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Large Deviation Tail Estimates For Random Recursive Sequences

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The HUB – Meeting Room 1
4000 University Drive, Fairfax, VA 22030
October 13, 2017

Time: 11:00 A.M. - 12:00 Noon

Abstract:

Random recursive sequences arise in a variety of applications, ranging from branching processes in random environments to financial time series models and ruin problems in insurance mathematics. In these contexts, it is often of interest to study the tail decay of the limiting stationary distribution, which satisfies a stochastic fixed point equation. Early work on this problem dates to a seminal paper of Kesten (1973), who studied the multidimensional recursive sequence

$$V(n) = A(n)\,V(n-1) + B(n), \quad n=1,2,....,$$

showing that the stationary tail distribution exhibits Pareto tails. In the first part of the talk, we will revisit Kesten's estimate, and describe an alternative approach to the problem using methods from large deviation theory. Next, we will develop more refined large deviation estimates which describe the path properties of such sequences, including a analog of the Gibbs conditioning principle. Extensions to matrix-driven recursions and to corresponding computational problems, using importance sampling, will also be described. (Based on joint work with Anand Vidyashankar.)

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