

Reinforcement Learning for evaluating Large Deviations in non-Markov systems

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Reinforcement Learning frameworks have recently been developed for the numerical evaluation of the large deviation Scaled Cumulant Generating Function (SCGF). The goal of these frameworks is to leverage advances in Machine Learning for the simulation and analysis of rare fluctuations in non-equilibrium systems. However, existing works have mostly been limited to Markov systems, i.e., processes with history-independent dynamics. Here we explore possible extensions of Reinforcement-Learning-based techniques to compute SCGFs in non-Markov systems with a particular focus on semi-Markov dynamics, where memory is encoded via the distributions governing the waiting time at each state. We demonstrate the viability of our techniques through toy examples.

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