

Introduction to the Articles on Innovative Applications of Artificial Intelligence

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■ *This issue of AI Magazine provides extended versions of several papers that were recently presented at the Innovative Applications of Artificial Intelligence Conference (IAAI-2010). We present three articles reflecting deployed applications of AI, one describing a unique, emerging application, plus an article based on the invited talk by Jay M. Tenenbaum, who was the 2010 Engelmore Award recipient.*

The Innovative Applications of Artificial Intelligence (IAAI) conference was founded in 1989 with the goal of documenting the progress that has been made in integrating AI applications into the real world. Throughout the ensuing 21 years we have been witness to a vast array of different AI-based systems that showcased how AI technology can be deployed to solve critical real-world problems and provide benefits to people around the world. We are proud to continue this tradition with the presentation of five articles from the Twenty Second IAAI conference that was held in Atlanta, Georgia, from July 11–14, 2010.

We were especially honored to have Jay M. (Marty) Tenenbaum accept the Robert S. Engelmore Memorial Award for his exceptional contributions to AI in computer vision and manufacturing as well as his visionary role in the birth of electronic commerce. This issue of *AI Magazine* includes an article based on his lecture *Cancer: A Computational Disease That AI Can Cure*. In this article, Jay Tenenbaum and Jeff Shrager provide a personal view of their work in the development of an AI-based system that addresses the challenge of helping to find a cure for cancer.

As a cancer survivor himself, Tenenbaum has a unique insight into the shortcomings of current approaches to treating this disease. He was diagnosed with metastatic melanoma over a decade

ago and needed to make critical decisions about his treatment without having access to all of the relevant knowledge about his disease and possible treatments. This technology was just not available at that time. After his successful treatment, Tenenbaum started CollabRx to help cancer patients make these decisions by providing them and their physicians with access to knowledge about their particular type of cancer and potential treatments. Cancer Commons is a family of web-based rapid learning communities where physicians, scientists, and patients collaborate to individualize each patient's therapy. Using both semantic web knowledge representation techniques and machine-learning algorithms, Cancer Commons provides an intelligent methodology to help find effective individual treatments for cancer. The goal of finding a cure for cancer is certainly a worthy addition to being one of the great challenges of AI and demonstrates how AI is making a positive contribution for the common good of people around the world.

The three deployed application articles show how diverse and prevalent AI technology has become. In *Optimizing Limousine Service with AI*, Andy Hon Wai Chun describes an application that is being used in Hong Kong by a limousine company to assist travel planners in creating schedules for their drivers. The dynamic nature of the business requires that schedules be modified as travel conditions change and this application uses a constraint-based approach to create schedules that meet all of the constraints in a timely manner. The deployment of this application has allowed the company to handle a 100 percent increase in the number of weekly orders without needing any additional planners.

Anton Leuski and David Traum describe their work in building a natural language-processing component for virtual humans in the article *NPCEditor: Creating a Virtual Human Dialogue Using Information Retrieval Techniques*. Virtual human applications use artificial characters that can interact with humans through speech and by exhibiting characteristics such as gestures and emotion. These systems have been deployed as museum guides, foreign language tutors, and training simulators. This article describes a system that provides a user-friendly editor to help create effective virtual humans quickly by using statistical language classification technology to map user input text to system responses. The NPCEditor has been applied in a number of virtual human applications, including SGT Star for Army recruiting and virtual museum guides at the Boston Museum of Science.

Ayse Tosun Misirli, Ayse Bener, and Resat Kale address the difficult problem of predicting defects in software releases in their article *AI-Based Software Defect Predictors: Applications and Benefits*

in a Case Study. This article describes a learning-based software defect prediction system deployed at a large telecommunications company in Turkey. The system employs a naïve Bayes classifier to predict the probability that a software module is defect free based on its attributes, enabling the software testing group to concentrate their limited resources on modules that are most likely to contain defects. This approach reduces code inspection effort by more than 70 percent.

We also include an emerging technologies article that demonstrates innovative applications of AI that are well on their way to becoming deployed applications. Written by Laura Rassbach, Elizabeth Bradley, and Ken Anderson, *Providing Decision Support for Cosmogenic Isotope Dating* describes an AI-based system that uses argumentation to assist geologists in the unique task of dating geological landforms. This system, known as *Calvin*, uses an argumentation framework and a system of confidence that represents the quality of heuristics and the strength of evidence in a two-dimensional vector. Calvin is in use and has also been tested against a number of previous studies, where it produced arguments that were identical to, or similar to, geologists' arguments in over 80 percent of the cases.

We are grateful to the authors and *AI Magazine* for including these articles and for the opportunity to highlight how AI is being used in real-world applications. IAAI and *AI Magazine* provide a unique venue for documenting, publicizing, and advancing the development of AI applications, and we encourage everyone involved in similar efforts to submit a paper to a future IAAI conference.

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