

Asymptotic genealogies of sequential Monte Carlo algorithms

Suzie Brown.

University of Warwick.

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Abstract

The performance of sequential Monte Carlo algorithms depends strongly on properties of the genealogical process induced by resampling. We present a theoretical analysis of this induced process, including simple conditions under which it converges to a time-rescaled n -coalescent as the number of particles goes to infinity. These conditions are established for a broad class of low-variance resampling schemes, as well as multinomial resampling, covering most of the SMC algorithms used in practice. Similar results are presented for conditional SMC, a component of the particle Gibbs algorithm.

This is joint work with Paul Jenkins, Adam Johansen and Jere Koskela.

References

- [1] Brown, Suzie, Paul A. Jenkins, Adam M. Johansen, and Jere Koskela. "Simple conditions for convergence of sequential Monte Carlo genealogies with applications." arXiv preprint arXiv:2007.00096 (2020).