triage to identify molecular targets of opportunity. This new strategy raises challenges in AI domains including planning, intelligent control, multidimensional pattern recognition, and data fusion.

AI Spring

Organized by Kristian J. Hammond,
The Intelligent Information Laboratory, Northwestern University

For better or worse, AI Winter is over and AI Spring is upon us. As with most times of rebirth, it brings with it two things: a set of new opportunities and the need to bury those that did not survive the cold.

In this panel we'll look at both aspects of this new time in AI. We'll look to the future and see how we've emerged as a leaner tougher field hardened by the chilly times of the past.

Courtesy, Orlando Convention and Visitors Bureau

Courtesy, Orlando Convention and Visitors Bureau

Exhibit Programs

The AAAI-99 Exhibition will take place on Tuesday, July 20 and Wednesday, July 21, and will comprise a host of events designed to showcase current products, research and applications in artificial intelligence. Admittance is open to all AAAI-99 registrants. Other interested individuals may visit the exhibits for a nominal onsite fee of $10.00. Student groups are welcome, preferably by prior arrangement. For more information about the exhibition, please visit the AAAI web site or write to ncai@aaai.org.

Exhibitors

Exhibitors will be leading suppliers of AI software, as well as AI consultants and publishers displaying the latest in AI books and periodicals. AAAI-98 Exhibitors included:

- AAAI Press
- ACM
- Activemedia Robotics
- Applied AI Systems
- Brightware, Inc.
- Cedar
- Elsevier Science Publishers
- Franz, Inc.
- Harlequin Group
- IEEE Computer Society
- Inquizit Technologies
- Kluwer Academic Publishers
- Macro Vu, Inc.
- Morgan Kaufmann Publishers
- NASA Ames Research Center
- Numan Intelligence, Inc.
- *PC AI Magazine*
- Prentice Hall
- Real World Interface, Inc.
- RML Technologies
- Springer Verlag New York, Inc.
- The MIT Press

Intelligent Systems Demonstrations

Advances in artificial intelligence research are making it possible to develop intelligent artifacts in a wide range of application areas. The AAAI-99 Intelligent Systems Demonstrations program showcases state-of-the-art AI implementations and provides AI researchers with an opportunity to show their research in action.

The program is intended to highlight innovative contributions to the science of AI with an emphasis on the benefits to be gained from developing and using implemented systems in AI research. Last year's demonstrations included speech- and gesture-based systems, AI-based simulators, several systems using AI on the world-wide web, an intelligent classroom, and even AI "pets." System builders will be on hand to present their work, and audience interaction with the systems is encouraged as much as possible.

Demonstrations are scheduled throughout the AAAI Exhibition as well as being available during the AI Festival. Check the conference program for times and locations.

Mobile Robot Competition and Exhibition

The Eighth Annual AAAI Mobile Robot Competition and Exhibition brings together teams from universities and other research laboratories to compete, and also to demonstrate state-of-the-art research in robotics and AI. The goals of the Competition and Exhibition are to:

- Foster the sharing of research ideas and technology
- Allow research groups to showcase their achievements
- Encourage students to enter the fields of robotics and AI
- Increase awareness of the field

The Competition and Exhibition comprises three separate events.

The Robot Contest

The contest allows teams to show off their best attempts at solving common tasks in a competitive environment. Teams compete for place awards as well as for technical innovation awards, which reward particularly interesting solutions to problems. There will be two contest events this year.

The Robot Exhibition

The exhibition gives researchers an opportunity to demonstrate state-of-the-art research in a less structured environment. Exhibits are scheduled through several days of the conference, and in addition to live exhibits, a video proceedings will be produced.

The Robot Challenge

This year we add a new event—the Robot Challenge. In this event, a particularly challenging task is defined that is well beyond current capabilities, will require multiple years to solve, and should encourage larger teams and collaborative efforts. The challenge task is defined by a long-term committee of researchers. Currently the task is for a robot to be dropped off at the front door of the conference venue, register itself as a volunteer, perform various tasks as assigned, and talk at a session. The challenge will require integration of many areas of artificial intelligence as well as robotics.

For more information: http://www.aic.nrl.navy.mil/~schultz/aaai99/

Special Programs

AAAI-99 Robot Building Laboratory

Sunday–Monday, July 18–19, 1999 *(Preregistration is required.)*

AAAI-99 Robot Building Laboratory (RBL) participants will spend two days seeing how easy or difficult it is to implement their favorite AI techniques on an actual robot. This year's kit will feature pneumatic actuators and a sonar range finder in addition to the traditional collection of DC motors and analog sensors. Participants will be grouped into small teams, each of which will build their own mobile robot. The AAAI-99 RBL will start with a quick tutorial on robot basics covering sensors, effectors and realtime programming techniques. Participants will spend most of their time designing, building and programming their mobile robot. Throughout the laboratory there will be individual team tutorials covering specific aspects of robot design and programming. Demonstrations of other robot systems and technologies will also take place, and an extensive library of robot functions will be available. Some portions of the mobility system will be provided prebuilt, thereby assuring that all groups get a good start on a fully functional robot. There will be ample opportunity for individual design, creativity, testing and redesign. At the end of the session all the robots will participate in a double elimination tournament. Then we will see which robot has the right stuff to best accomplish the task (which will be specified at the beginning of the robot lab)! Later in the conference, courageous volunteers from the RBL will have a chance to have their robots participate in an exhibition match with the national finalists of the **High School Botball Tournament.**

This tournament will be open to all the attendees of AAAI. The lab is being organized and taught by the KISS Institute for Practical Robotics (KIPR) for AAAI. For updated information about this event, please see http://www.kipr.org/rbl99. For information about how to register for RBL-99, please see the registration fee schedule in this brochure.

CHIkids@AAAI: Five Days of Kids, Technology, and Fun!

New at this year's AAAI conference is the CHIkids program, a program well known for providing enriching technology experiences for children. The CHIkids program, which originated at ACM's annual CHI conference, combines the feeling of summer camp with the fun of technology, all as a part of the unique conference experience. (To see past activities: http://www.acm.org/sigchi/chi98/chikids/)

Now in its fifth year, CHIkids continues to bring children and technology together, so that young people can be conference reporters, web site designers, multimedia storytellers, software testers, conference attendees, and more. CHIkids is a place where kids, adults, and technology can come together with common goals and do meaningful things. Thanks to CHIkids@AAAI, a conference newsletter and website will be created by kids.

CHIkids@AAAI is a five-day program for children 7 to 15 years of age. Children can choose to participate in all five days or select specific days to be a CHIkids participant. Children will also be provided with a mixture of off-computer activities to complement their technology experiences. All CHIkids activities will be led by a team of adult CHIkids volunteers with experience in technology, kids, and fun! Assistance will be provided by KiddieCorp, our experienced child care facilitators. If you are interested in receiving information on CHIkids please fill out the information request form at the back of this brochure.

Student Programs

AAAI-99 Student Abstract Poster Program

The AAAI–99 Student Abstract Program is designed to provide a forum in which students can present and discuss their work while still in its early stages, meet peers who have related interests, and introduce themselves to more senior members of the field. Student abstracts, which have been chosen for inclusion in the AAAI-99 conference *Proceedings,* will display their work at the Student Abstract Poster Session during the AI Festival on Wednesday, July 21, 6:00—10:00 PM in Exhibit Hall A1 of the Orange County Convention Center. All AAAI-99 registrants are encouraged to visit these presentations.

AAAI/SIGART Doctoral Consortium

The Fourth AAAI/SIGART Doctoral Consortium will be held Sunday and Monday, July 18–19, 1999 from 8:30 AM – 6:00 PM. The Doctoral Consortium provides an opportunity for a group of Ph.D students to discuss and explore their research interests and career objectives in an interdisciplinary workshop together with a panel of established researchers. The students accepted to participate in this program will also participate in the Student Poster program on Wednesday, July 21, from 6:00–10:00 PM during the AI Festival. All interested AAAI-99 student registrants are invited to observe the presentations and participate in discussions at the workshop. AAAI and ACM/SIGART gratefully acknowledge a grant from the National Science Foundation, Knowledge and Cognitive Systems Program, which partially supports student travel to the event.

Tutorial Forum

The 1999 Tutorial Forum features 12 four-hour tutorials that provide an opportunity for researchers to spend two days freely exploring exciting advances in disciplines outside their normal focus. Two special tutorials on Sunday and Monday evenings, including the second annual AAAI Mentoring Tutorial round out the program. All AAAI attendees are encouraged to participate in this continuing education program. Each tutorial is taught by experienced scientists and practitioners in AI. AAAI-99 technical registrants may register for up to four consecutive tutorials for no additional fee. No preregistration is required for the special evening tutorials.

Sunday, July 18

SA1: Knowledge-Based Scheduling
Steve Chien and Stephen Smith, 9:00 AM – 1:00 PM

SA2: Automatic Programming by Means of Genetic Programming
John Koza and Forrest Bennett, 9:00 AM – 1:00 PM

SA3: Robotic Soccer: The Research Challenges and the Concrete Simulation and Real Robot Platforms
Peter Stone and Manuela Veloso, 9:00 AM – 1:00 PM

SP1: Economically Founded Multiagent Systems
Tuomas Sandholm, 2:00 – 6:00 PM

SP2: Markov Decision Processes and Planning Under Uncertainty
Leslie Kaelbling and Michael Littman, 2:00 – 6:00 PM

SP3: Recent Progress in Machine Learning
Tom Mitchell and Andrew Moore, 2:00 – 6:00 PM

SP4: Plenary Tutorial: Java for Lisp Programmers
Speaker: TBA, 7:00 – 9:30 PM

Monday, July 19

MA1: Evaluating Machine Learning and Knowledge Discovery
David Jensen and Foster Provost, 9:00 AM – 1:00 PM

MA2: The Integration of Artificial Intelligence and Operations Research Techniques
Carla Gomes, Ken McAloon and Carol Tretkoff, 9:00 AM – 1:00 PM

MA3: Statistical Methods in Natural Language Processing
Lillian Lee and John Lafferty, 9:00 AM – 1:00 PM

MP1: Behavior-Based Robotics
Ronald Arkin and Maja Mataric, 2:00 – 6:00 PM

MP2: Advances in Reasoning and Search for Model-Based Autonomous Systems
Henry Kautz, Pandu Nayak, Bart Selman and Brian Williams, 2:00 – 6:00 PM

MP3: Genetic Algorithms, Evolution Strategies and AI
Darrell Whitley and Thomas Back, 2:00 – 6:00 PM

MP4: Mentoring Tutorial: How Not to Present a Paper
Eugene Freuder, University of New Hampshire, 7:00 – 8:30 PM

Special Tutorials

AAAI is pleased to present two plenary tutorials on the evenings of Sunday, July 18 and Monday, July 19. These two tutorials are open to all AAAI-99 technical registrants. No preregistration is required.

Mentoring Tutorial: How Not to Present a Paper (MP4)

Eugene Freuder, University of New Hampshire
Monday, July 19, 7:00–8:30 PM

Eugene C. Freuder is a Fellow of the AAAI, a professor at the University of New Hampshire, director of the UNH Constraint Computation Center, and editor-in-chief of the *Constraints* journal. He has presented papers, copresented a tutorial and given an invited talk at previous AAAI Conferences.

Special Tutorial: Java for Lisp Programmers (SP4)

Speaker: TBA
Sunday, July 18, 7:00–9:30 PM

Please watch the AAAI web site for further details about this special tutorial.

Advances in Reasoning and Search for Model-Based Autonomous Systems (MP2)

Henry Kautz, Pandu Nayak, Bart Selman, and Brian Williams

Monday, July 19, 2:00–6:00 PM

We have recently seen the dramatic success of AI systems that harness powerful new search and reasoning techniques with deep domain models. Examples include the autonomous Remote Agent system aboard NASA's *Deep Space One* probe, that can reason about a formal model of the spacecraft in order to recover from unexpected failures; the chess championship level play of IBM's Deep Blue, that derives its strength through highly optimized search over the basic rules of chess; the performance of Blackbox, a planning system based on propositional inference, at the AI Planning Systems competition; and the recent discovery of mathematically significant proofs in group theory by automated theorem provers. The model-based, compute-intensive approach represents a paradigm shift away from the expert-system approach that eliminates search by employing a large number of "shallow," situation-specific rules.

Our tutorial will begin with an overview of recent successful applications of automated inference to real-world domains, and a discussion of the "search versus knowledge" tradeoff possible with compute-intensive approaches. Next, we will investigate the topic of domain modeling by going through a detailed study of the creation of a model-based executive for a real-time autonomous system, and we will describe the kinds of core reasoning algorithms that have been successfully deployed in such applications.

Henry Kautz is a Technology Leader for AT&T Labs. He holds an M.Sc. in computer science from the University of Toronto and a Ph.D from the University of Rochester. He is a AAAI Fellow and member of the Executive Council, past recipient of the IJCAI Computers and Thought Award, and program cochair for AAAI-2000. He is known for his work on planning satisfiability testing (SATPLAN), stochastic search, software agents, temporal reasoning, and the logical foundations of knowledge representation.

Pandurang Nayak is a research scientist with RIACS at the NASA Ames Research Center, and a consulting faculty at Stanford University. He holds a Ph.D in computer science from Stanford University (1992), and his dissertation was an ACM Distinguished Thesis. He is an associate editor of *JAIR,* and his research interests include model-based autonomous systems, diagnosis and recovery, abstractions, qualitative and causal reasoning. His work on incremental truth maintenance won a best paper award at AAAI-97.

Bart Selman is an associate professor of computer science at Cornell University. He holds a Ph.D in computer science from the University of Toronto, and a M.Sc. in physics from Delft University of Technology. His research interests include efficient reasoning procedures, knowledge representation, and planning. He received best paper awards at the AAAI, CSCSI, and KR conferences, holds an NSF Career award, and is a Sloan Research Fellow.

Brian Williams, associate professor at MIT's space systems and artificial intelligence laboratories, formerly led the Autonomous System's Group at NASA Ames Research Center. He holds a Ph.D in computer science from MIT, has been a guest editor of *Artificial Intelligence,* and is on the editorial boards of *JAIR* and AAAI Press. He won AAAI best paper prizes for his work on hybrid algebras and incremental truth maintenance. He is known for his research in model-based autonomous systems, model-based diagnosis, and qualitative reasoning.

Automatic Programming by Means of Genetic Programming (SA2)

John Koza and Forrest Bennett
Sunday, July 18,
9:00 AM–1:00 PM

Genetic programming is a domain-independent technique for automatically creating computer programs that solve, or approximately solve, problems. It addresses the challenge of getting a computer to automatically solve a problem by telling it "what to do" instead of "how to do it." Starting with a primordial ooze of thousands of randomly created computer programs, a population of programs is progressively evolved over many generations. Genetic programming employs the Darwinian principle of survival of the fittest, a sexual recombination operation (crossover), mutation, gene duplication, gene deletion, and embryonic development.

Genetic programming has already yielded about two dozen published results that are competitive to human-produced results (including ten previously patented results). It has been successfully applied to problems of engineering design, control, classification, system identification, empirical discovery, data mining, pattern recognition, multi-agent programming, optimization, and computational molecular biology.

Our tutorial will begin by explaining genetic programming. We will then discuss the methods and present illustrative applications. Topics include multi-part programs, automatically defined functions (subroutines), automatically defined iterations, automatically defined loops, automatically defined recursions, and automatically defined memory structures, architecture-altering operations, genetically evolved assembly code, and implementation on parallel computers and evolvable hardware. There are no prerequisites.

Forrest H. Bennett III is a chief scientist of Genetic Programming Inc. of Los Altos, California. He is coauthor (with John Koza, David Andre, and Martin A. Keane) of *Genetic Programming III: Darwinian Invention and Problem Solving* (Morgan Kaufmann 1999) and over fifty published papers on genetic programming.

John Koza is a consulting professor of medical informatics at Stanford University. He is author of *Genetic Programming: On the Programming of Computer by Means of Natural Selection* (1992) and *Genetic Programming II: Automatic Discovery of Reusable Programs* (1994) and coauthor of *Genetic Programming III: Darwinian Invention and Problem Solving* (1999).

Courtesy, Orlando Convention and Visitors Bureau

Behavior-Based Robotics (MP1)

Ronald Arkin and Maja Mataric

Monday, July 19, 2:00–6:00 PM

Behavior-based robotics has, in the last decade, become one of the leading approaches to mobile robot control and has been effectively applied in a variety of domains, ranging from modeling biological systems, to studying difficult robotics problems, to real-world applications. The approach addresses the fundamental AI issues of sensing, thinking, and acting in real-time and presents a successful approach to solving situated AI problems.

In this tutorial we present a brief history of intelligent robotics, describe the interdisciplinary origins of behavior-based control, and place it in context relative to deliberative, reactive, and hybrid approaches. We illustrate the basic principles of behavior-based control, methods for system synthesis and analysis, and relevant biological inspirations and models of robot control, from a neuroscientific, ethological, and psychological perspective. Key issues in perception for behavior-based systems, including active, action oriented, and modular perception are covered. We also survey the current state-of-the-art in research and applied control, and outline outstanding problems and current directions, videotapes of robots in action are used for illustration and evaluation.

The tutorial requires no robotics background. It ties behavior-based robotics to general AI methods, principles, and goals and makes the robotics papers and the AAAI Robot Competition and Exhibition more accessible.

Ronald Arkin is a professor in the College of Computing at Georgia Tech and is Director of the Mobile Robot Laboratory. His interests include behavior-based reactive control and action-oriented perception for mobile robots and unmanned aerial vehicles, robot survivability, multi-agent robotic systems, and learning in autonomous systems. He recently completed *Behavior-Based Robotics* (The MIT Press) and is the series editor for the *Intelligent Robotics and Autonomous Agents* book series. He is a senior member of IEEE, and a member of AAAI and ACM.

Maja Mataric is an assistant professor in the Computer Science Department and the neuroscience program at the University of Southern California, and Director of the USC Robotics Research Labs. She received her Ph.D in computer science and AI in 1994 and her MS in 1990 from the Massachusetts Institute of Technology. She is on the editorial board of *JAIR* and *Adaptive Behavior*. Her research interests include multi-robot and multi-agent control and learning, and modeling imitation. She is a member of AAAI and ISAB.

Economically Founded Multiagent Systems (SP1)
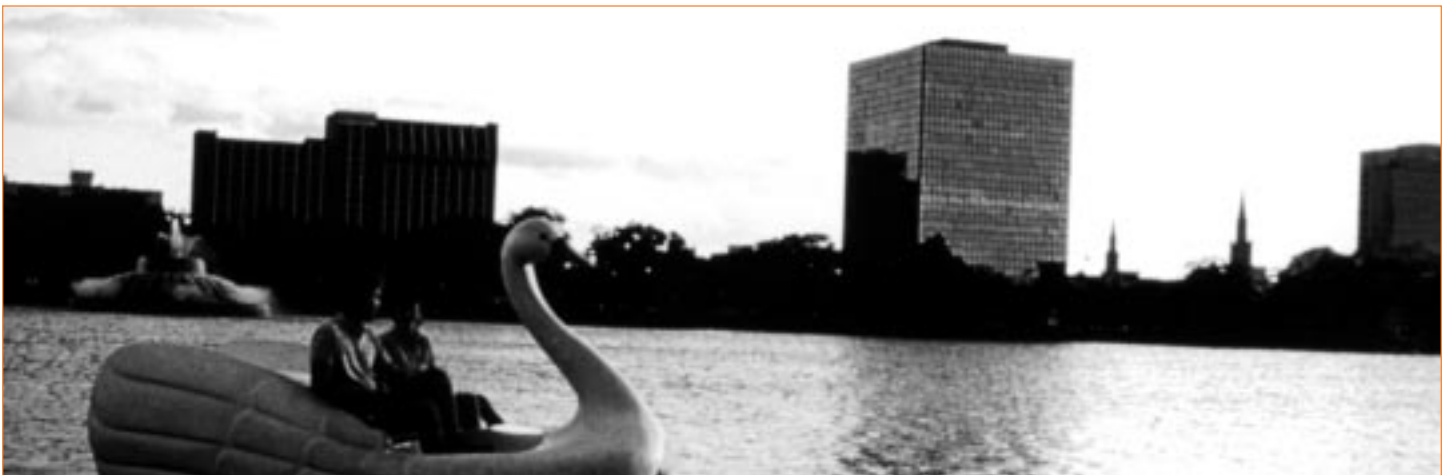

Tuomas Sandholm

Sunday, July 18, 2:00–6:00 PM

In multiagent systems—e.g. for agent-mediated electronic commerce—computational agents find contracts on behalf of the real world parties that they represent. This automation saves human negotiation time, and computational agents are often better at finding beneficial deals in combinatorially and strategically complex settings. Applications include electronic trading, manufacturing planning and scheduling among companies, electricity markets, allocating and pricing bandwidth in networks, vehicle routing among dispatch centers, and resource allocation in distributed operating systems, to name just a few.

A key research goal is to design open distributed systems in a principled way that leads to globally desirable outcomes even though every participating agent only considers its own good and may act insincerely. This tutorial covers relevant topics in AI, game theory, market mechanisms, voting, auctions (especially next generation combinatorial auctions), coalition formation, and contract nets. Emphasis is given to rigorous results and algorithms—both classic ones from microeconomics and recent ones from the MAS community. Effects of computational limitations (agents' bounded rationality) are discussed as a key feature that has not received adequate attention. Implementation experiences will be shared, and real world applications presented.

Tuomas Sandholm is an assistant professor of computer science at Washington University in St. Louis. He received his Ph.D and M.S. degrees in computer science from the University of Massachusetts at Amherst in 1996 and 1994. He earned an M.S. (B.S. included) with distinction in industrial engineering and management science from the Helsinki University of Technology, Finland, in 1991. He has nine years of experience building multiagent systems. He has also codeveloped two fielded AI systems, and is chief scientist of an electronic commerce startup company. He has published seventy-five technical papers, and received several academic awards.

Courtesy, Orlando Convention and Visitors Bureau

Evaluating Machine Learning and Knowledge Discovery (MA1)

David Jensen and Foster Provost

Monday, July 19,
9:00 AM–1:00 PM

Learning is an increasingly common component of AI systems, allowing adaptation in complex and dynamic environments. However, learning raises unique evaluation challenges and requires specialized techniques and experimental designs. This tutorial will cover four basic topics:

- Fundamentals of empirical evaluation of learned knowledge, including basic challenges, statistical foundations, useful statistical and visualization techniques, and specific pitfalls.
- Evaluating learned knowledge in the context of the goals and the problem characteristics of a specific task, particularly in the face of uncertainty about the target environment (costs, benefits, etc.).
- Specific challenges of evaluating knowledge when it is derived inductively, concentrating on unifying ideas from statistics and computational learning theory.
- Challenges faced by open-ended discovery, surveying insights from AI work on AM, EURISKO, and MetaDENDRAL through more recent work on scientific discovery and KDD.

The tutorial assumes almost no prior background in statistics. Familiarity with basic learning algorithms for classification or reinforcement learning will be helpful. The audience will come away armed with fundamental and advanced techniques for evaluation, and with exposure to many examples of how both to improve the performance of their systems and to improve their empirical understanding of that performance.

David Jensen is a research assistant professor of computer science at the University of Massachusetts, Amherst. His research focuses on learning and knowledge discovery, particularly the statistical properties of these algorithms. From 1991 to 1995, he was an analyst with the Office of Technology Assessment of the United States Congress.

Foster Provost researches machine learning and knowledge discovery at Bell Atlantic (formerly NYNEX) Science and Technology, focusing on evaluation, scaling up, using background knowledge, and on applications such as fraud detection and network diagnosis. Foster coedited a recent *Machine Learning* journal special issue on applications and the knowledge discovery process.

Genetic Algorithms, Evolution Strategies and AI (MP3)

*Darrell Whitley and
Thomas Back*

Monday, July 19, 2:00–6:00 PM

Genetic algorithms and evolution strategies are both forms of simulated evolution used to solve difficult optimization problems. Both methods developed in parallel in the 1970s: genetic algorithms in the US and evolution strategies in Germany. Each method has distinct advantages.

The classic theory underlying genetic algorithms suggests that they sample hyperplane subpartitions of the space to allocate increasing trials in above-average regions of the search space. In recent years there have been several new insights and questions about the significance of schema processing. Evolution strategies have placed more emphasis on characterizing convergence behavior on specific classes of functions, and have developed a more advanced theory concerning the role of mutation and self-adaptive operators. Some of the best evolutionary algorithms in use today borrow ideas from both approaches.

Representation and operator selection is a key issue in both genetic algorithms and evolution strategies. In genetic algorithms representation tends to be emphasized more, while in evolution strategies, the notion of "strong causality" and operator design are important. Applications of these methods include reinforcement learning and neurocontrol applications. These methods can also be used in the construction of decision trees and other tools related to data mining. Other applications include problems in computer vision.

Darrell Whitley is a professor of computer science and director of the Colorado State Artificial Intelligence Lab (CSAIL) at Colorado State University. He developed some of the first evolutionary methods for scheduling applications as well as some of the first systems combining genetic algorithms and neural networks. He served as chair of the Governing Board of the International Society for Genetic Algorithms (1993-1997) and is currently editor-in-chief of the *Evolutionary Computation* journal.

Thomas Back is a senior research fellow and director at the Center for Applied Systems Analysis within the Informatik Centrum Dortmund. He is also an associate professor of computer science at Leiden University and codirector of the evolutionary computation program of the Leiden Center for Natural Computing. He is author of *Evolutionary Algorithms in Theory and Practice: Evolutionary Strategies, Evolutionary Programming, Genetic Algorithms* and coeditor-in-chief of the *Handbook of Evolutionary Computation.*

The Integration of Artificial Intelligence and Operations Research Techniques (MA2)

Carla Gomes, Ken McAloon, and Carol Tretkoff

Monday, July 19,
9:00 AM–1:00 PM

Developments in computer science, artificial intelligence, and operation research (OR), and the needs of the marketplace have brought AI and OR technologies together. We will illustrate this convergence by looking at combinatorial problems. The following two themes will be emphasized:

We will discuss the situation where the methods of constraint programming (CP) and mixed integer programming (MIP) have been used together. Examples range from loose integration where two parts of a problem are solved in succession using each technique in turn to the other extreme where tight integration of the two techniques is required. Applications include flight departures times, employee scheduling, two dimensional bin packing, robot planning, and others.

We will also review recent progress on using AI based phase-transition analysis to better understand the complexity of combinatorial problems. Then we will discuss how to exploit the properties of the probability distributions of randomized search methods for boosting combinatorial search. We will illustrate randomized approaches using both methods from CP and MIP. Applications will include planning and scheduling.

The tutorial is meant for a general AI audience; no prior knowledge of OR techniques is assumed.

Carla P. Gomes received her Ph.D in computer science, (specialization area, artificial intelligence and operations research), from the University of Edinburgh in 1993. She is a research associate at Cornell University and is also affiliated with the U.S. Air Force Research Lab (Rome Laboratory; knowledge-based systems area). Her research interests include planning and scheduling, and multidisciplinary approaches for solving combinatorial problems.

Ken McAloon is the Broeklundian Professor of Computer Science and Mathematics at City University of New York. Coauthor of *Optimization and Computational Logic* (Wiley, 1996), McAloon has worked in constraint based programming for over ten years. He holds his Ph.D in mathematics from the University of California, Berkeley and has taught at Princeton and the University of Paris. This year he is on sabbatical at Ilog. His current research is in the area of hybrid constraint solving systems.

Carol Tretkoff received her Ph.D in mathematics from the Courant Institute of New York University. She has held teaching and research positions at Bell Labs, IDA, and the City University of New York. She is currently a senior consultant in optimization at Ilog in Mountain View, California. Her current interests include the use of scheduling problems and the use of cooperating solvers to find solutions to combinatorially difficult problems.

Knowledge-Based Scheduling (SA1)

Steve Chien and Stephen Smith

Sunday, July 18,
9:00 AM–1:00 PM

This tutorial will cover the principal concepts and techniques that underlie AI-based approaches to automated scheduling. We will start by covering basic scheduling concepts such as representation of scheduling knowledge and constraints, search, constraint propagation, conflict resolution, bottleneck analysis, search control heuristics, and basic constructive and iterative approaches to schedule generation. Next, more advanced scheduling topics will be covered, including scheduling under uncertainty, reactive scheduling, distributed scheduling, mixed-initiative scheduling, machine learning approaches to scheduling, and evolutionary computation approaches. We will conclude with a characterization of the current state of research and practice, and a discussion of the prospects and open issues in the field. The tutorial will be motivated with experiences drawn from real-world scheduling systems which have been or are currently being deployed, and concepts will be illustrated using examples drawn from these systems.

Knowledge of basic concepts from artificial intelligence will be presumed: search, expert systems, and logiclike representations. Familiarity with some planning and scheduling systems, constraint propagation, and basic search strategies would be helpful but not essential.

Steve Chien is the technical group supervisor of the Artificial Intelligence Group, at the Jet Propulsion Laboratory, California Institute of Technology, where he leads efforts in automated planning and scheduling. His current projects include basic research and deployment of planning systems for automated science analysis, spacecraft mission planning, spacecraft design, maintenance of space transportation systems, and Deep Space Network Antenna operations. Chien holds a B.S., M.S., and Ph.D in computer science, all from the University of Illinois. He is also an adjunct assistant professor at the University of Southern California's Department of Computer Science. Chien is a 1995 recipient of Lew Allen Award for Excellence, the highest honor JPL awards to researchers in the early years of their professional careers.

Stephen F. Smith is a senior research scientist in the Robotics Institute at Carnegie Mellon University where he is the director of the Intelligent Coordination and Logistics Laboratory. For the past several years, Smith's research has focused on constraint-based reasoning frameworks and techniques for flexible planning, scheduling and control in practical domains. Smith has been involved in numerous deployed systems in diverse applications including airlift and tanker mission scheduling, semiconductor scheduling, and communications antenna scheduling. His current research interests include mixed-initiative and reactive planning and scheduling, reconfigurable and self-organizing scheduling systems, and agent-based modeling and analysis of supply chain dynamics.

Markov Decision Processes and Planning Under Uncertainty (SP2)

Leslie Kaelbling and Michael Littman

Sunday, July 18, 2:00–6:00 PM

Markov decision processes (MDPs) and partially observable MDPs (POMDPs) are a class of formal models suitable for controlled stochastic dynamic systems, including robots, factories, and operating systems. In this tutorial, we will start by describing the basic MDP and POMDP models, reviewing state-of-the-art methods for finding optimal plans under these models. Given this background, we will survey current proposals on how to specify and solve much larger MDPs and POMDPs, focusing particularly on the use of dynamic belief networks and simulation models.

Leslie Pack Kaelbling is associate professor of computer science at Brown University. She received her Ph.D in computer science from Stanford University in 1990, and has held positions at SRI International and Teleos Research. She is an NSF Presidential Faculty Fellow, a member of the AAAI Executive Council, and the 1997 recipient of the IJCAI Computers and Thought Award.

Michael L. Littman joined the faculty of the Department of Computer Science at Duke University in 1996, after completing his Ph.D at Brown University. Professor Littman received his bachelor's and master's degrees in computer science from Yale University in 1988, and worked in Bellcore's Cognitive Science Research group before starting his Ph.D. His research is on numeric approaches to problems in artificial intelligence, primarily sequential decision making (reinforcement learning, planning under uncertainty, Markov models), and statistical natural language processing (information retrieval, cross-language information retrieval, part of speech tagging). Professor Littman's current research combines algorithm development, analysis, and empirical studies and is supported by a National Science Foundation CAREER grant.

Courtesy, Sea World

Recent Progress in Machine Learning (SP3)

Tom Mitchell and Andrew Moore

Sunday, July 18, 2:00–6:00 PM

Machine learning is the study of computer algorithms that improve automatically from experience. The past five years have produced rapid progress in machine learning, and successful applications now range from information filtering systems that learn their users' reading preferences, to data mining programs that learn to predict mortality risk for pneumonia patients, to autonomous robots that learn to drive on highways or play soccer in teams. Recent progress includes new learning algorithms that scale up to more practical problems such as the colossal terabyte scientific repositories emerging in biology and physics, problems with incomplete data containing hidden variables, learning from data such as text and images, and learning decision policies in uncertain worlds with delayed rewards.

This tutorial will present two kinds of information. The first part will describe the most successful current algorithms for machine learning, including neural networks, decision trees, rule learners, regression analysis, Bayesian networks, reinforcement learning, and boosting. It will also present key theoretical results in the statistical foundations and PAC learning theory. The second part will move on to sample current research in machine learning, examining topics such as colossal data, learning to extract information from the web, learning from unlabeled as well as labeled data, and learning to control manufacturing processes and supply chains.

This tutorial's objective is that participants who have previously been exposed to only zero, one or two facets of the current machine learning field will leave with a wider appreciation of the set of tools available, what they are being applied to, and where the field is moving.

Tom M. Mitchell is a professor of computer science and robotics, and the director of the Center for Automated Learning and Discovery at Carnegie Mellon University. He is the author of the widely used textbook *Machine Learning* (McGraw Hill, 1997), on which the first part of this tutorial will be based. Mitchell's current research focuses on machine learning to extract factual information while browsing the web, and on algorithms that learn from a combination of labeled and unlabeled data. Mitchell received the IJCAI Computers and Thought Award in 1983, served as cochair of the AAAI National Conference in 1988, has been a Fellow of the AAAI since 1990, and has been a member of the National Research Council Computer Science and Telecommunications Board since 1998. His secret goal is to teach a robot to windsurf.

Andrew Moore is the A. Nico Haberman Associate Professor of Computer Science and Robotics at Carnegie Mellon University. He received a Ph.D in computer science from the University of Cambridge in 1991. (Moore's dissertation topic was robot learning.) He has worked with robots that learn, factories than learn and supply chains that learn. His research interests include: atatistical foundations, autonomous learning systems for manufacturing, efficient algorithms for machine learning from massive data and reinforcement learning, finite production scheduling, and machine learning applied to optimization. Moore's secret goal is to be taught windsurfing by Mitchell's robot.

Robotic Soccer: The Research Challenges and the Concrete Simulation and Real Robot Platforms (SA3)

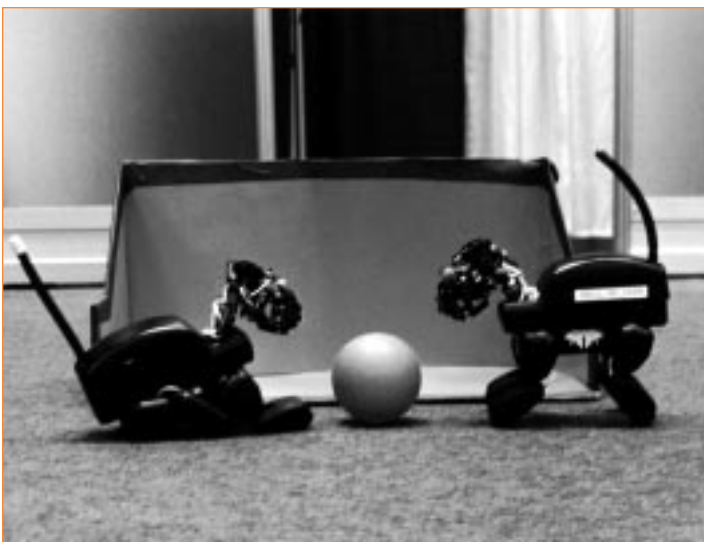*Peter Stone and Manuela Veloso*

Sunday, July 18,
9:00 AM–1:00 PM

Robotic soccer is a multi-agent domain consisting of teams of agents that need to collaborate in a real-time noisy, adversarial environment. As such, this exciting domain provides a myriad of AI research opportunities related to multi-agent systems, machine learning, real time planning, opponent modeling, intelligent robotics, and several other current AI topics.

This tutorial will be of interest to AI researchers and practitioners concerned with real-time multi-agent systems, including entertainment domains. Robotic soccer is a specific, focused domain that is challenging enough to require innovative technical solutions. As the domain embodies several characteristics of general interest, many of these technical solutions will generalize to other domains. We plan to take special care to identify future research opportunities. Participants in this tutorial do not need to have previous familiarity with robotic soccer.

Peter Stone is a post-doctoral fellow in the computer science department at Carnegie Mellon University. He received his Ph.D in computer science from Carnegie Mellon University in 1998. His research interests include planning and machine learning, particularly in multi-agent systems. Stone has been a central figure in the creation of the robotic soccer world cup (RoboCup) initiative, currently serving as the chair of the RoboCup 99 simulator committee.

Manuela M. Veloso is an associate professor of computer science at Carnegie Mellon University. She received her Ph.D in computer science from Carnegie Mellon University in 1992. She received a B.S. degree in electrical engineering in 1980 and an M.Sc. in electrical engineering in 1984 from the Instituto Superior Tecnico in Lisbon, as well as an M.A. in computer science in 1986 from Boston University. Veloso is the U.S. representative and founding member of the International Committee for the RoboCup International Federation.

Courtesy, Richard Skalsky

Statistical Methods in Natural Language Processing (MA3)

Lillian Lee and John Lafferty

Monday, July 19,
9:00 AM–1:00 PM

Natural language processing (NLP) is concerned with enabling computers to understand, extract information from, and generate human language. While many early NLP systems relied heavily on hand-crafted rules, during the past ten years a great deal of progress has been made using probabilistic methods that automatically and implicitly learn about language by extracting statistics from large quantities of text, thus reducing the knowledge acquisition bottleneck. Currently, statistical techniques have proven to be effective in a number of areas; as the computational capacity of computers improves and more natural language data becomes available on-line, statistical methods will become increasingly attractive and powerful in the future.

This tutorial will introduce some of the central themes and techniques that have emerged in statistical methods for natural language processing. Examples include the source-channel paradigm, predictive language models, and hidden Markov models. Selected case studies involving technologies such as word and document clustering, word sense disambiguation, parsing, and machine translation will also be presented. The material draws upon machine learning, statistics, and information theory, but only an elementary knowledge of probability will be assumed.

Lillian Lee is an assistant professor of computer science at Cornell University. She received an A.B. in mathematics and computer science from Cornell University in 1993 and a Ph.D in computer science from Harvard University in 1997. Her research interests are in language modeling, data clustering, statistical natural language processing, machine learning, and formal language theory.

John Lafferty received his Ph.D in mathematics from Princeton University in 1986, and taught in the mathematics department at Harvard University before joining the computer sciences department of the IBM Thomas J. Watson Research Center in Yorktown Heights as a Research Staff Member in 1988. Since 1994 he has been a member of the faculty of the School of Computer Science at Carnegie Mellon University, where he is currently an associate professor in the computer science department and Language Technologies Institute. His research interests include statistical methods for natural language, information retrieval, and coding and information theory.

Workshops

Participation in the workshop program is by invitation only. Registration is included in the AAAI-99 technical registration fee. All workshop participants must register for the AAAI-99 technical program, or in the case of the jointly sponsored workshop (W6), must register for either AAAI-99 or GECCO-99.

Artificial Intelligence for Electronic Commerce (W1)
Tim Finin (finin@cs.umbc.edu) and
Benjamin Grosof (grosof@us.ibm.com)
Sunday, July 18

Agent-Based Systems in the Business Context (W2)
Brian Drabble (drabble@cirl.uoregon.edu)
Monday, July 19

Artificial Intelligence for Distributed Information Networking (W3)
Sue Abu-Hakima (suhayya@amikanow.com) and
Steven Willmott (willmott@lia.di.epfl.ch)
Sunday, July 18

Computation with Neural Systems (W4)
Jim Austin (austin@cs.york.ac.uk)
Monday, July 19

Configuration (W5)
Boi Faltings (faltings@lia.di.epfl.ch),
Eugence C. Freuder (ecf@cs.unh.edu) and
Gerhard Friedrich (gerhard.friedrich@ifi.uni-klu.ac.at)
Monday, July 19

Data Mining with Evolutionary Algorithms: Research Directions (W6)
Jointly sponsored by GECCO-99
Alex Freitas (alex@ppgia.pucpr.br)
Sunday, July 18 (1/2-day workshop)

Environmental Decision Support Systems and Artificial Intelligence (W7)
Miguel Sanchez-Marre (miguel@lsi.upc.ef) and
Ulises Cortes (ia@lsi.upc.ef)
Sunday, July 18

Going Further with Agents' Conflicts: Definitions and Roles in Agents' Evolution (W8)
Catherine Tessier (catherine.tessier@cert.fr) and Laurent Chaudron
Sunday, July 18

Intelligent Information Systems (W9)
Kristian Hammond (hammond@ils.nwu.edu) and
Larry Birnbaum (birnbaum@ils.nwu.edu)
Sunday and Monday, July 18-19 (two-day workshop)

Intelligent Software Engineering (W10)
Aditya Ghose (aditya@uow.edu.au),
Tim Menzies (tim.menzies@ivv.nasa.gov) and
Ken Satoh (ksatoh@db-ei.eng.hokudai.ac.jp)
Monday, July 19

Exploring Synergies of Knowledge Management and Case-Based Reasoning (W11)
David Aha (aha@aic.nrl.navy.mil),
Irma Becerra-Fernandez (becferi@fiu.edu),
Frank Maurer (maurer@cpsc.ucalgary.ca), and
Hector Munoz-Avila (munoz@cs.umd.edu)
Monday, July 19

Machine Learning for Information Extraction (W12)
Mary Elaine Califf (mecalif@ilstu.edu)
Monday, July 19

Mixed-Initiative Intelligence (W13)
Michael T. Cox (mcox@cs.wright.edu)
Sunday, July 18

Negotiation: Settling Conflicts and Identifying Opportunities (W14)
Sandip Sen (sandip@kolkata.mcs.utulsa.edu)
Monday, July 19

Ontology Management (W15)
Adam Farquhar (afarquhar@slb.com) and
Kilian Stoffel (kilian.stoffel@seco.unine.ch)
Sunday, July 18

Reasoning in Context for AI Applications (W16)
Patrick Brezillon (patrick.brezillon@lip6.fr) and
Jean-Charles Pomerol (jean-charles.pomerol@lip6.fr)
Monday, July 19

Spatial and Temporal Reasoning for Collaborating Mobile Agents (W17)
Frank D. Anger (fanger@nsf.gov) and
Hans W. Guesgen (hans@cs.auckland.ac.nz)
Sunday, July 18

Registration Fees

The AAAI-99/IAAI-99 program registration includes admission to all technical sessions, invited talks, the Exhibition Program, the Intelligent Systems Demos, the Robot Competition and Exhibition, the Student Abstract and Poster Session, the Tutorial Forum, the Workshop Program (by invitation only), the opening reception, the AI Festival, and the *AAAI-99/IAAI-99 Conference Proceedings*. Onsite registration will be located on the first level of the Omni Rosen Hotel, 9840 International Drive, Orlando, Florida 32819.

Early Registration

(Postmarked by May 21)

AAAI Members	Regular $395	Students $120
Nonmembers	Regular $475	Students $185

Late Registration

(Postmarked by June 18)

AAAI Members	Regular $445	Students $145
Nonmembers	Regular $525	Students $210

Onsite Registration

(Postmarked after June 18 or onsite)

AAAI Members	Regular $495	Students $170
Nonmembers	Regular $575	Students $235

Robot Building Lab (RBL-99)

The Robot Building Lab registration includes admission to the Robot Building Lab and the Exhibition Program. Fees are $150 for members or nonmembers and $75 for students. Attendance is limited and early registration is strongly encouraged. Preregistration is required.

Payment Information

Prepayment of registration fees is required. Checks, international money orders, bank transfers, and traveler's checks must be in US dollars. American Express, MasterCard, VISA, and government purchase orders are also accepted. Registration applications postmarked after the early registration deadline will be subject to the late registration fees. Student registrations must be accompanied by proof of full-time student status.

Refund Requests

The deadline for refund requests is June 25, 1999. All refund requests must be made in writing. A $75 processing fee will be assessed for all refunds.

Registration Hours

Registration hours will be as follows:

Sunday and Monday, July 18-19: 7:30 AM–6:00 PM
Tuesday and Wednesday, July 20-21: 8:00 AM–6:00 PM
Thursday, July 22: 8:30 AM–2:00 PM.

All attendees must pick up their registration packets for admittance to programs.

General Information

AAAI-99 Hotel

AAAI has reserved a block of rooms at the Omni Rosen Hotel at reduced conference rates. Conference attendees must contact the hotel directly and identify themselves as National Conference on Artificial Intelligence (AAAI-99) registrants to qualify for the reduced rates. Important! Attendees must submit their name, address, fax and phone numbers when making reservations. Please note the cut-off date for reservations and the reservation method/information below. Hotel rooms are priced as singles (1 person, 1 bed), doubles (2 persons, 2 beds), triples (3 persons, 2 beds), or quads (4 persons, 2 beds). Rooms will be assigned on a first-come first-served basis. All rooms are subject to a 12% sales and resort tax.

The Omni Rosen Hotel
(Headquarters Hotel)
9840 International Drive
Orlando, FL 32819-8122
Reservations: 1-800-204-7234
Telephone: 407-996-9840
Fax: 407-996-3169
Single: $119
Double: $119
Triple: $139
Quad: $159
Check-in time: 3:00 PM
Check-out time: 11:00 AM
Distance to center: adjacent
Cut-off date for reservations: 5:00 PM CDT, June 18, 1999

All reservation requests must be accompanied by a first night room deposit including tax, or guaranteed with a major credit card. Checks, money orders, and credit cards are acceptable forms of deposit funds. The hotel will not hold any reservations unless guaranteed by one of the above methods. All reservation requests will require a one night's advance deposit that will be refundable only if the reservation is cancelled at least three days prior to the arrival date, and a cancellation number is obtained.

Participants in the AAAI-99 Student Programs will be sent information about alternate housing in their registration packets.

Air Transportation and Car Rental

Orlando, Florida—Get there for less! Discounted fares have been negotiated for this event. Call Conventions in America at 800-929-4242 and ask for Group #428. You will receive five percent to ten percent off the lowest applicable fares on American Airlines and Delta Airlines, or the guaranteed lowest available fare on any carrier. Take an additional five percent off if you purchase at least sixty days prior to departure. Travel between July 15 and July 25, 1999. All attendees booking through CIA will receive free flight insurance. Avis Rent A Car is also offering special low rates with unlimited mileage. Call Conventions in America at 800-929-4242, ask for Group #428. Reservation hours: Monday–Friday, 6:30 AM–5:00 PM Pacific Time. Outside US and Canada, call 619-232-4298/Fax 619-232-6497. E-mail address flycia@scitravel.com. If you call direct: American 800-433-1790, ask for index #11398; Delta 800-241-6760, ask for file #121974A; Avis 800-331-1600, AWD #J949010.

Ground Transportation

The following information is the best available at press time. Please confirm fares when making reservations.

Taxi

Taxis are available at Orlando International Airport. Approximate fare from the airport to downtown Orlando is $25.

Bus

Greyhound Bus—For information on fares and scheduling, call 800-231-2222.

City Transit System

I-Ride trackless trolley service provides transportation along International Drive from the Belz Factory Outlet to Sea World. I-Ride operates seven days a week from 7 AM to midnight, every 15 minutes. The fare is $.75 per person per trip, and free for children 12 and under. An unlimited pass is available in one, three, five and seven day increments. For information call 407-354-5656. In addition, Lynx is a citywide bus transit service for the greater metropolitan Orlando area. The fare is $.85 per person per trip; hours vary. For information call 407-841-8240.

Train

Amtrak/Auto Train—For information on fares and scheduling, call 800-USA-RAIL.

Parking

The Omni Rosen Hotel provides a complimentary covered parking garage.

Courtesy, Orlando Convention and Visitors Bureau

Orlando Visitor Information

The Orlando Convention & Visitors Bureau welcomes you to Orlando! They can assist with dining reservations, directions, tour bookings, entertainment suggestions, transportation, and hotel information. Maps and brochures are available.

Official Visitor Center

8723 International Drive, Suite 101
(At the corner of International Drive and Austrian Court)
Orlando, FL 32819
Telephone: 407-363-5872
Open daily: 8:00 AM–6:00 PM for tickets,
8:00 AM–7:00 PM for information
URL: http//www.Go2orlando.com

Please consult the AAAI web site and your registration confirmation letter for special offers on Orlando attractions!

Disclaimer

In offering American Airlines, Avis Rent A Car, Conventions in America, Delta Airlines, Omni Rosen Hotel, and all other service providers (hereinafter referred to as "Supplier(s)" for the National Conference on Artificial Intelligence and the Innovative Applications Conference), AAAI acts only in the capacity of agent for the Suppliers which are the providers of the service. Because AAAI has no control over the personnel, equipment or operations or providers of accommodations or other services included as part of the AAAI-99 / IAAI-99 program, AAAI assumes no responsibility for and will not be liable for any personal delay, inconveniences or other damage suffered by conference participants which may arise by reason of (1) any wrongful or negligent acts or omissions on the part of any Supplier or its employees, (2) any defect in or failure of any vehicle, equipment or instrumentality owned, operated or otherwise used by any Supplier, or (3) any wrongful or negligent acts or omissions on the part of any other party not under the control, direct or otherwise, of AAAI.

Preregistration Form

Name_____ Company/Univ. _____
☐ Home ☐ Work

Address _____ Dept./MS _____

City _____ State _____ Zip _____

Country _____ Daytime Telephone & Fax _____

Membership No. _____ E-mail Address _____

Circle fees that apply. Students must submit registration receipt or letter from faculty advisor.	AAAI Member	AAAI Student Member	Nonmember	Nonmember Student	TOTAL
AAAI-99/IAAI-99 Early Registration (Postmarked by May 21, 1999)	$395	$120	$475	$185	_____
AAAI-99/IAAI-99 Late Registration (Postmarked by June 18, 1999)	$445	$145	$525	$210	_____
AAAI-99 / IAAI-99 Onsite Registration (Postmarked after June 18, 1999 or onsite)	$495	$170	$575	235	_____
Tutorial Forum (Included in Technical Registation Fee above) Circle all courses you plan to attend. Limit: 4 consecutive tutorials.	7/18 AM SA1 SA2 SA3	7/18 PM SP1 SP2 SP3	7/19 AM MA1 MA2 MA3	7/19 PM MP1 MP2 MP3	
Robot Building Lab	$150 (Regular)	$75.00 (Student)			_____
AAAI-99 Opening Reception	Spouse, or guest @ $15.00 per person; child @ $5.00		_____ No. Persons		_____
AAAI-99 Festival	Spouse, or guest @ $20.00 per person; child @ $5.00		_____ No. Persons		_____
AAAI Membership / Journals	(totals continued from reverse)				_____
AAAI-99 Workshops	Included in technical registration fee above Workshop Number(s) _____				_____
	Participation is by invitation only. Do not register for workshops unless you have been invited to participate by the workshop organizer.				

Method of Payment (Circle One):

MC   Visa   Amex   Check (payable to AAAI-99 and drawn on a US Bank)   US Govt. PO

Card Number _____ Exp. Date _____

Name (as it appears on card) _____ Signature _____

Total Enclosed

_____

All refund requests must be made in writing by June 25, 1999. A $75.00 processing fee will be assessed for all refunds.

Registrations postmarked after June 18 are subject to on-site rates.

On-site registration will be on the first level of the Omni Rosen Hotel, 9840 International Drive, Orlando, Florida 32819.

Send with payment to AAAI-99 / IAAI–99 445 Burgess Drive, Menlo Park, CA 94025-3442. 650/328-3123; Fax 650/321-4457

AAAI Membership Application / Renewal

Now it's even easier to become a member of the AAAI. Just fill out and mail both sides of this form, and we'll ensure that you receive all the benefits that thousands of members worldwide enjoy each year.

Here are just a few of the benefits you'll receive:

- *AI Magazine*
- AAAI Electronic Library Access
- Reduced rates on selected AI-related journals and publications

Information about all of AAAI's events and programs, including:

- Spring and Fall Symposium Series
- AAAI Press Publications
- Conference on Innovative Applications
- Tutorial Program
- Exhibit Program
- AAAI Student Programs
- Technical Program of the National Conference on Artificial Intelligence
- AAAI–Sponsored Workshops

Take the initiative to join the association that will keep you informed about the latest developments in your exciting field.

Renew your membership or become a member of the AAAI today.

Application Type

☐ New Application

☐ Change of Address

☐ Renewal

(Please include your membership number on the reverse side of this form)

☐ Do not include me in the *Membership Directory*

☐ Do not release my name to outside groups

☐ I am interested in the following subgroup

☐ AI in Medicine   ☐ AI and the Law

☐ AI in Manufacturing   ☐ AI in Business

Journals *(Offer limited to individuals only).*

☐ Send me the 1999 *AI Journal*.
   I enclose an additional $116.00.

☐ Send me the 1999 *Machine Learning Journal*.
   I enclose an additional $170.00.

Membership Categories

Please circle desired term and amount

Individual US / Canadian Member

One Year	Three Year	Five Year	Life
$50	$150	$250	$700

Individual Foreign Member

One Year	Three Year	Five Year	Life
$75	$225	$375	$1000

Institution / Library—US / Canadian

One Year	Three Year	Five Year	Life
$75	$225	$375	n/a

Institution / Library—Foreign

One Year	Three Year	Five Year	Life
$100	$300	$500	n/a

Full-Time US/Canadian Student

One Year	Three Year	Five Year	Life
$20	n/a	n/a	n/a

Full-Time Foreign Student

One Year	Three Year	Five Year	Life
$45	n/a	n/a	n/a

Order cannot be processed if information is incomplete or illegible. Student applicants must send legible proof of student status, i.e., a letter from your faculty advisor verifying full-time enrollment in a degree-bearing program, or a copy of your current registration receipt. Prepayment is required for all orders. Memberships begin with the next published issue of AI Magazine.

Be sure to enter your complete name and address on the reverse side of this form!

Amount

_____

(Enter here and on reverse)

CHIkids

CHIkids Information

If you are interested in receiving registration information regarding CHIkids, please fill out the information request form below. Registration information will be mailed to you immediately. Please note registration will be on a first-come, first-served basis. Space is limited, and there will be **no** onsite registration. A waiting list will be formed if all spaces are filled. Waiting list registrants will be notified if space becomes available. All preconference registration requests after June 15, 1999 will be considered on a space available basis. Registration fee will be $70 per day, and includes a daily lunch and CHIkids T-shirt. Children may register by the day or for the entire conference, Sunday–Thursday, for $350.00.

Please return this form no later than June 15, 1999 to
AAAI • 445 Burgess Drive • Menlo Park, California 94025 • USA • (Fax: 650-321-4457)

CHIkids@AAAI Information Request Form

I am interested in learning more about CHIkids@AAAI

Parent(s)Name(s):_____

Child(ren)'s Name(s): _____

_____

Address: _____

City:_____

State: _____ Zip: _____

Country: _____

Telephone: _____ Fax: _____

E-mail address: _____

For further information regarding the AAAI-sponsored CHIkids technology program, please contact:
   Angela Boltman
   CHIkids@AAAI Chair
   E-mail: aboltman@umiacs.umd.edu
   Voice: 301-484-2157
   Fax: 301-405-6707

Orlando Map

ORLANDO
Orlando/Orange County Convention & Visitors Bureau, Inc.
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N

I-4 EAST
ALTAMONTE DR.
48 • Dog Track • Jai Alai
ALTAMONTE SPRINGS
47
EATON-VILLE
WINTER PARK
PARK AVE.
FAIRBANKS
45
527 ALOMA AVE.
SEMINOLE CO.
ORANGE CO.
UNIVERSITY OF CENTRAL FLORIDA
PRINCETON
43
ORLANDO ART MUSEUM
ORLANDO SCIENCE CENTER
50
CENTRAL FLORIDA FAIRGROUNDS
EXPO CENTER
ORLANDO ARENA
COLONIAL DR.
41
ORLANDO EXECUTIVE AIRPORT
EAST-WEST EXPRESSWAY
38 Church Street Station
FLORIDA CITRUS BOWL
36
CHURCH ST. HISTORICAL DISTRICT
BOB CARR AUDITORIUM
CHURCH STREET STATION
UNIVERSITY STUDIOS FLORIDA
ORLANDO
33
HOFFNER RD.
TURNPIKE
31 TURNPIKE
439
30B Universal Studios
30A Int'l Drive Wet 'n Wild
WET 'N WILD
SAND LAKE RD.
482
HOSPITAL
29
506 436
BEE LINE EXPRESSWAY
ORANGE COUNTY CONVENTION CENTER
527
Entrance
North Exit
ORLANDO INTERNATIONAL AIRPORT
535
POST OFFICE
28 • Sea World • Airport
27A Sea World
CENTRAL FLORIDA PKWY.
VISTA BLVD.
SEA WORLD OF FLORIDA
423
South Exit
WALT DISNEY WORLD
HOTEL PLAZA BLVD.
27 Lake Buena Vista
INTERNATIONAL DR.
Official Visitor Center
Purchase discounted tickets here.
535
26AB EPCOT WDW
536
441 17 92
CENTRAL FLORIDA GREENEWAY
ORANGE CO. OSCEOLA CO.
192
25B Walt Disney World
25A Kissimmee
424
OSCEOLA PKWY.
545
24E
525
530
15
4
192 VINE ST.
27
532
KISSIMMEE MUNICIPAL AIRPORT
523
23 Cypress Gardens
TO TAMPA
I-4 WEST
KISSIMMEE
525
525
531
535
523

WINTER GARDEN-VINELAND RD.
FLORIDA'S TURNPIKE
APOPKA-VINELAND RD.
KIRKMAN RD.
TURKEY LAKE RD.
WORLD DR.
POINCIANA BLVD.
JOHN YOUNG PKWY.
ORANGE BLOSSOM TR.
ORANGE AVE.
MILLS AVE.
CONWAY RD.
SEMORAN BLVD.
BOGGY CREEK RD.
TRADEPORT DR.
NARCOOSSEE ROAD
CENTRAL FLORIDA GREENEWAY
FLORIDA'S TURNPIKE
BOGGY CREEK ROAD
LEE RD.
EDGEWATER DR.

50 STATE ROAD
528 TOLL ROAD
17 92 U.S. HIGHWAY
4 INTERSTATE
506 COUNTY ROAD

Map courtesy of Orlando/Orange County Convention & Visitors Bureau, Inc.

Conference at a Glance

MORNING	AFTERNOON	EVENING
Sunday, July 18		
Registration	Registration	Special Java Tutorial SP4
Tutorial Forum	Tutorial Forum	
Workshops	Workshops	
AAAI/SIGART DC	AAAI/SIGART DC	
RBL-99	RBL-99	
Monday, July 19		
Registration	Registration	AAAI-99 Opening Reception
IAAI-99	IAAI-99	Mentoring Tutorial MP4
Tutorial Forum	Tutorial Forum	1999 Fellows Dinner
Workshops	Workshops	
AAAI/SIGART DC	AAAI/SIGART DC	
RBL-99	RBL-99	
Tuesday, July 20		
Registration	Registration	Program Committee Dinner
Keynote Address and Invited Talks	Invited Presentations	
AAAI-99 & IAAI-99	AAAI-99 & IAAI-99	
Exhibition / IS Demos	Exhibition / IS Demos	
Robot Competition	Robot Competition	
Wednesday, July 21		
Registration	Registration	AI Festival
AAAI-99 & IAAI-99	AAAI-99 & IAAI-99	
Invited Presentations	Invited Presentations	Student Poster Session
Exhibition / IS Demos	Exhibition / IS Demos	Exhibition / IS Demos
Robot Competition	Robot Competition	Robot Competition
Thursday, July 22		
Registration	Registration	
AAAI-99	AAAI-99	
Keynote Address	Invited Presentations	
Invited Talks		