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Gauge-equivariant multigrid neural networks

Monday, 31 July 2023 17:00 (20 minutes)

We show how multigrid preconditioners for the Wilson-clover Dirac operator can be constructed using gauge-equivariant neural networks. For the multigrid solve we employ parallel-transport convolution layers. For the multigrid setup we consider two versions: the standard construction based on the near-null space of the operator and a gauge-equivariant construction using pooling and subsampling layers. We show that both versions eliminate critical slowing down. We also show that transfer learning works and that our approach allows for communication-avoiding algorithms on large machines.

Topical area

Algorithms and Artificial Intelligence

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