



THE UNIVERSITY OF CHICAGO

Departments of Computer Science, Mathematics, Statistics, and the Computation Institute
SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

PAUL DUPUIS

Division of Applied Mathematics
Brown University

Infinite Swapping Schemes for Accelerated Monte Carlo Approximation

THURSDAY, April 25, 2013, at 4:30 PM
Eckhart 133, 5734 S. University Avenue

ABSTRACT

The theory of large deviations has been used in the development of Monte Carlo methods for estimating quantities defined in terms of a specific rare event, such as ruin probabilities or buffer overflow probabilities. However, rare events also play an important role when estimating functionals of an invariant distribution, where straightforward simulation will converge very slowly when parts of the state space do not communicate well. Problems of this sort are common in statistical inference, engineering and the physical sciences. After reviewing some of the methods used to accelerate the convergence of Monte Carlo, we consider the use of the large deviation rate for the empirical measure as a performance measure and introduce a new class of algorithms (which we call infinite swapping schemes) that optimize this rate. Various interesting properties of the associated processes will be discussed and illustrated.

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