

UIC Researchers Probe Computer 'Commonsense Knowledge'

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(PhysOrg.com) -- Challenge a simple pocket calculator at arithmetic and you may be left in the dust. But even the most sophisticated computer cannot match the reasoning of a youngster who looks outside, sees a fresh snowfall, and knows how to bundle up for the frosty outdoors.

For artificial intelligence scientists, enabling computers to have such human-level intelligence requires a commonsense knowledge base that can evolve and learn new things. But it's an elusive goal.

"It's been the Holy Grail of artificial intelligence research since its early days to answer questions that a young child can answer about the world," says Robert Sloan, professor and head of computer science at the University of Illinois at Chicago. "We're still a long way from that."

Sloan and colleague Gyorgy Turan, professor of mathematics, statistics and computer science at UIC, hope to build theoretical foundations that will bring artificial intelligence closer to everyday human reasoning. They were recently awarded a three-year, \$500,000 National Science Foundation grant to develop algorithms for use in building commonsense knowledge bases that can evolve.

"You can view this evolving process as a kind of learning about the world by a computer," said Turan. "Our task is to understand the problem, find useful mathematical models, understand the basic mathematical properties and, hopefully, provide some efficient computational methods and algorithms in those models."

Part of the work will involve looking at the construction of current Web-based commonsense knowledge base systems, such as Cycorp's "Cyc" and MIT's "Open Mind Common Sense," that allow any user to enter bits of knowledge considered relevant, useful or interesting.

Turan and Sloan will consider questions such as how to deal with contradictory information that is entered and how to organize knowledge in formats that are useful for deriving further knowledge.

"The issue is how to process new information that comes in over time," said Sloan. "One crisply defined algorithmic problem is how do you incorporate the new information both efficiently and in a reasonable way? Of course, defining the meaning of 'reasonable' is a challenging problem in itself."

The UIC researchers will work with graduate students and postdoctoral staff to concentrate on the interaction between different subtasks of evolving commonsense knowledge bases and on developing efficient computational methods.

Sloan and Turan hope their work will find applications in the [artificial intelligence](#) field, possibly through improved robots and other automated devices.

"Currently we're studying abstract mathematical versions of these problems, but we hope the conclusions will lead to useful, practical tools," said Turan.

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