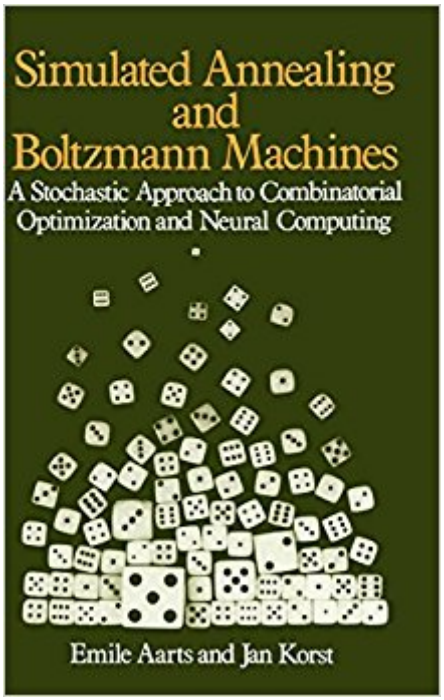
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Simulated Annealing And Boltzmann Machines: A Stochastic Approach To Combinatorial Optimization And Neural Computing



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Synopsis

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Book Information

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Customer Reviews

Introduces a method of solution for maximizing annealing, while minimizing cost, using massively parallel processing for quick execution. Establishes a correspondence between the free energy of the material being annealed and the cost function, and between the solutions and the physical states--the result is a solution method of combinatorial optimization based on a simulation of the annealing process. This method features general applicability and the ability to produce solutions arbitrarily close to an optimum. Part I treats the simulated annealing algorithm in detail. Part II addresses the problem of designing parallel annealing algorithms on the basis of Boltzmann machines.

Simulated Annealing and Boltzmann Machines A Stochastic Approach to Combinatorial Optimization and Neural Computing Emile Aarts, Philips Research Laboratories, Eindhoven, and Eindhoven University of Technology, The Netherlands Jan Korst, Philips Research Laboratories, Eindhoven, The Netherlands Simulated annealing is a solution method in the field of combinatorial optimization based on an analogy with the physical process of annealing. The method is generally applicable, and can obtain solutions arbitrarily close to an optimum. However, finding high quality solutions can require large computational effort. The computational effort required can be greatly reduced by using the computational model of the Boltzmann machine. This is a neural network model which belongs to the class of connectionist models. It is characterized by massive parallelism and distributed representations. These features lead to a conceptually simple yet powerful model, which can be seen as an architectural blueprint for future parallel computers which can cope with higher order optimization problems such as learning. This book brings together in one volume the theory of simulated annealing and the model of the Boltzmann machine. It combines a mathematical treatment with a clear view of the applications which are already possible and the exciting developments which are beginning. It will be of great interest to graduate students and researchers

in combinatorial optimization, numerical optimization, parallel processing, neural networks, computer science, artificial intelligence and automaton theory. Contents Preface Simulated Annealing Combinatorial Optimization Simulated Annealing Asymptotic Convergence Finite-Time Approximation Simulated Annealing in Practice Parallel Simulated Annealing Algorithms Boltzmann Machines Neural Computing Boltzmann Machines Combinatorial Optimization and Boltzmann Machines Classification and Boltzmann Machines Learning and Boltzmann Machines Appendix A: The EUR100 Instance Bibliography

I bought this book many years ago for the first half on simulated annealing because it was showing up in so many references on the subject. In about 90 pages it covers the theory (Metropolis algorithm, the Markov chain theory), shows how to apply it, suggests an algorithm to determine a good cooling schedule, and gives some example applications to combinatorial problems. The exposition is clear, the theory leads naturally into the practical material, and the results readily translate to computer algorithms. Consider this as a point of departure, though: in practice I have had to modify the suggested cooling schedule according to the problem being solved.This is the book I go to when developing a new simulated annealing solution to any problem. The price is exorbitant, though. If you can’t find it in a library, look for cheaper copies overseas.

R.H.J.M Otten and L.P.P.P van Ginneken The Annealing Algorithm Kluwer Academic Publisher

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