STANFORD PROBABILITY SEMINAR

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4:15pm (Refreshments at 4pm in the 1st Floor Lounge)
Sequoia Hall, Room 200

Importance sampling and differential games

Abstract. Importance sampling is a variance reduction technique used to improve the efficiency of Monte Carlo approximation of probabilities and expected values. Under certain law of large numbers scalings, the optimal performance of importance sampling schemes can be characterized by a differential game, or equivalently, in terms of the solution to the related Isaacs equation (a nonlinear PDE).

In this talk, we will describe how subsolutions to the Isaacs equation can be used very effectively in the design and analysis of asymptotically optimal importance sampling schemes. The main ideas are first described for a multi-dimensional version of the level crossing problem studied by Siegmund. We then discuss other classes of problems to which the approach has been applied, including stochastic networks and sums of heavy-tailed random variables.