Day 3 (Poster E)

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Title:Global Optimization Algorithm for QUBO Problems by Deforming Their Energy Function at Run-Time

Abstract:
Since many problems in a real-world can be modeled using combinatorial optimization problems, there is growing interest in methods for solving them with high speed and high accuracy. Combinatorial optimization problems are formulated as Quadratic Unconstrained Binary Optimization (QUBO), and some heuristic methods to solve them have been proposed. Simulated Annealing (SA), one of the heuristic methods, is an algorithm to escape from the local optimal solution by allowing the solution to deteriorate probabilistically when searching for a neighboring solution. When the energy function is multi-peaked or has large undulations, the final solution of SA often remains in a local optimal solution under realistic execution time. In this study, we propose an algorithm to escape from local optimal solutions by deforming the QUBO matrix and distorting the energy function to obtain the optimal solution or a solution closer to the optimal solution. We take up graph partitioning problems, whose energy function has many local optimal solutions, and verify the effectiveness of the proposed method against SA.

This work was done in collaboration with Tomokazu Yoshimura, Tatsuhiko Shirai, Masashi Tawada, and Nozomu Togawa.