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Comment on the Quantum Supremacy Claim by Google

Tuesday, 27 July 2021 12:45 (15 minutes)

The recent paper by google [1] claiming to achieve quantum supremacy in quantum computing has risen a lot of interest. While there seems to be lot of questions regarding the validity of their claims of achieving quantum supremacy and comparison with the classical time frames in calculating the same quantity, it seems that there is little doubt they indeed perform computation using quantum operations. But the question still remains "after operating the random quantum gates on the input state and making measurement, with just the output data available, how do we classify the data as quantum or classical?" I.e, The inputs sate has indeed has gone through a series of quantum operations (that operate on more than 2 qubits at a time) to produce the available data. This due to the fact that the data supporting supremacy is not verified. To address this question we propose a modified verification scheme to test the output data which can tell us whether data available is generated from a quantum computer or not along with the fidelity and number of qubits in the quantum computer.

References:

[1] Frank Arute etal. Quantum supremacy using a programmable superconducting processor, Nature, Vol574, 24 October 2019, 505.

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PhD

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