

Jeanne Trinquier: Machine-learning-assisted Monte Carlo fails at sampling computationally hard problems

Several strategies have been recently proposed in order to improve Monte Carlo sampling efficiency using machine learning tools. A recently developed line of research proposed to solve the problem in an elegant and universal way, by machine learning proper MCMC moves using autoregressive models. While these methods allow for very efficient sampling for some models, I will show that it is still a challenge to do efficient sampling on a class of problems that are known to be exponentially hard to sample using conventional local Monte Carlo at low enough temperatures. In particular, we studied the antiferromagnetic Potts model on a random graph, which reduces to the coloring of random graphs at zero temperature. We tested several machine-learning-assisted Monte Carlo approaches, and we found that they all fail. Our work thus provides good benchmarks for future proposals for smart sampling algorithms.