Qeios

Peer Review

Review of: "An Approximated QUBO Formulation for Solving Practical SAT Problems"

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The article is overall well-written, with some minor typographic errors and fluency issues. Some parts, in the reviewer's opinion, do not give a full coherent picture of the discussion at hand. The tests proposed are appealing and well-detailed, even if in the reviewer's opinion they are not very well motivated nor have a clear theoretical (or heuristic) explanation.

In Section 1 (Introduction), in the reviewer's opinion, the methods MAX2SAT and NAE3SAT should be introduced with some more detail in order to let the reader understand why they are needed, why they work well, and how they schematically work since they play an important role in the proposed methodology.

In Section 2 (Proposed Method), an example of the complete procedure for the proposed method would be a great help for the reader, who can then follow the steps of the formulations easily and in a well-defined context. Moreover, from what the reviewer understood, the author is using a semiring interpretation of the clauses in order to get a QUBO formulation (as is common), but this is not highlighted. For instance, the Viterbi semiring is often used in SAT.

In Section 3 (Experiments), a mention of the motivations that led to the choice of the test instances PHP, GC, COMP23 could be beneficial. Moreover, some results are quite strong (e.g., Table 1), and the reviewer wonders if there are some (heuristic) explanations that the author could give to support the experimental evidence also in theory. Also, a clearer relationship between the simulated annealing experiments carried out and the Hamiltonian formulation of the QUBO problems could be expanded (e.g., introducing the Ising formulation of the considered problems).

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Declarations

Potential competing interests: No potential competing interests to declare.