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An Introduction to Matrix Product State Algorithms

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Tensor Networks were developed in Many-Body Quantum Physics for describing many-body wavefunctions. Matrix Product States are a simple 1D ansatz which lends itself to efficient computation and as such have been explored for many applications in MBQP and beyond. I give an overview of some of the most common MPS algorithms and their uses: the Tensor Cross Interpolation for efficiently finding MPS representations of functions; Density Matrix Renormalisation Group for finding the ground state of Hamiltonians; and Time Evolving Block Decimation for time evolution. Uses of MPS for manipulating functions are presented as well as applications to the Ising model and for simulating quantum electrodynamics with the Schwinger model.

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