Kolodner
3285
255-3810

CONTACT: John Toon/Ginger Pinholster
(404) 894-3444

LEARNING FROM EXPERIENCE: **For Immediate Release**

COMPUTERS MIMIC HUMAN REASONING; USE   **October 18, 1989**

PAST CASES TO SOLVE NEW PROBLEMS   Color/B&W Available

Humans often solve new problems by remembering how they handled similar situations in the past. At the Georgia Institute of Technology, computer scientists are teaching computers to mimic this approach through a technique called case-based reasoning.

Like humans, the Georgia Tech computers recall information about past cases and apply it to new problems. They can work with incomplete information, find workable -- though not always optimal -- answers, then adapt their solutions to changing conditions.

And they learn from each new situation, becoming more skilled with each problem they tackle and each mistake they make.

Computer scientists working on the project believe case-based reasoning may be an improvement over more traditional artificial intelligence techniques, offering a short-cut toward solving real world problems.

"People use case-based reasoning all the time," explained Dr. Janet Kolodner, professor in Georgia Tech's School of Information and Computer Science. "As you experience new problems and new kinds of situations, those get stored into memory, so you learn by remembering. If you didn't, you would have to go back to the beginning for each new problem."

Typical computer expert systems rely on a set of rules distilled from interviews with human experts. An expert system for organizing factory operations, for instance, uses rules provided by skilled operators, who often lean heavily on their recollections of specific cases.

"If you go interview experts and ask them how they do things, they tell you stories -- they don't give you rules," she said. "The people writing the systems have to turn those stories into rules, and it is difficult."

Instead of developing rules, however, the case-based approach stores information about a large number of cases directly into computer memory. With enough cases available, the computer can match almost any new problem to a similar case it has already "seen."

- more -

The computer's experience may not provide the exact solution for the new case, Kolodner noted, but it does offer a valuable starting point for solving the problem. Working interactively with the operator, the computer can then request additional information and suggest possible solutions until it finds one satisfactory to the human operator.

Because conditions change and new information may be found during the search, the computer is flexible enough to re-direct its approach without starting over.

Many expert systems are limited because they require that everything be known about the problem before it can be solved. In the real world, Kolodner pointed out, "we make assumptions, and depend on what we have done before. There are all sorts of things we do to make up for the fact that we are missing information."

At the other end of the process, expert systems often assume that they can find one perfect solution. In the real world, however, such ideal solutions may not exist -- or even be worth finding.

"It's not really necessary to compute the full range of solutions to come up with one that is satisfactory," Kolodner suggested. "You don't have to get the best answer as long as you get a good one. There are a lot of problems where we agonize over options where either way is really okay."

Human involvement is critical, Kolodner believes, because case-based reasoning is designed to supplement humans -- not replace them.

"In the old days of artificial intelligence, a lot of us thought intelligent programs were going to take over for people," she said. "What we have found is that we would rather have programs help people. There is always something wrong with what the machine does."

Tech researchers have several systems which use case-based reasoning. They include:

* JULIA, a menu planning system that finds recipes which meet certain conditions for ingredients, taste preferences and dietary requirements. The system learns from its mistakes: it would suggest combining beets with sweet potato pie only once. "It sometimes comes up with interesting things to cook, sometimes not," admitted Kolodner.

* PERSUADER, a mediation system that looks at how past disputes were solved. It suggested solutions to an impending bus system strike by finding a similar case and adapting it to higher cost of living conditions in the problem location.

* SUPERMOM, an activity planner that helps schedule a working mother's day. It schedules getting children off to school, doing the laundry and making sure mom gets to work on time. It must adapt to unexpected problems -- like a child who wakes up sick.

* MEDIC, a medical system for diagnosing pulmonary problems.

#