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1QBit

Reinforcement Learning Using Quantum Boltzmann Machines

The Boltzmann distribution of the energy function of a Boltzmann machine can be used to design machine learning algorithms. In this talk, instead of a classical energy function, we associate a transverse field Ising spin Hamiltonian with significant transverse field to the Boltzmann machine and propose a reinforcement learning algorithm based on this graphical model. We then discuss quantum Monte Carlo methods of approximating the partition function, the Gibbs free energy, and the expected values of the spins in the model along the measurement basis, and show that this richer Boltzmann machine can improve the convergence of the algorithm to an optimal policy for an autonomous agent seeking optimal control over its ambient environment.

Some of these results are disclosed in <https://arxiv.org/abs/1612.05695>.

