

## Day 2 (Poster C)

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Title: A Spin Fixation Method for the Balanced Pick-up Service Problem Using an Ising machine

Abstract:

The balanced pick-up service problem (BPSP) is an optimization problem concerned with the optimal selection of depots (e.g. postal offices) to collect customers' items. The objective is to minimize two cost functions (1) the total distance between the depots and customers; (2) the load variances between depots. When the depots have limited capacities, the depot load, which is the total item weights of customers assigned to the depot, must not exceed the depot capacity. We map the BPSP onto the clustering problem which is an extension to the NP hard Knapsack Problem (KP) with additional distance and capacity concerns. Due to the limited number of spins on current Ising machines, we also develop a spin fixation method to reduce the number of spins required by Ising machines. For example, a customer should never be assigned ahead to the furthest depot. Experimental results demonstrate the advantages of the proposed spin fixation method for Ising machines compared with the method with non-spin fixation in computation time and solution quality.

This work was done in collaboration with Siya Bao, Shu Tanaka, Nozomu Togawa.