

Towards community-driven benchmarking for quantum computing

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We are excited to hear about the IEEE initiative to provide a framework for benchmarking quantum computing¹, as it is similar in spirit to our community-driven Quantum Collective Knowledge (QCK) initiative we have been working on for the past year². QCK builds upon Collective Knowledge (CK)³, a universal open-source framework for collaborative and reproducible R&D.

Following our involvement in AI/ML benchmarking initiatives such as MLPerf⁴ and ReQuEST⁵, we believe that community involvement implies building upon at least three good things: representative workloads, rigorous and fair methodology, and state-of-the-art workflow automation⁶.

Of course, benchmarking quantum computers brings additional challenges. We believe we have made a reasonable first stab at them through designing and launching the 1st open QCK challenge⁷. This QCK challenge (based on the Variational Quantum Eigensolver approach) supports different molecules, simulators and hardware from IBM and Rigetti, various quantum circuits and classical optimisers, and misc parameters⁸. The primary metric is Time-to-Solution⁹. Users can explore solutions on a highly-configurable interactive dashboard¹⁰.

We look forward to sharing our experience with a broader community, and collaborating on the new IEEE initiative (e.g. contributing the VQE challenge as one of the first representative benchmarks).

¹ rebootingcomputing.ieee.org/quantum

² cknowledge.org/quantum

³ github.com/ctuning/ck

⁴ mlperf.org

⁵ cknowledge.org/request

⁶ linkedin.com/pulse/beauty-community-driven-benchmarking-aiml-systems-anton-lokhmotov

⁷ linkedin.com/pulse/first-open-quantum-collective-knowledge-challenge-anton-lokhmotov

⁸ github.com/ctuning/ck-quantum/tree/master/module/challenge.vqe

⁹ github.com/ctuning/ck-quantum/wiki/Measuring-Performance

¹⁰ cknowledge.org/dashboard/challenge.vqe