Revealing Broken Gates in Quantum Circuits by Exploiting Hybrid Machine Learning

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As quantum computers advance, a way to diagnose quantum circuit failures becomes necessary for diagnostic purposes and to resolve data corruption due to faulty gates and eavesdropping. This project uses hybrid quantum and classical machine learning to classify corrupted quantum logic gates based on fidelity measurements taken with regards to known basis states. By using this fidelity measurement, the quantum circuits can be measured in a way which becomes viable for classical machine learning algorithms. The machine learning algorithm used was K-Nearest-Neighbor machine learning to classify gate failures. The algorithm was tested with up to 8 qubits and 30 logic gates in the circuit. It was able to correctly identified quantum gate corruptions for multi-gate circuits of up to 100 qubits with above a 90 percent accuracy.

Awards Won: