AI Magazine Volume 19 Number 1 (1998) (© AAAI)

Introduction to This Special Issue

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The ninth annual meeting of the Innovative Applications of Artificial Intelligence (IAAI-97) Conference was held as an independent program of the Fourteenth National Conference on Artificial Intelligence (AAAI-97) in Providence, Rhode Island, on 28–30 July 1997. This meeting represented the most significant transformation in the history of IAAI. IAAI-97 consisted of two paper tracks as well as invited talks and panels. The first paper track, Deployed-Application Case Studies, comprised papers about deployed AI systems that are relied on for operations and have clearly defined business value. This track was equivalent to previous IAAI programs. The deployed applications track's standards for innovation recognize four types: (1) first application of an AI technique in a deployed application, (2) application of an AI technique to a new domain, (3) a high business payoff, and (4) a novel integration of techniques. Deployment is equally strict: An application must be relied on for real business decisions and have a measurable benefit, there must be a minimum of several months of use, and it must be used by people other than its developers. The second track, added in 1997, consisted of emerging applications and technologies. It was added to bridge the gap between deployed applications and AI research. Its goal was to promote a dialog between AI research and AI applications by filling the gap with papers devoted to AI technologies and emerging applications. A common program committee selected papers for each of the tracks according to distinct sets of review criteria.

IAAI-97 continued the evolution of IAAI from an independent conference through a collocated conference with separate registrations to a fully integrated independent program of the National Conference on AI. The organizers' goal was to contribute to a unified AI field that ranges from scientific research through engineering technology to application development but recognizes distinct motivations and success criteria. We wanted to provide researchers with case studies of successful applications of their ideas and real application problem descriptions that could motivate further advances. We wanted to provide technologists with an opportunity to present new opportunities for more powerful applications and with feedback from successful attempts to deploy AI technology. We wanted to provide application developers with exposure to new technological opportunities and new research ideas. Finally, in line with the original motivation for IAAI, we wanted to continue to recognize application developers and business users for their successful efforts in applying AI technologies and to continue to demonstrate the economic benefits of AI. Based on feedback provided by conference attendees, IAAI-97 achieved these goals.

Award-winning deployed applications in 1997 fell into the areas of scheduling (3), planning-layout (2), regulatory compliance (4), and computer diagnosis (2). Table 1 presents a cumulative list of IAAI award winner domains, using the historical categories.

Some areas in which we have previously seen deployed applications were represented only in the emerging areas track this year, namely, military simulation and planning, space, large-scale diagnosis, complex systems design, and information extraction-retrieval and classification, using AI techniques such as agents, robotics, vision, natural language, and planning. Telephony applications have become almost routine and were not represented in 1997. New areas such as knowledge management and multimedia also appeared in the emerging applications track. The emerging areas track included some applications built around well-known AI research projects such as SOAR and PRODIGY as well as promising application-oriented projects that have not yet been deployed. Our invited talks and panel supplemented the emerging areas track and included talks on knowledge discovery in databases, information retrieval, spacecraft autonomy, AI and education, and knowledge management, all fruitful areas for future deployed applications.

This issue contains updated versions of five papers describing deployed AI applications from IAAI-97, each of which was selected because it was a clear and illustrative example of the deployment and innovation criteria. The system described by Kyoung Jun Lee and his colleagues in "Case- and Constraint-Based Project Planning for Apartment Construction" integrates physical layout with project scheduling using a combination of AI techniques. It augments network-based project-planning techniques with knowledge of physical constraints and past experience, represented as cases. It is used by the Hyundai Engineering and Construction Company to provide a competitive advantage in submitting bids and training new employees and has achieved an order-of-magnitude decrease in time for several planning tasks. The system described by Kirk Wilson in "CHEMREG: Using Case-Based Reasoning to Support Health and Safety Compliance in the Chemical Industry" applies case-based reasoning to a complex regulatory domain, namely, the transportation of hazardous materials. Both these systems use case adaptation as well as case retrieval. "MITA: An Information-Extraction Approach to the Analysis of Free-Form Text in Life Insurance Applications," by Barry Glasgow and his colleagues, describes the use of information-extraction techniques to classify textual respons-

Application Domain	1989–1996	1997	Total
Manufacturing-design	30		30
Business operations	26	6	32
Finance	25	1	26
Telephony	12		12
Diagnostics and troubleshooting	11	2	13
Claims processing and auditing	10	2	12
Information retrieval and classification	9		9
Computers and software engineering	8		8
Military	6		6
Space	4		4

Table 1. A Cumulative List of IAAI Award-Winner Domains.

es on life insurance applications.[1] MITA currently processes 20,000 applications a month; it is a front end that potentially enables automated underwriting in the insurance industry. "An Intelligent System for Case Review and Risk Assessment in Social Services," by James Nolan, describes DISXPERT, which uses knowledge engineering and rule-induction techniques to evaluate disability applications in New York State; it is an extremely powerful example of the potential for service improvement and standardization by large-scale deployment and distribution of a system based on well-known AI techniques. Its use has resulted not only in productivity improvements but also more effective disability assessments. "CREWS_NS: Scheduling Train Crews in The Netherlands," by Ernesto Morgado and João Martins, describes an application that instantiates a task-specific tool. CREWS was developed as a generic crew-scheduling tool over several years, beginning on Lisp machines, migrating to UNIX, and finally porting to NT. Its successful application in CREWS_NS is resulting in opportunities for use by other organizations. CREWS_NS has resulted in an order-of-magnitude decrease in scheduling time, a reduction in annual personnel costs of $4 million, and the preservation of specialized knowledge.

Common themes of all these applications are the traditional benefit from AI systems of knowledge dissemination to an organization, integration of multiple AI techniques, and integration of the application with not only the information systems environment but also the business users' environment. From a technology perspective, this year saw the first deployments of case-based reasoning systems that used case adaptation, use of techniques from data mining, and web deployment. A trend toward task-specific AI shells (for example, CREWS), in addition to the more generic reasoning shells that predominated previously, might be forming. Changes in the information system environment, from mainframes to networked workstations and now the web, have been reflected in the applications we have selected for IAAI. Finally, as AI is becoming more embedded and integrated, it is more useful but less visible, which is a sign of a maturing technology.

Much of the difficulty in creating an AI application comes from the complexity of the environment in which the application must operate. This environment is typically part of a large information system, which in itself is part of a business user organization. Issues faced by application developers include not only selection, trade-offs, and integration of appropriate AI techniques but also integration into the information system environment and the business environment in which the system is to be used. AI research has benefited from the challenge of creating integrated artifacts that can exist in a complex environment; successful AI applications have, of necessity, faced and overcome similar challenges.

IAAI has benefited over the years from the long-term commitments and efforts of many program committee members; their role in providing a stable evolution of the conference has been essential to its success, and I would like to thank them once again for their efforts with regard to IAAI-97. I believe that the revitalized IAAI structure will serve the entire AI community as we move forward to 1998 and beyond, discovering new insights, developing new technologies, and providing useful capabilities.

Note

1. This application was presented as part of the Emerging Areas Track because it had not been deployed sufficiently at the time of review; it met the criteria in time for the conference and will receive the Innovative Application Award next year.