

Day 3 (Poster D)

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Title: Vehicle Routing Problem with Balanced Pick-up Using an Ising machine

Abstract:

Pick-up services build on the concept that a fleet of heterogeneous vehicles starting from different depots must collect customers' baggage without transshipment at any intermediate location. We map the pick-up service problem into the Vehicle Routing Problem with Balanced Pick-up (VRPBP). The VRPBP is a variant of the NP-hard Vehicle Routing Problem (VRP), and the main characteristics of the VRPBP resemble multiple depots and vehicles with various capacity constraints. The objective of the VRPBP is to achieve the optimal transportation cost and capacity planning for a given fleet of vehicles to travel between their starting depots and assigned customers. We propose a three-phase algorithm to solve the VRPBP. The first and second phases both belong to the clustering phase which is an extension to the NP-hard Knapsack Problem (KP) with additional distance and capacity concerns. The last phase is mapped to the NP-hard Travelling Salesman Problem (TSP). Experimental results demonstrate the advantages of the proposed algorithm for Ising machines compared with existing algorithms in terms of computation time and solution quality.

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