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AAAI President's Message

AI@50 We Are Golden!

Alan K. Mackworth

■ Artificial intelligence (AI), on the 50th anniversary of its naming, is an autonomous discipline. The field has an established record of success, as exemplified by three recent achievements presented at AAAI-06/IAAI-06. It is now mature enough to collaborate productively with its sister disciplines, realizing the dream of ubiquitous computational intelligence.

Happy golden anniversary, artificial intelligence! AI, a field still young as sciences go, is golden in achievement and promise. The 50th anniversary of the naming of our field, at Dartmouth College in 1956, is a time for reminiscence, celebration, and prognostication. We have great successes to celebrate, while most of our failures are along the lines of achieving successful results later than we had predicted in our youthful exuberance. Many of the philosophers who lectured us on what we would never be able to achieve have gone strangely silent.

In our early days, to build identity, recruitment, and morale, we often pumped up AI and sometimes slighted related fields, such as cybernetics and pattern recognition; however, this tactic had some unfortunate side effects including a tendency towards isolation. The divorce of AI from robotics was particularly harmful to both fields. Given both our success and our maturity as a field, we are now more open to collaboration and integration with our sister disciplines. This augurs well for the future. This collaboration will be a major theme over the next 50 years.

Perhaps by the time of our centennial celebration, we will have realized the vision elaborated by Richard Brautigan, in his poem "All Watched Over by Machines of Loving Grace" (Brautigan 1967),

> of a cybernetic meadow
> where mammals and computers
> live together in mutually
> programming harmony
> like pure water
> touching clear sky."

AI is a new autonomous science with its own paradigms. From Thomas Kuhn's perspective (Kuhn 1962), it is an interesting case study. Several of AI's subdisciplines have well-established paradigms. Researchers working within these paradigms share common models, without argument. They are practitioners of Kuhn's "normal" science—filling in boxes and finding new ones, within a shared framework. Other parts of our field seem to be in a state of perpetual revolution. Perhaps most common is a scheme of alternating periods of normal science and revolutionary struggle, with a frequency of alternation higher than that of other disciplines. All this struggle and debate demonstrates the health of the field. AI at 50 shows no signs of impending senility. This struck me particularly forcefully at AAAI-06 in Boston. The youthful enthusiasm and vigorous arguments of all the students and young researchers convinced me that AI, as a field, has a renewed vitality. Now that we need not be anxious about our status and independence, we can collaborate across disciplines without fear of losing our identity. Maybe this is the real meaning of "golden" for us.

One theme common in computer science is *ubiquitous computing*. I believe that AI has the potential to transform that theme to *ubiquitous computational intelligence*. Let me give you three examples of the emerging theme of ubiquitous computational intelligence, as illustrated by the talks of three speakers at AAAI-06/IAAI-06.

First, Tim Berners-Lee was the keynote speaker at AAAI-06. The web has transformed the global society, and AI already plays a significant role in that transformation. The synergy between the semantic web and AI technologies will further that transformation.

Second, Sebastian Thrun and the Stanford Racing Team designed and built Stanley, an autonomous vehicle. Thrun's invited talk at IAAI-06 documented the team's achievement in winning the DARPA Grand Challenge, a major breakthrough for intelligent robotics (see Thrun's article on this topic elsewhere in this issue—*ed.*). The science behind this victory integrated robotics, control, vision, and online AI. Like the web, robotics is another transformational technology. Sadly, the promise of robotics has not been fulfilled as rapidly as we had hoped: no need yet for Asimov's Laws of Robotics, alas. However, the Stanford team's work, both theoretical and practical, shows the way forward to building significant robotics technologies, such as intelligent cars and assistive robots for the disabled and elderly. This is an area of huge potential for AI and robotics researchers.

Third, Tuomas Sandholm gave an exciting IAAI-06 talk about his work on "expressive commerce" at CombineNet, where he and his team have demonstrated the enormous gains achievable with a synthesis of approaches from operations research, AI, constraint programming, and auction theory in e-commerce applications in satisfying commercial procurement sourcing and logistics requirements (Sandholm 2006). This work has already had a big impact, but its future impact will undoubtedly be greater in a global economy.

Each of these success stories demonstrates the coming theme of ubiquitous computational intelligence. Each also demonstrates the leverage gained by combining AI theory and practice with approaches from our sister disciplines.

So, AI at 50, relax and celebrate your golden anniversary. Your future, ubiquitous computational intelligence, is even brighter than your past!

References

Brautigan, R. 1967. All Watched Over by Machines of Loving Grace. In *All Watched Over by Machines of Loving Grace*. San Francisco: The Communication Company. Reprinted in *The Pill Versus the Springhill Mine Disaster* (San Francisco: Four Seasons Foundation, 1968).

Kuhn, T. S. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press, 1962.

Sandholm, T. 2006. Expressive Commerce and Its Application to Sourcing. In *Proceedings of the Twenty-First National Conference on Artificial Intelligence*, 1736–1743. Menlo Park, CA: AAAI Press.

Alan K. Mackworth is a professor of computer science, Canada Research Chair in Artificial Intelligence, and the founding director of the Laboratory for Computational Intelligence at the University of British Columbia. He received a B.A.Sc. (Toronto, 1966), A.M. (Harvard, 1967), and D.Phil. (Sussex, 1974). He has worked primarily on constraint-based artificial intelligence with applications in vision, constraint satisfaction, robot soccer, and constraint-based agents. He has served as chair of the IJCAI Board of Trustees and as president of the Canadian Society for Computational Studies of Intelligence; he is now president of AAAI.