



The University of Chicago
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STATISTICS COLLOQUIUM

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**Optimal Scaling vs. Optimal Design of MCMC
Algorithms: A Comparison**

MONDAY, February 27, 2012, at 4:00 PM

133 Eckhart Hall, 5734 S. University Avenue

Refreshments following the seminar in Eckhart 110.

ABSTRACT

(Markov Chain Monte Carlo) algorithms are an extremely powerful set of tools for sampling from complex probability distributions. Understanding and quantifying their behavior in high dimensions thus constitute an essential part of modern statistical inference. In this regard, most of the research efforts so far were focussed on obtaining estimates for the mixing times of the corresponding Markov chain. In this talk we will first introduce an important and often overlooked alternative approach called the ‘optimal scaling,’ where the key idea is to study the properties of the proposal distribution as a function of the dimension. This point of view gives us new insights on the behavior of the algorithm, such as precise estimates of the number of steps required to explore the target measure.

Although optimal scaling is extremely useful and is the prevailing theory used by practitioners, it turns out that in certain high dimensional problems the efficiency gain by adopting this point of view is only marginal. In the second part of the talk we will introduce yet another approach which we call the “optimal design” of proposals which leads to significant efficiency gain compared to the optimal scaling. We will discuss our recent results on high dimensional target measures arising in the context of statistical inference for mathematical models representing physical phenomena.

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