

Special Issue on Innovative Applications of AI

Guest Editor's Introduction

Randall W. Hill, Jr. and Neil Jacobstein

We are pleased to publish this special selection of articles from the Sixteenth Annual Conference on Innovative Applications of Artificial Intelligence (IAAI-04), which occurred July 27–29, 2004 in San Jose, California. IAAI is the premier venue for learning about AI's impact through deployed applications and emerging AI technologies. Case studies of deployed applications with measurable benefits arising from the use of AI technology provide clear evidence of the impact and value of AI technology to today's world. The emerging applications track features technologies that are rapidly maturing to the point of application. The seven articles selected for this special issue are extended versions of the papers that appeared at the conference. Four of the articles describe deployed applications that are already in use in the field. The other three articles, which are from the emerging technology track, were selected because they are particularly innovative and show great potential for deployment.

Deployed Applications

The General Motors Variation-Reduction Adviser by Alexander P. Morgan, John A. Cafeo, Kurt Godden, Ronald M. Lesperance, Andrea M. Simon, Deborah L. McGuinness, and James L. Benedict is a knowledge system built on case-based reasoning principles that is currently in use in a dozen General Motors Assembly Centers. One of the keys to the system's success was to take seriously the user feedback on early prototypes. That step resulted in a product that enables manufacturing plant employees to communicate across shifts, keep track of updates to

equipment and work done, and provide a repository of best practices. The key AI enabler for this application is ontology-guided search using domain-specific ontologies.

Danny Oh and Chew Lim Tan (Making Better Recommendations with Online Profiling Agents) describe an application that makes real estate recommendations with an online profiling system. With a small amount of prior knowledge and human-provided input they were able to dramatically speed up online learning over an approach that starts with the profiling agent knowing nothing. Using its prior knowledge or "experiences" about the real estate domain, the application effectively assists users in identifying requirements, especially unstated ones, quickly and unobtrusively.

Nestor Rychtyckyj (Ergonomics Analysis for Vehicle Assembly Using Artificial Intelligence) describes an AI application deployed at Ford Motor Company that analyzes potential ergonomic concerns at the company's assembly plants. The benefit of the system is to reduce the significant costs associated with workplace injuries and lost productivity due to bad ergonomic design. The ergonomics analysis system is credited with stopping hundreds of process sheets with potential ergonomic problems, resulting in significant savings by avoiding injury costs.

William Cheatham's article, "Tenth Anniversary of the Plastics Color Formulation Tool," describes a case-based reasoning tool that determines color formulas that match requested colors. This tool, called *FormTool*, has been in use for ten years and saved GE millions of dollars in productivity and material (such as colorant) costs. The technology developed in *FormTool* was subsequently used to create an on-line color selection tool called *ColorXpress Select*.

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Emerging Applications

"VModel: A Visual Qualitative Modeling Environment for Middle-School Students," by Ken Forbus, Karen Carney, Bruce L. Sherin, and Leo C. Ureel II, describes a system that uses visual representations to enable middle-school students to create qualitative models. Software coaches use simple analyses of model structure plus qualitative simulation to provide feedback and explanations. VModel has been used in several studies in Chicago Public School classrooms, with curricula developed in collaboration with teachers. Evidence from the school studies indicates VModel is successful in helping students.

In their article, "Identifying Terrorist Activity with AI Plan Recognition Technology," Peter Jarvis, Teresa Lunt, and Karen Myers describe the application of plan recognition techniques to support human intelligence analysts in processing national security alert sets by automatically identifying the hostile intent behind them. Identifying the intent enables the system to both prioritize and explain the alert sets for succinct user presentation. An empirical evaluation demonstrates that the approach can handle alert sets of as many as 20 elements and can readily distinguish between false and true alarms.

Robert Wray, John Laird, Andrew Nuxoll, Devvan Stokes and Alex Kerfoot's article, "Synthetic Adversaries for Urban Combat Training,"

describes the requirements for simulating adversaries for urban combat training. The criteria for success included competence, taskability, fidelity, variability, transparency and efficiency. Their agents, called *MOUTBots*, use the Soar architecture as the engine for knowledge representation and execution and a commercial computer game to define, implement and test basic behavior representation requirements and these components.



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