

Preface

The National Conference on Artificial Intelligence is the main yearly occasion for a broad spectrum of AI researchers to gather together, share results, and recharge the enthusiasm needed to spend another year fighting the day-to-day technical battles that are the “99% perspiration” part of AI research —the conference provides some of the “1% inspiration” (which is fortunate, since we don’t need any more perspiration in July!).

This volume is the permanent record of the technical program of the conference, which is the backbone of the meeting. The 143 papers reproduced here were selected out of 475 submissions by a rigorous double-blind referee process, which we describe in more detail below.

The reviewing process would not have been possible without the supporting software developed by Ramesh Patil and diligently maintained at the AAAI office by Rick Skalsky. Ramesh has volunteered his time for this task year after year, greatly above and beyond the call of duty.

Like Ramesh, all the members of the Conference Committee are volunteers who have taken time from their own research and other agendas to help make this conference a success. Thank you.

We would also like to thank Carol Hamilton, Executive Director of AAAI, and all of her able staff at the AAAI office for their competent support and unflappable good humor throughout all aspects of organizing the conference.

How the Review Process Works

Careful review is one of AAAI’s most important functions in the AI research community and entails a considerable investment of resources to assign, review, and discuss each paper. Including actual expenses, such as meetings and office staff time, and unpaid reviewer time, each paper costs hundreds of dollars to review on average.

Each paper was assigned to a supervising member of the Senior Program Committee and three members of the AAAI-98 Program Committee, all selected for their relevant expertise. To support impartiality, conflicts of interest are checked during paper assignment and reviewers are not told the identity of paper authors.

Selecting qualified reviewers for each paper is obviously key to obtaining high-quality reviews. AAAI has evolved a semi-automated, web-based mechanism for this purpose. Authors submit paper titles and abstracts electronically along with keywords from a predefined list. Reviewers then examine these online entries (without author identification) and

“bid” for the papers they are most qualified for and would most like to review. Ramesh Patil’s software then performs a global assignment algorithm to assign as many papers as possible to the best qualified reviewers. In cases where a paper has too few bids, the algorithm falls back on a reviewer profile in which each reviewer has rated his/her expertise in each keyword area. Finally, the Program Cochairs meet in January to review all the assignments with special attention to keyword-only matches.

Each of the three members of the Program Committee initially wrote independent reviews of each paper and emailed them to the supervising member of the Senior Program Committee. Once all the reviews for a given paper were completed, the reviewers exchanged and discussed their reviews, in some cases at great length. Based on this discussion (and in some cases after writing his or her own review or obtaining an additional reviewer), the supervising member recommended whether to accept the paper. The entire Senior Program Committee then met in person with the Program Cochairs for a weekend in March to discuss problematic papers and make final decisions. For some papers, additional reviews were written during this meeting by Senior Program Committee members to clarify the reasons for decisions that might not be obvious from the initial reviews.

Generally speaking, an AAAI paper should clearly present an interesting idea with convincing evidence that it significantly advances the field by solving an important new problem or improving over previous approaches. Reviews often include suggestions for how the paper can be improved; we hope authors use them as a guide both in revising their AAAI submissions and for future research and presentation.

We are very proud of the seriousness and dedication of everyone who participated in the reviewing process. On behalf of the whole research community, we thank them for their work.

Conference Events

In addition to continuing the popular regular events and the successful Hall of Champions experiment initiated last year, this year’s program included several innovations—the Integrated AI Systems track, the Intelligent Systems Demonstrations, and an invited panel of chairs from the collocated conferences.

Integrated AI Systems. An important force holding our field together is the shared goal of building “artificial intelligences” that perform valued activities in real environments by integrat-

ing capabilities from AI's diverse subdisciplines. To encourage and support the development of such systems, the AAAI-98 conference program included a special track for papers about systems that integrate methods from multiple AI subdisciplines. These submissions were reviewed by a specially selected pool of reviewers, headed by Milind Tambe, who were sensitive to the challenges of presenting this kind of work in a conference format. Quality standards for this track were high: out of 20 submitted papers, 6 were accepted for presentation, including one which received an Outstanding Paper award.

Intelligent Systems Demonstrations The purpose of the Intelligent Systems Demonstrations, organized by George Ferguson and Randy Jones, was primarily to encourage the early exhibition of research prototypes. Each demonstration was attended by someone, usually the architect of the system, who could answer in-depth technical questions. Submissions to this program were reviewed on the basis of their innovation, relevance, scientific contribution, and presentation. A special invitation was made to authors of accepted papers.

Collocated Conferences

- Eighth International Conference on Inductive Logic Programming (ILP '98), July 22-24, 1998
- Third Annual Genetic Programming Conference (GP-98), July 22-25, 1998
- Symposium on Genetic Algorithms (SGA-98), July 22-25, 1998
- Eleventh Annual Conference on Computational Learning Theory (COLT '98), July 24-26, 1998
- Fifteenth International Conference on Machine Learning (ICML '98), July 24-26, 1998
- Fourteenth Annual Conference on Uncertainty in Artificial Intelligence (UAI-98), July 24-26, 1998
- Eighth Annual Meeting of the Society for Text and Discourse (ST&D98), July 29-31, 1998
- Twentieth Annual Meeting of the Cognitive Science Society, August 1-4, 1998

The eight organizations above chose to hold their meetings in Madison contiguous with AAAI-98 this year. In honor of this special occasion, we invited a chairperson from each of these conferences to join a panel on the opening morning of AAAI-98 to answer the following question: What is the most important recent result/experiment/discovery in the area of your conference that the general AI audience doesn't know/understand/appreciate, but should (and why)?

We hope this event will stimulate further public discussion about how the relationship between the National Conference on AI and the—now many—subfield conferences might evolve in the future.

Finally, just to let you know that this job can have its lighter moments, we would like to end by sharing with you the most amusing referee comment we received:

This paper generated enough interest in me to spend far more time criticizing it than I should have. Perhaps AAAI attendees should be given the same pleasure.

(We won't tell you whether the paper was accepted or not!)

— *Jack Mostow and Charles Rich*
AAAI-98 Program Cochairs

IAAI-98

The Tenth Annual Conference on Innovative Applications of Artificial Intelligence (IAAI-98) 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-98 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 schedules 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.

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-98 will address the full range of AI techniques including knowledge-based systems, natural language, and vision.

IAAI-98 showcases the deployed applications on the first day. 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 education, the military, networking, spacecraft, medicine, games, the stock market, and more. AI techniques include, among others, planning, natural language processing, diagnostic reasoning, and cognitive simulation.

— *Bruce G. Buchanan, Program Chair & Ramasamy Uthurusamy, Program Cochair*