

ICTS DISTINGUISHED LECTURE

Computational Complexity in Theory and in Practice

The quest for efficient algorithms is central both to theoretical computer science and to the practice of computing, but the metrics used in the two areas are different: theoreticians usually evaluate algorithms by their worst-case performance, whereas practitioners are more interested in empirical performance. This talk will contrast the two approaches through a series of examples. On the theory side, we will cover the complexity classes P and NP, NP-completeness, approximation algorithms and hardness of approximation. On the practical side, we will discuss satisfiability solvers, linear and integer programming, the traveling salesman problem, deep learning algorithms and game playing programs based on reinforcement learning.

Richard M. Karp

University of California, Berkeley

Richard Karp is one of the most influential computer scientists alive today. After bachelors, masters, and PhD at Harvard University, he joined the research staff at IBM T. J. Watson Research Centre, moving to Berkeley afterward. He is currently University Professor at UC Berkeley, with appointments in computer science & operations research. The unifying theme in Karp's work has been the study of combinatorial algorithms. His 1972 paper, "*Reducibility Among Combinatorial Problems*", showed that many of the most commonly studied combinatorial problems are NP-complete, and hence likely to be intractable. Much of his work has concerned parallel algorithms, the probabilistic analysis of combinatorial optimization algorithms and the construction of randomized algorithms for combinatorial problems. His current research activities center around algorithmic methods in genomics and computer networking. Honors and awards include U.S. National Medal of Science, Turing Award, Fulkerson Prize, Harvey Prize, Centennial Medal (Harvard), Kyoto Prize, Von Neumann Theory Prize, Distinguished Teaching Award (Berkeley) and Babbage Prize, among many others. He is a member of both the U.S. National Academies of Sciences as well as Engineering, the American Philosophical Society, the French Academy of Sciences, and a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, and the Association for Computing Machinery.

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ICTS Bengaluru

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