

Quantum circuit learning: a variational quantum algorithm for machine learning

Saturday, January 26, 2019 4:30 PM (25 minutes)

We propose a classical-quantum hybrid algorithm for machine learning on near-term quantum processors, which we call quantum circuit learning. A quantum circuit driven by our framework learns to perform a given task by tuning parameters implemented on it. We also provide a way to obtain an analytical gradient of an expectation value of an observable for gradient-based optimization of parameters. Theoretical investigation shows that a quantum circuit can approximate nonlinear functions, which is further confirmed by numerical simulations. Quantum circuits can provide feature maps that have not been accessible with classical approach. Hybridizing a low-depth quantum circuit and a classical computer for machine learning.

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Session Classification: Quantum machine learning and quantum sensing

Track Classification: Open-source tools and quantum machine learning