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Constructing approximate semi-analytic and machine-learned trivializing maps for lattice gauge theory

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While approximations of trivializing field transformations for lattice path integrals were considered already by early practitioners, more recent efforts aimed at ergodicity restoration and thermodynamic integration formulate trivialization as a variational generative modeling problem. This enables the application of modern machine learning algorithms for optimization over expressive parametric function classes, such as deep neural networks. After a brief review of the historical origins of this research program, I will focus on spectral coupling flows as a particular parameterization of gauge-covariant field diffeomorphisms. The concept will be introduced by explicitly constructing a systematically improvable semi-analytic solution for SU(3) gauge theory in (1+1)d, followed by a discussion and outlook on recent results in (3+1)d from a proof-of-principle application of machine-learned flow maps.

Topical area

Algorithms and Artificial Intelligence

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