answer

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Dear Amirreza Taghizadeh,

Hello, I am one of the authors of the paper "A branch-and-bound approach for AGV dispatching and routing problems in automated container terminals," and the algorithm in the paper was mainly implemented by me. Below are my responses to your questions.

1. How many vertical and horizontal routes are used (meaning what values of XR and YR are used) since it affects the solution space?

A: In this paper, the number of paths included in XR and YR is directly related to the number of yard locations. As shown in Figure 4, each yard block has 5 HPs, and each HP corresponds to a vertical path. There is also one vertical path between every two container blocks. In addition, there are 5 horizontal paths set under the quay crane and on the yard side. Note that in small-scale instances, fewer paths can be used to validate the effectiveness of the algorithm, as increasing the number of paths causes the computation time to grow exponentially. When the solution space is too large, the presence of four acceleration strategies can significantly shorten the computation time, especially the fourth acceleration strategy.

2. How many vertical and horizontal routes (meaning XR and YR are used) are employed, as this will affect the solution space? For example, in Constraint 23, the constraint block is written according to the horizontal and vertical layout. In the upper-bound algorithm (Algorithm 2) and conflict-free scheme generation heuristic algorithm (Algorithm 3), there is a set of optional routes for a container (m, i), i.e., R(m, i). I do not fully understand the definition of this set and how you determine these routes (for example, using A*, Dijkstra).

A: The container routes can be understood based on Figure 5. The quayside operation location and block location of each container are fixed. For Figure 5(a), Action 1 and Action 4 each select a horizontal path, while Action 2 and Action 3 each select a vertical path. All possible route combinations form the set R(m, i). This set is unique to each container and can be derived from the quay crane operation position and path layout.

In addition, action (n, j, a2) is a notation representation; it is an index of an action and does not represent a specific action.

Regards,

Zehao Wang