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Optimization by simulated annealing. (English) Zbl 1225.90162
Science 220, No. 4598, 671-680 (1983).

From the introduction: We briefly review the central constructs in combinatorial optimization and in statistical mechanics and then develop the similarities between the two fields. We show how the Metropolis algorithm for approximate numerical simulation of the behavior of a many-body system at a finite temperature provides a natural tool for bringing the techniques of statistical mechanics to bear on optimization.

We apply this point of view to a number of problems arising in optimal design of computers. Applications to partitioning, component placement, and wiring of electronic systems are described in this article. In each context, we introduce the problem and discuss the improvements available from optimization.

Of classic optimization problems, the traveling salesman problem has received the most intensive study. To test the power of simulated annealing, we use the algorithm on traveling salesman problems with as many as several thousand cities. This work is described in a final section, followed by our conclusions.

MSC:

- 90C59** Approximation methods and heuristics in mathematical programming
- 90C27** Combinatorial optimization
- 82C80** Numerical methods of time-dependent statistical mechanics (MSC2010)

Cited in **9** Reviews
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