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Quantum annealing for solving combinatorial optimization problems

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Quantum processing units (QPUs) such as those made by D-Wave Systems can be used for solving complex combinatorial optimization problems, which makes them increasingly attractive for researchers in this domain. For the author, coming from the field of evolutionary computation, the potential of applying QPUs in this domain is truly exciting. In this presentation, the author will review a canonical NP-hard problem, the maximum independent set (MIS) problem, in order to measure performance of the D-Wave 2000Q quantum annealer. The results from the D-Wave machine are compared to classical algorithms such as simulated thermal annealing and the graphical networks package NetworkX. In addition, some results obtained by applying an additional optimization algorithm for tuning the QPU parameters are also discussed. These results detail how we can apply problem-specific tuning to the quantum annealer.

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