

Introduction to the Special Issue on Innovative Applications of Artificial Intelligence (IAAI 2008)

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- *This special issue of AI Magazine covers select applications from the IAAI conference held in 2008 in Chicago, Illinois. The articles address a broad range of very challenging issues and contain great lessons for AI researchers and application developers.*

Your vacuum cleaner roams around your home at night. Your rice cooker, toaster, and washing machine have their own minds. Your car parks itself; its transmission adapts itself to your driving preferences, and it tells the dealership which parts it thinks it will need to have replaced three months from now. Your PDA knows your preferences and acts as your personal radio station, playing only music you like. You use a search engine that is capable of looking through billions of documents with new documents being added every millisecond. Semiautonomous rovers are driving around on Mars. There is a virtual person on the phone, tirelessly trying to help you. You still cannot beat the AI in your kid's video game.

None of this technology is perfect and we certainly have a lot more to research and understand, but, in terms of intelligent applications, we already have accomplished a considerable amount and seem to be on the right track. While we have not achieved human-level intelligence in its entirety (and it is arguable whether we need it), we can argue that some of the applica-

tions we built have approached it in certain, very limited areas.

The goal of the Innovative Applications of Artificial Intelligence (IAAI) conference is to highlight new, innovative systems and application areas of AI technology and to point out the often-overlooked difficulties involved in deploying complex technology to end users. Those of us who have ventured out of the realm of pure research and tried to build applications to be used by our fellow humans realize that it takes a lot more than just brilliant algorithms to make an application survive in the real world. Each application that succeeds is worth celebrating, and the teams behind them are due wholehearted congratulations.

It is in this spirit that we bring you this special issue covering select applications from the IAAI conference held last year in Chicago. We think the articles address a broad range of very challenging issues and contain great lessons for fellow AI researchers and application developers.

The first article is by Chris Urmson and his colleagues from the Carnegie Mellon Tartan Racing team. They were the winners of the DARPA Urban Challenge in 2007. In this article, they

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describe the technology behind Boss (a modified 2007 Chevy Tahoe) and the impact of various design decisions on their performance at the Urban Challenge.

The second article by Seth Goldstein and his colleagues (also from Carnegie Mellon University) describes the concept of a rather innovative new material: claytronics. This is essentially the "stuff" science fiction is made of. Similar to the way audio and video are used for rendering sound and moving images over distances, pario—of which claytronics is a sample—is for remotely rendering arbitrary three-dimensional physical shapes. Claytronics implements large numbers of sub-millimeter-sized spherical robots that act in a coordinated fashion. The article describes the motivation, technology, and challenges; provides an analysis of the feasibility of the concept; and describes what has been achieved so far.

David Wilson and his colleagues from the University of North Carolina describe a system that supports low-income families in choosing public schools. The application addresses one of the lesser-utilized aspects in the 2001 No Child Left Behind Act: the right to change schools if the school in which the student is currently enrolled does not make adequate yearly progress. Very few families know

about this opportunity and even fewer are able to leverage it to their child's benefit. This recommender system helps families to select a school that matches the needs, interests, talents, and abilities of each particular student.

The fourth article in this special issue addresses how AI can be used as a framework to teach English as a foreign language. Jiyou Jia from Peking University describes how he leverages Computer Simulation in Educational Communication (CSIEC), an intelligent, web-based human-computer dialogue system, to provide a virtual chatting partner for students. The system contains several scenarios to train students in English conversation and give them feedback.

Lewis Johnson and Andre Valente from Alelo Inc. describe their Tactical Language and Culture Training System (TLCTS) that can be used to develop interactive, gamelike scenarios to train users in foreign languages and cultures. Their framework was utilized to develop systems such as Tactical Iraqi, Tactical Pashto, and Tactical French and has been used by 25,000 users (mostly U.S. marines and soldiers) so far.

Robert Morris and his colleagues describe NASA and USGS's collaborative effort to create a global map of Earth using Landsat 5 and Landsat 7 images.

The problem they are facing is to automatically filter, select, and merge partial images from these satellites to create one global map of uniform quality.

Christian von Lücken and Ricardo Brunelli from the National University of Asunción in Paraguay deal with more earthly issues. They address the problem farmers face when they try to optimize yield with respect to soil characteristics, crop type, fertilization, and liming. Choosing the right crop for a field greatly affects the farmer's earnings and can reduce the need for soil treatment and environmental damages.

We would like to point out that this selection of articles contains only a few of the extremely interesting set of articles presented at IAAI 2008 in Chicago and encourage our readers to have a look at the proceedings of AAAI/IAAI 2008. We also want to strongly encourage our readers to submit descriptions of their own applications to the Innovative Applications of Artificial Intelligence conferences.

We hope you enjoy this selection of articles from IAAI 2008.

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