

Day 4 (Poster F)

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Title: Analysis and Acceleration of Optimization Problems With Inequality Constraints on Ising Machines

Abstract:

Ising machines have difficulties solving combinatorial optimization problems including inequality constraints. Such a problem is the binary quadratic knapsack problem (QKP), which aims at optimizing a quadratic cost function within a single knapsack. Its applications reach various fields such as VLSI design, network flow and budgeting problem. We propose a novel method to visualize the landscape of the search and demonstrate how difficult it is to solve QKP on an Ising machine, such as a second generation Digital Annealer. Secondly, we propose a software solution improvement algorithm to efficiently solve QKP on an Ising machine. Finally, we highlight the performance of solving QKP on an Ising machine-based system which targets improvements regarding inequality constraints such as the third generation Digital Annealer.

This work was done in collaboration with Professor Nozomu Togawa from Waseda University.