Computational phase transitions meet statistical physics

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2/16/2016 at 02:00 pm
Core A (Room 301)

Abstract

This talk looks at randomly sampling from a huge collection of objects, and
the associated approximate counting problems. The type of sampling/counting
problems we study arise in a variety of settings, for example, for inference in
graphical models and reconstruction of phylogenetic trees. We’ll focus on
combinatorial models where we can get a firm grasp on when these count-
ing/sampling problems can be efficiently solved or when it is intractable even
to obtain a rough estimate in the worst case. We’ll see a computational phase
transition which occurs between efficiency and inapproximability. A beautiful
connection arises: the critical point for this computational phase transition
on general graphs is identical to the critical point for a classical statistical
physics phase transition on infinite, regular trees.

Bio

Eric Vigoda received his PhD in CS from UC Berkeley in 1999. After
postdoc stints at the University of Edinburgh and Weizmann Institute, Eric
was a faculty member at the University of Chicago for 2002-4. Since 2004,
Eric has been on the faculty at Georgia Tech. His work with M. Jerrum and
A. Sinclair presenting a Markov Chain Monte Carlo (MCMC) algorithm for
the permanent of a non-negative matrix won a Fulkerson Prize in 2006.

Faculty Host: Eric Allender