

A general perspective on the Metropolis-Hastings kernel: incorporating stopping times in proposals.

Anthony Lee.

University of Bristol, UK.

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Abstract

The design of computationally effective Markov chains with a given stationary distribution very often involves sophisticated uses of the Metropolis–Hastings framework, and the verification of the correctness of such algorithms can be difficult to communicate efficiently. We introduce a framework for mechanically producing correct acceptance probabilities, and use it to show that certain Markov chains that involve the simulation of a random number of auxiliary variables can be clearly validated. This is accomplished via "certificates" consisting of a probability measure on an extended state space, an involution and an acceptance function. As an example, we will cover a generalization of the basic version of the No U-turn Sampler of Hoffman and Gelman (2014).

arXiv: <https://arxiv.org/abs/2012.14881>