



# Artificial Intelligence in China

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In this special issue, AI researchers in China aim to share recent research contributions and developments with the international community. We've particularly emphasized research topics with unique Chinese roots (either cultural or language related) or those with significant technical contributions from Chinese researchers, and perspectives of Chinese AI researchers on active research areas and popular schools of thought.

On the basis of suggestions from the *IEEE Intelligent Systems* editorial board, we took a dual approach to this issue to both broaden community participation and realize the maximum impact of this collaborative endeavor. In early 2007, we distributed an open call for papers to the Chinese AI and computer science communities. Two publication outlets for the same thematic topic were offered: a special issue of *IS* on AI in China, and a special issue of *Communications of the China Computer Federation (CCF)*, a research magazine widely read by Chinese computer science researchers and practitioners. Many top AI researchers in China responded positively and contributed articles. All submissions were reviewed and processed following the peer-review and paper-processing guidelines of *IS*. Accepted papers written in Chinese appeared

in the August 2008 *Communications of the CCF*,<sup>1</sup> which has met with substantial success owing to the interest it has generated in the Chinese AI research community over a short period of time. A selected subset of papers written in English (some of them overlap in content with the Chinese version) constitute this special issue of *IS*.

## The AI Debate

In several research circles, including those in China, AI has been associated with controversy. Some extreme views state that AI is "a dead-end street" with a dim future. Critics give many reasons for these pessimistic viewpoints, but two stand out. First, from a basic scientific or philosophical standpoint, some researchers have deep doubts or directly deny the grand vision that machine intelligence could advance enough

to perform the functions of human intelligence. Second, owing to overly optimistic views and unrealized promises from the early days of AI, some researchers refuse to believe that it can ever deliver significant, practical value.

We disagree with both viewpoints.

First, AI research has shown in both theory and practice that machine intelligence can partially substitute human intelligence. In addition, developments of practical significance (in the application areas of planning and scheduling, for example) are important by themselves, making debates about the equivalence or nonequivalence of machine and human intelligence largely irrelevant. Second, early visions of AI should serve to motivate, accelerate, and broaden research. In areas ranging from combinatorial optimization and information overload

to the Internet and Web science, and from practical applications to the drive for individual and societal development, we see the critical need for cutting-edge AI research.

Since AI's beginnings in the mid-'50s, it has accomplished a great deal. Yet it also faces new challenges, many of which were brought about by computer networks and the virtualization of many facets of human life. In today's environment, individuals, groups, and societies are submerged in a sea of information. To survive and excel, we must extend our cognitive capabilities and intelligence. If we consider the transition from an agricultural society to an industrialized society as a consequence of the extension of human physical capabilities through machinery, electrical systems, and automation, then we can safely project that the next leap in human society will be to a knowledge society through the extension of human intelligence via information networks and the adoption of intelligent technologies. AI will obviously play a central role in this transition. In such a sense, AI research is not a dead-end street. Rather, AI could play a pivotal role in a history-changing junction of societal evolution, and AI researchers are charged with enormous responsibilities.

### In This Issue

This special issue contains eight contributions. The first article, "AI in China: A Survey," by Xiao-shan Gao and his colleagues, discusses various research activities in China in 10 areas of AI. The second, "50 Years of Image Processing and Pattern Recognition in China," by Nanning Zheng, Qubo You, Gaofeng Meng, Jihua Zhu, Shaoyi Du, and Jianyi Liu, looks at one of China's most active AI subfields.

Natural language processing has been a research hotspot for years, and processing Chinese poses unique challenges. "Chinese R&D in Natural Language Technology," by Chengqing Zong and Qinshi Gao, presents a review of language-processing research in China, with an emphasis on machine translation. "Machine Learning: The State of the Art," by Jue Wang and Qing Tao, presents Chinese perspectives on machine learning research and some of its key challenges. "The Creation Process of Chinese Calligraphy and Emulation of Imagery Thinking," by Jun Dong, Miao Xu, Xianjun Zhang, Yanqing Gao, and Yun-he Pan, covers material uniquely rooted in Chinese cultural and scientific research. Imag-

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ery thinking is a concept proposed by renowned Chinese scientist Hsen-Shen Tsien, and Chinese calligraphy is an art form with thousands of years of history.

"The Knowledge Grid Environment," by Hai Zhuge, discusses ongoing work on the Knowledge Grid platform, dynamic relations between individuals and communities, and the relation between the environment and socio-economic development, all in the context of knowledge sharing.

In the Applications department, "Intelligent-Commerce Research in China," Daniel Zeng, Fei-Yue Wang, Xiaolong Zheng, Yong Yuan, Guoqing Chen, and Jian Chen review recent AI research on e-commerce and online marketing related topics.

In the Expert Opinion department, "Toward a Revolution in Transportation Operations: AI for Complex Systems," Fei-Yue Wang discusses recent applications of AI-based techniques for control and management of large-scale open complex systems involving both engineering and social/behavioral operations. Urban transportation systems illustrate the use of the ACP (artificial, computational, parallel) approach, where modeling, analysis, and management are conducted through artificial systems, computational experiments, and parallel execution.

It's impossible, of course, to present a comprehensive review of all the ongoing AI research work in China. But we hope that this issue will serve to introduce the international research community to some of the key areas Chinese researchers are actively exploring. We also hope that researchers inside and outside China will discover unique research streams that attract their attention.

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### Reference

1. "AI Research in China," *Comm. China Computer Federation*, Aug. 2008.

