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Performance evaluation of a classical database search that internally simulates an ensemble quantum database search¹ AKIRA SAITOH, Research Center for Quantum Computing, Interdisciplinary Graduate School of Science and Engineering, Kinki University, Japan — Average computation time of classical database search for non-trivial oracles, such as one for SAT, is known to exhibit a certain dependence on the constraint density of instances. We investigate this property for a solver that internally uses a matrix-product-state (MPS) simulation of an extended Bruschweiler search. The database search tool that we had used in [A. SaiToh and M. Kitagawa, Phys. Rev. A 73, 062332 (2006)] has been extended in precision and improved in the speed. This enabled us to evaluate the tool for a larger size of inputs. It is found that the dependence on the constraint density for our tool is different from those for the conventional solvers; this suggests that the MPS approach is useful as a complementary method. Results are shown for several non-trivial conjunctive and disjunctive normal forms.

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