

Preface

Please Join Us for AAAI-97!

The National Conference on Artificial Intelligence is the major occasion of the year for AI researchers and practitioners in North America to gather, interact, learn about recent progress, present our own latest results, give and receive feedback, and generally share our excitement about the amazing adventure that is artificial intelligence.

The National Conference serves three major roles for the AI community. First, it serves the needs of current and future technical specialists. Second, it provides continuing professional education, allowing specialists and practitioners to broaden their knowledge of this complex and changing field. Third, it educates the public about AI by providing ways for researchers in certain areas to demonstrate the state of on-going research.

The technical specialists of today and tomorrow are served by the papers in the Proceedings you hold in your hands, and by the many technical sessions at which these papers are presented and discussed. IAAI-97, of course, is an integral part of AAAI-97, providing extremely important cross-fertilization between researchers and application developers. Many additional papers are presented, and issues discussed, in the 14 technical workshops hosted by AAAI-97, open to specialized audiences by invitation only.

The AAAI-97 technical program covers a wide range of disciplines, methodologies, and presentation styles. No single best paper can do justice to the different types of excellence that contribute to AI. However, certain exemplary papers are particularly fine examples of the combination of substantial content and lucid presentation that we all should strive for. Therefore, the Senior Program Committee and the Program CoChairs have selected the following as Best Papers for AAAI-97. (Listed in order of time of presentation at the conference.)

- Fast Context Switching in Real-time Propositional Reasoning. *P. Pandurang Nayak and Brian C. Williams.* (Tuesday, 11:40)
- Optimal Triangulations Via Minimal Vertex Separators. *Kirill Shoikhet and Dan Geiger.* (Tuesday, 2:00)
- Statistical Parsing with a Context-free Grammar and Word Statistics. *Eugene Charniak.* (Wednesday, 4:30)
- Building Concept Representations from Reusable Components. *Peter Clark and Bruce Porter.* (Thursday, 10:30)

The Student Abstract and Poster Program serves future technical specialists by providing an opportunity for students to present and discuss their work during its early stages, meet peers with related interests, and introduce themselves to more senior members of the field. It is also a wonderful opportunity for all of us to get acquainted with some of the up-and-coming talent and their new research ideas. Also for students is the SIGART/AAAI Doctoral Consortium program -- a small, focused gathering that allows selected students to present their work to a faculty panel and to their peers for discussion and practical advice.

Continuing professional education includes the three-day series of invited talks, starting with the Keynote Address entitled, "I Growing Up: The Changes and Opportunities," to be presented by James Allen of the University of Rochester. There are many other exciting invited talks, including reports on highlights from the UAI, ML, KR, and KDD conferences.

The popular Tutorial Forum, introduced at AAAI-96, also continues this year, with a single admission allowing participation in up to four (4) tutorials during two full days. This year, among other topics will be "Belief Networks and Decision-Theoretic Reasoning for AI," "Mobile Robot Control Architectures," "Physics-Based Modeling for Vision and Virtual Human Animation," and "Data Mining."

The Robot Building Lab is an opportunity for AAAI attendees from across the range of AI to experience the excitement and frustration of building robots that interact with the physical world. Even knowing in principle the difficulties of mapping real-world sensor data onto symbolic descriptions and then to physical actions, one learns an enormous amount by building and programming a Lego robot to participate in a tournament or exhibition of skill.

Educating the public about the importance and value of science and engineering is an increasingly important role for scientific conferences. The AAAI Mobile Robot Competition has been extraordinarily successful in this over the years. A large number of academic and industrial research groups bring robots, tools, computers, and teams of researchers to experience the thrill of victory and the agony of defeat as their robots compete to perform ever more challenging tasks. This year, the robots will demonstrate their latest earth-bound skills at vacuuming rooms, finding TV remote controls, and serving hors d'oeuvres, and their latest extra-terrestrial skills at discovering life on Mars. (Simulated, we

expect.) This event attracts a large audience of spectators and external media interested in how real robots perform.

This year, AAAI-97 inaugurates a new public education event. At the Hall of Champions, many of the best computer players of classic games of strategy including chess, checkers, go, bridge, scrabble and backgammon will demonstrate their skill. Each will play a public challenge match against some of the best human players in the world. Each will be available for AAAI-97 attendees and the general public to compete with the programs, and discuss technical and social issues with their authors. Both the Hall of Champions and the Robot Competition stimulate the best efforts of top research groups, as well as educating the public. Both events will present their results and discuss their significance as part of the invited speaker track.

An enormous number of people contributed their time, effort, and brilliance to the success of this conference. First, of course, are the authors of the technical papers contributed to AAAI-97, which are the life's blood of the field. Second are the members of the Program Committee who reviewed these papers with care, and the members of the Senior Program Committee who supervised the reviewing and worked out the difficult cases. Their names are listed in this volume.

The reviewer preference and assignment software was developed and updated by Ramesh Patil, and maintained by Rick Skalsky. The CoChairs of the Tutorial Forum are Bart Selman and Brian Williams. The Student Abstract and Poster Chair is Polly Pook, and the Doctoral Consortium organizers are Vibhu Mittal and Loren Terveen. The Workshop Chair is Ray Mooney. The Robot Building Lab is organized by David Miller. The Mobile Robot Competition is organized by Ron Arkin and Jim Firby, and the Hall of Champions was created and organized by Matt Ginsberg. Finally, the organization could not have worked without the help of Carol Hamilton and the able staff at AAAI.

The field of artificial intelligence remains one of the most exciting intellectual adventures of this and the next century. The field is diverse, innovative, controversial, full of hard problems and fascinating solutions. The National Conference is a focus for that excitement. Welcome to AAAI-97.

Ben Kuipers and Bonnie Webber
Program Cochairs, AAAI-97

Please Join Us for IAAI-97

The Ninth Annual Conference on Innovative Applications of Artificial Intelligence (IAAI-97) continues the IAAI tradition of case studies of deployed applications with measurable benefits whose value depends on the use of AI technology. In addition, IAAI-97, for the first time, augments these case studies with papers that address emerging areas of AI technology or applications. It also includes several invited talks organized around this same theme of emerging areas. IAAI is organized as an independent program within the National Conference, and the schedules are coordinated, 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.

A key goal of IAAI-97 is to promote a rewarding dialog between basic and applied AI. Basic AI research benefits by learning about challenges of real-world domains and difficulties and successes in applying AI techniques to real business problems. AI applications developers benefit from learning about new AI techniques that will enable the next generation of applications.

IAAI-97 showcases 11 winners of the "Innovative Application Award." These applications are the most impressive AI applications of the past year. They are selected for their demonstrated business value and their technical innovation. 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. Organizations honored this year are leading businesses and government agencies from the US, Europe, and Asia.

Three of this year's award winning applications solve transportation scheduling problems. The CREWS_NS system schedules the work of 5000 people for the Dutch Railways, and was developed by ISCOG - Sistemas Cognitivos Lda. Union Pacific Railroad uses their Rail Train Scheduler, developed with Brightware, Inc., to schedule the replacement and repair of tracks. Several trucking companies in Singapore use SunRay V, developed with Clarity Systems Pte Ltd, to manage their operations. Two award winners address planning, scheduling, and layout problems. The Hyundai Engineering and Construction Co., Ltd., in Korea, uses their FASTrak-APT system to plan large apartment construction projects. A major French bank, "La Caisse d'Epargne" uses STHANA, developed with Isoft, to analyze the profitability of different locations for automated teller machines (ATM's). Four applications address key regulatory compliance and eligibility determination which involve issues at the forefront of public policy debates. ChemReg is used by Air Products and Chemicals, Inc. to support compliance with

regulatory requirements for communicating health and safety information in the shipping and handling of chemical products. DISXPERT is used by the New York State Education Department to determine eligibility for social security vocational rehabilitation services. Fannie Mae uses their Desktop Underwriter for mortgage underwriting. And Oxford Health Plans uses their Provider Selection Tool to aid clients to select a health care provider. The final two award winning applications are used by major computer manufacturers to provide product support. The IBM Corporation uses its RESTORE application to support its AS/400 products, and Hewlett Packard uses PIMTOOL to troubleshoot hardware failures in its high-end servers.

The incorporation of diverse advances in AI technology into deployed applications continues. This years' innovations include the first deployment of case based reasoning that includes case adaptation as well as case retrieval, the continuing combination of multiple techniques in a single application (e.g., rule-based and case-based reasoning, or planning combined with scheduling), as well as natural language and vision based applications. We also are seeing deployment over the World Wide Web, reminding us once again that AI techniques are most useful in the context of overall trends in information technology.

This year completes the changes instituted last year to integrate IAAI with the AAAI technical program, reflecting the importance of interactions between applications and research in our field. A new track, Emerging Applications and Technologies, has been added to "bridge the gap" between AI research and AI applications development. Papers in this track describe efforts whose goal is the engineering of AI applications, and which inform AI researchers about the utility of specific AI techniques for and constraints imposed by applications domains and/or AI applications developers about tools, techniques, or methods that will enable the next generation of new and more powerful applications. These papers include several that were originally submitted to the AAAI-97 technical program but which fit better with the themes of IAAI.

These emerging application and technology papers also cover a broad range of AI techniques and application domains. We have papers applying AI techniques to information extraction, complex systems design, military simulation, large scale diagnosis, space, knowledge management and multi-media, using AI technologies such as agents, robotics,

vision, natural language, and planning. We hope and expect that some of these applications and these technologies will develop into fully deployed AI applications in the near future.

IAAI-97 also includes several invited talks which address key areas in which we expect to see AI applied in the near future. Alexa McCray of the National Library of Medicine will discuss the essential issue in information retrieval (IR) - making sense of language - in her talk entitled "Taming the Jabberwock." Jack Mostow of Carnegie-Mellon University will discuss uses of AI in education. Rich Doyle of the Jet Propulsion Laboratory will discuss uses of AI in combination with other technologies for autonomous spacecraft. A final invited talk, "Recent Advances in KDD" will discuss the current state of this exciting and active area, Knowledge Discovery and Data Mining, illustrated by highlights of the 1997 International Conference on Knowledge Discovery and Data Mining. These last two talks are cosponsored with the AAAI technical program as they are of interest to both researchers and application developers. The invited talks are organized around the following common themes and questions: (1) technical background - what AI techniques are applicable to this area ? (2) current breakthroughs - what has happened recently to make applications feasible in this area ? (3) emerging applications - what are some sample applications that are beginning to appear ? (4) barriers - what are the remaining technical and institutional roadblocks to widespread use of AI in this area ? (5) strategies for progress - what can and should the AI community do to overcome these barriers ?

Overall, IAAI-97 offers a diverse mix that is truly representative of how AI is being used today and how it will likely be used tomorrow. The papers in these Proceedings reaffirm the continuing value of AI as a key enabling technology for intelligent information systems and provide evidence that this value will continue to increase as current AI research is applied in the future to a varied set of application domains.

Ted E. Senator
Program Chair

Bruce G. Buchanan
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