LABORATORY FOR COMPUTER SCIENCE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

PHYSICS OF COMPUTATION SEMINAR

Date: Wednesday, May 11, 1994
Time: Refreshments at 4:00pm
Talk at **4:15pm**
Place: 6-120

Information Distance and Thermodynamics of Computation

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The ultimate thermodynamic cost in dissipated energy of computing is, by Landauer's principle, governed by the minimal number of irreversibly erased bits. It turns out that there is a quantitative relation between the ultimate thermodynamic cost of a computation and an absolute notion of information distance between objects (like input and output). This is quantified in terms of Kolmogorov complexity, a modern notion of the randomness in individual objects. People have been looking without success for an objective notion of cognitive distance to account for the intuitive notion of 'similarity' of pictures. Thermodynamic considerations lead to a recursively invariant notion of cognitive distances. It turns out that the information distance is a universal cognitive distance which discovers all effective features used by any cognitive distance whatsoever.

This is joint work with Charles Bennett, Péter Gács, Ming Li, and Wojciech Zurek.

Hosts: Norm Margolus, Tom Toffoli

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. If you would like to receive electronic notice of these seminars, send email to "poc@im.lcs.mit.edu."