



**The Center for Control, Dynamical Systems, and Computation
University of California at Santa Barbara
Fall 2008 Seminar Series
Presents**

**Randomized optimization with an expected value
criterion: Finite sample bounds and applications**

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Abstract:

Simulated annealing, Markov Chain Monte Carlo, and genetic algorithms are all randomized methods that can be used in practice to solve (albeit approximately) complex optimization problems. They rely on constructing appropriate Markov chains, whose stationary distribution concentrates on “good” parts of the parameter space (i.e. near the optimizers). Many of these methods come with asymptotic convergence guarantees, that establish conditions under which the Markov chain converges to a globally optimal solution in an appropriate probabilistic sense. An interesting question that is usually not covered by asymptotic convergence results is the rate of convergence: How long should the randomized algorithm be executed to obtain a near optimal solution with high probability? Answering this question allows one to determine a level of accuracy and confidence with which approximate optimality claims can be made, as a function of the amount of time available for computation. In this talk we present some new results on finite sample bounds of this type, primarily in the context of stochastic optimization with expected value criteria using Markov Chain Monte Carlo methods. The discussion will be motivated by the application of these methods to collision avoidance in air traffic management and parameter identification for biological systems.

About the Speaker:

John Lygeros received a B.Eng. degree in Electrical Engineering and an M.Sc. degree in Automatic Control from Imperial College, London, U.K., in 1990 and 1991, respectively. He then received a Ph.D. degree from the Department of Electrical Engineering and Computer Sciences, University of California, Berkeley, in 1996. He held a series of postdoctoral research appointments with the National Automated Highway Systems Consortium, the Massachusetts Institute of Technology, and the University of California, Berkeley. In parallel, he was also a part-time Research Engineer with SRI International, Menlo Park, CA, and a Visiting Professor with the Department of Mathematics, Universite de Bretagne Occidentale, Brest, France. Between July 2000 and March 2003, he was a University Lecturer with the Department of Engineering, University of Cambridge, Cambridge, U.K. and a Fellow of Churchill College. Between March 2003 and July 2006, he was an Assistant Professor with the Department of Electrical and Computer Engineering, University of Patras, Patras, Greece. In July 2006, he joined the Automatic Control Laboratory, ETH Zurich, Switzerland as an associate professor. His research interests include modeling, analysis, and control of hierarchical, hybrid and stochastic systems with applications to biochemical networks and large-scale engineering systems such as highway and air traffic management.