Tensor networks for classical and quantum computations

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Abstract

Tensor networks are multilinear-algebra data structures that are finding application in diverse fields of science, from quantum many-body physics to artificial intelligence. I will introduce tensor networks and illustrate how they can be used to represent classical and quantum computations. I will then motivate tensor network algorithms that perform or simulate computations in practice and demonstrate their performance on benchmarks of current interest, such as model counting and quantum circuit simulation. I will close with an outline of ongoing work and an outlook on future directions.