

Approximating the Partition Function of the Ising Model

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Abstract

Estimating the partition function Z of the ferromagnetic Ising model is a fundamental problem in statistical physics. It is known to be $\#\mathbf{P}$ -hard to compute Z exactly in the general case. There have been many efforts to approximate Z , especially using Markov chain Monte Carlo techniques. In this talk I'll present two new approximation algorithms to find Z that are based on the heuristic sampling method of Chen. These algorithms perform much better in practice than the best known algorithms, although a proof of such remains elusive. This is joint work with Isabel Beichl, Noah Streib, and Francis Sullivan.

Keywords: partition function, Ising model, Markov chain, Monte Carlo.