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Excited random walks in cookie environments with Markovian cookie stacks

Excited random walks (also called cookie random walks) are a model of self-interacting random motion where the transition probabilities depend on the past behavior of the walk through the local time at the present site. Known results for the model include (1) an explicit characterization of recurrence/transience, (2) an explicit characterization of ballisticity, and (3) a characterization of the limiting distributions for excited random walks, but most of these prior results relied on the assumption of "boundedly many cookies per site." Recently, however, Kozma, Orenshtein, and Shinkar studied the case where the cookie sequences are given by a deterministic periodic sequence at each site and proved an explicit characterization of recurrence/transience for such excited random walks. In this paper we consider a more general model where the cookie sequence at each site is given by the realization of a finite state Markov chain. This model generalizes both the case of periodic cookie sequences and many instances of boundedly many cookies per site. We are able to extend many of the known results from the boundedly many cookies case to our setup, including characterizations of recurrence/transience, ballisticity, and limiting distributions in the transient case. This talk is based on joint work with Elena Kosygina.