



CSE Case Studies Seminar

S. Kirkpatrick et al.:

Optimization by Simulated Annealing

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What Is an Inverse Problem?

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Optimization by Simulated Annealing

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In this article 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

sure of the "goodness" of some complex system. The cost function depends on the detailed configuration of the many parts of that system. We are most familiar with optimization problems occurring in the physical design of computers, so examples used below are drawn from

with N , so that in practice exact solutions can be attempted only on problems involving a few hundred cities or less. The traveling salesman belongs to the large class of NP-complete (nondeterministic polynomial time complete) problems, which has received extensive study in the past 10 years (3). No method for exact solution with a computing effort bounded by a power of N has been found for any of these problems, but if such a solution were found, it could be mapped into a procedure for solving all members of the class. It is not known what features of the individual problems in the NP-complete class are the cause of their difficulty.

Since the NP-complete class of problems contains many situations of practical interest, heuristic methods have been developed with computational require-

Summary There is a deep and useful connection between statistical mechanics

[1]

What Is an Inverse Problem?

ambiguous_[1]

What Is an Inverse Problem?

wanted: $p(x|y)$ _[1]

Benefits of the INN Method

- Very good quantitative and qualitative results
- Relatively easy, cheap and straightforward to train

Challenges of the INN Method

- How to decide the intrinsic dimension of the data?
- How to decide splitting x into u_1 and u_2 ?
- How to decide permutation of the streams u_1 and u_2 between coupling layers?

My Take

My Take



References I



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