# Stochastic gradient descent for hybrid quantum-classical optimization

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EEE 606 – Preliminary Project Proposal

**Problem:** Study the doubly stochastic gradient descent using quantum computation

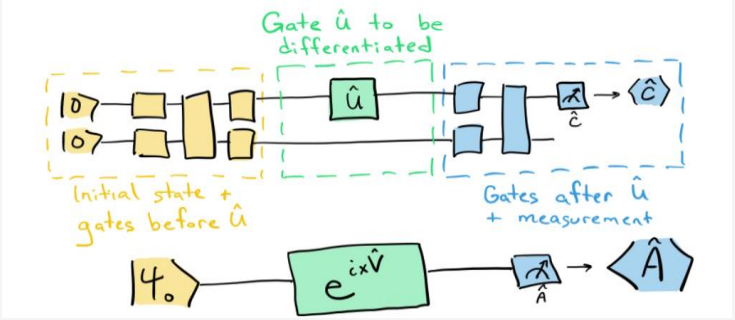
**Task:**

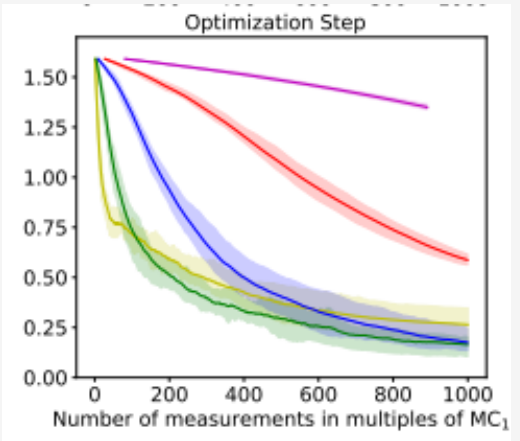
- Implement a parameterized quantum circuit
- Optimize with doubly stochastic gradient descent
- Compare the convergence curve of double stochastic vs analytic gradient descent

**Challenges:** Encoding practical data into an optimization problem with a quantum circuit

**Goal:**

- To study an optimization method using quantum computation and compare with classical gradient descent
- Compare the results with classical computation
- Prepare a final report and present to the class




Convergence Curve – Vanilla GD vs Quantum Stochastic GD

**Reference:**

Sweke, R., Wilde, F., Meyer, J., Schuld, M., Faehrmann, P. K., & Eisert, J. (2019). Stochastic gradient descent for hybrid quantum-classical optimization. *arXiv*. https://doi.org/10.22331/q-2020-08-31-314