

Machine Learning of Unitary t-design Quantum Circuit (研究の進捗発表)

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Machine Learning of Unitary t -design Quantum Circuit

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Recently, random quantum circuits, which are mathematically represented by probability distributions on unitary matrices, play important roles in various fields of quantum information science. Among various probability distributions, a unitary t -design is considered as a promising one since it approximates an ideal probability distribution (Haar measure) and also is easy to be implemented. On the other hand, a state-of-the-art quantum technology cannot completely suppress uncontrollable interaction between a quantum processor and an environmental system. Thus, an implemented random quantum circuit is inevitably affected by an environmental noise, and does not completely coincide a desired random quantum circuit. Hence, in this study, we try to estimate amount of noise in an implemented random quantum circuit from output data of the circuits by machine learning. For this purpose, we started our project from discriminating the output data for Haar measure from that for an environmental noise by machine learning.