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[TITLE]

Searching for a method to maximize computer capabilities

[MAIN BODY]

Computers perform many processes and boast computing capabilities that far exceed those of humans, but they don't do things of their own volition. Computers have to be instructed on what to do through software. To maximize computer capabilities, my research focuses on "letting computers do everything they can do."

Using a computer to create diagrams

What's the best way for a computer to draw a diagram? I'm considering the following method. First, I convert the requirements to be met by a target diagram into numerous mathematical equations called "constraints." Constraints are similar to positional relations among people in a family tree—for example, children are positioned below parents and siblings are arranged at the same hierarchical level. A computer performs calculations to solve those mathematical equations and draws a diagram based on the answers obtained. But the calculations may not produce answers or may result in too many answers in some cases. That's because it's hard for humans to express the requirements to be met by a diagram as appropriate constraints. So, I implement priorities in constraints to let computers find answers easily. I do research on flexible calculation methods needed by computers to handle diagrams.

Making computers more convenient

The wide use of computers we see today is largely due to easy-to-use user interfaces. But using a computer to handle diagrams requires special mathematical knowledge, which imposes major burdens on programmers who develop user interfaces. To resolve this issue, I'm developing a library package that programmers can embed in their programs, drawing on the results of my previous research. I've recently developed an interest in designing a new programming language dedicated to special applications like simulating physical motions and chemical reactions. The programming language in use today uses the smallest set of commands possible. It has versatility, but also makes it necessary to describe detailed processing procedures to be performed by a computer. Conversely, for specialized applications, complex processing procedures can be embedded into the language. My goal is to maximize computer capabilities to make it possible for them to do everything we want them to do.

(Interviewed and summarized by Masumi Nasukawa)