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Research News

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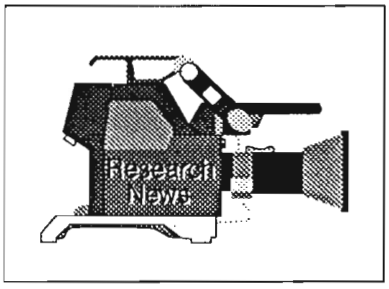

GEORGIA TECH VIDEO:

EXPLORING ALGORITHMS: SOMETIMES SEEING IS UNDERSTANDING

May 20, 1992

Imagine a drunken cockroach careening wildly among computer chips and brightly colored wiring -- the idea sounds like a "Saturday Night Live" skit or a computer technician's nightmare.

But John Stasko's "Drunken Cockroach" is far from a technical problem. It's one of about 50 algorithm animations the Georgia Institute of Technology assistant professor has collected and is making available free as learning and teaching aids to the academic and business worlds.

VISUALS AVAILABLE:

***Footage of a variety of algorithm animations running on computer**
***Dr. John Stasko using a computer to demonstrate various algorithm animations he has collected**
***Interview with Dr. Stasko**

"We are conveying information about computer programs and algorithms, giving people a concrete representation to explain what algorithms do," said Stasko, a faculty member in the College of Computing. "There is an element of movie-making or storytelling. You want to make a mini-film about what the program did."

Algorithms are detailed logical procedures made up of individual steps that, when executed in order, solve a problem. They may accomplish simple tasks, like the Drunken Cockroach's modeling of random walks people might take in a certain area. An algorithm might also sort a list of unordered numbers in a variety of ways. Computer scientists study why certain methods or algorithms are better than others.

But visualizing exactly what an algorithm accomplishes can be difficult. That's where animation becomes valuable. To demonstrate random paths, the Drunken Cockroach animation puts a white grid similar to a checkerboard on a computer screen.

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Squares get slightly darker each time they are included in a random path, showing which parts of the grid are crossed most often. Algorithms like the random walk can be used to simulate traffic in a computer network.

In another animation, spheres of different colors move randomly and quickly in a space, simulating the inside of a particle chamber. The particle chamber application might help a researcher who is developing a computer program to model molecules within such a chamber, Stasko said.

"For example, if all the spheres in the animation gather up in one corner, he'll know something's wrong with his program," said Stasko.

The animations Stasko has collected were developed by himself, students and other faculty members. They are accessible through an "anonymous ftp repository" -- people from all over the world can log on to a special account on Stasko's computer, which has no password and only provides access to the files publicly available. They retrieve the animations and run them on their own machines. The animations run on the UNIX operating system and the X Window System.

About 350 sites around the world, mostly universities, some businesses and some research institutes, have retrieved animations during the project's first year of operation. Stasko has spoken with people as far away as New Zealand and Israel who have retrieved algorithms.

"I provide it as an educational tool to use, but it wraps around and provides me valuable feedback on ways to make newer and better systems and what kinds of improvements can be made," he said.

In addition to making algorithm animations available to the public, Stasko is studying how they affect learning. He and colleagues from Georgia Tech and Georgia State University are testing students to explore whether and how such animations influence knowledge, understanding and comprehension.

The animations can be used for activities in addition to learning and teaching. Some Georgia Tech Ph.D. students who have developed new algorithms have animated their creations and videotaped the animations, showing the footage on job interviews.

"We're also trying to use the animations to help researchers get a better understanding of very complex algorithms," Stasko said. "These people often deal with large problems and frequently, to get an understanding, they doodle -- they draw pictures to get ideas."

But at some point the information can't be supported by drawings anymore. "If we can generate a way to give them animations, it might allow someone to get a visualization of something bigger, and maybe generate new ideas on algorithms," Stasko said.

If you are interested in reporting on this research and need more information or missed our Tuesday, May 19, 1992 satellite feed, please call David Kennedy at (404) 894-2453 or Lea McLees/John Toon at (404) 894-3444. Dr. Stasko can be reached at 853-9386. Our satellite feeds are scheduled 3 to 3:15 p.m. each Tuesday through May 26, 1992 at coordinates Westar 5, Transponder 24, Audio 6.2/6.8.