LABORATORY FOR COMPUTER SCIENCE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

PHYSICS OF COMPUTATION SEMINAR

Date: Thursday, February 24, 1994
Time: 11:00am
Place: 6-120

Cellular Automata Machines: Moving Towards Ultimate Computation

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The maximum computational density allowed by the laws of physics is available only in a format that mimics the basic spatial locality of physical law. Cellular Automata (CA) are fine-grained uniform computational systems with this kind of local interconnectivity.

Conventional computers are grotesquely inefficient at running these inherently efficient kinds of computations, and so discourage the development of CA models. To meet our own simulation needs, and to encourage others to investigate CA models, we have developed general-purpose CA machines which are optimized for studying large-scale CA systems.

Given a computing medium with a physics-like structure, it is only natural to use it first to model physics itself. In this talk, I will use our new CAM-8 machine to demonstrate some of the physical modeling tasks that CA's have been applied to, and will discuss some of the interesting practical and theoretical modeling challenges that remain.

This talk is part of a seminar series on adapting computers and computations to the constraints of, and opportunities afforded by, microphysics; and on the development and application of the physical theory of computation and information. This series is being sponsored by the MIT Information Mechanics Group (Lab for Computer Science), in conjunction with the MIT Physics and Media Group (Media Lab), the MIT Porous Flow Project (Earth, Atmospheric and Planetary Sciences), and the Mathematical Sciences Research Group at Thinking Machines Corporation.

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