

Counting and sampling on lattices: A computer science perspective

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Sampling algorithms are used throughout the sciences to learn about large data sets, to estimate their cardinality, and to approximate statistical quantities associated with these sets. Markov chains provide a fundamental tool for achieving all of these objectives. This tutorial will present a primer for designing efficient sampling algorithm using Markov chains and analyzing their convergence times. We will focus on lattice models from statistical physics where mixing rates can be bounded using insights from the underlying combinatorial and statistical models.