

Day 2 (Poster C)

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Title: Quick delivery routing of automated guided vehicles with reverse annealing approach

Abstract:

Automated Guided Vehicles (AGVs) have been widely used to transport stuff in factories and warehouses as a key technology to improve the efficiency of manufacturing and delivery processes in a various kind of industries. They can move along markers or wires laid on the floor and it is necessary to control the traveling routes while preventing delays and ensuring safety.

A recent study on AGVs' routing using a quantum annealer has shown a method with a significant reduction in the vehicles' downtime. However, the study was not aimed at minimizing the overall transfer time, which led to unnecessary detouring of the vehicles.

In this study, we introduce an alternative formulation of the AGVs' routing problem to minimize the entire delivery time. Furthermore, we utilize reverse annealing technology available on D-Wave's quantum annealer to solve the optimization problem.

To evaluate the efficiency of our method we ran the simulation in the virtual plant. The result shows the improvement of overall transfer time with less working rate. We also measured time-to-solution to compare our reverse annealing approach to Gurobi optimizer, a strong classical solver. As a result, we found that our method is more effective when the problem size is small.

This work was done in collaboration with Masayuki Ohzeki (1, 2, 3) and Kazuyuki Tanaka (1).

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