Markov chains for tensor network states

Sofyan Iblisdir
University of Barcelona
Dpt. Estructura i Constituents de la Materia,
647 Av. Diagonal, 08036 Barcelona, Spain
iblisdir@ecm.ub.edu

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Abstract

Markov chains for probability distributions related to matrix product states and 1-dimensional quantum Hamiltonians are introduced. With appropriate 'inverse temperature' schedules, these chains can be combined into a simulated annealing scheme for ground states of such Hamiltonians. Numerical experiments suggest that a linear, i.e. fast, schedule is possible in non-trivial cases. A natural extension of these chains to 2-dimensional quantum Hamiltonians is next presented and tested. This extension is stable by construction and the obtained results compare well with euclidean evolution. The proposed Markov chains are inherently sign problem free (even for fermionic degrees of freedom), and can be tailored to escape local minima.

References

[1] arXiv 1309.4880