

Controllability and Dimensional Expressivity: Two Sides of the Same Universal-Quantum- Computing Coin

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Universal quantum computing requires a quantum system that is operator-controllable [1]. However, the number of resources required for controllability in complex systems is not obvious and, moreover, assessing this property on the systems themselves is a difficult task to achieve in practice. In this project we present a hybrid quantum-classical algorithm, uniting quantum measurements and classical calculations.

The key to our approach is the design of a parametrized quantum circuit (PQC), which can be run on the original system with some extra ancilla qubits. By applying dimensional expressivity analysis we are able to count the number of independent parameters in the PQC [2,3]. This represents the dimensional expressivity of the PQC, which is then linked back to the controllability of the initial system.

References

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