Report

Title: Target guided algorithms for the container pre-marshalling problem
Authors: Ning Wang, Bo Jin, Andrew Lim
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Summary

The authors consider the container pre-marshalling problem (CPMP), which aims to rearrange containers in a bay with the least movement effort in order to find a layout where containers are stacked according to a predefined order. Further they propose a new problem, the CPMP with dummy stack (CPMPDS). A dummy stack is an additional stack, which can be used during the rearranging process, but has to be empty in the final layout. The authors propose, that the space next to the stacked containers, which is reserved for trucks, can be used as such a dummy stack. They present a lower bound for both problems and a heuristic algorithm for both problems is proposed and combined with two beam search strategies. In a computational study, the results are compared with a state-of-the-art algorithm.

General Remarks

The paper is well written and has a clear structure. The problem description as well as the solution approach are precisely presented. On the other hand there are some points, which need to be fixed.

1. In section 4.2.1, on page 8, line about 48 (the numbers on the left do not match the lines of the text in my version): The authors say "If a stack has zero immovable container, then add $H-im$ to element S_G. Notation im is the number of immovable containers in a stack...". In other words $im = 0$ in this case. Lemma 1 says, that im is the same for all stacks. In my opinion, in this case it should be $S_G = H \cdot S$, because there are zero immovable containers in all stacks. The formulation used by the authors seems to be right but misleading.

2. In section 4.3.2, on page 11, LP number 4: The authors write
"$x_i \in \{0,1\}, \forall i = 1,\ldots,S$". In my opinion it should be either
$x_i \in \{0,1\}, \forall i \in \{1,\ldots,S\}$ or
$x_i \in \{0,1\}, i = 1,\ldots,S$.

3. The authors present a lower bound for (CPMP) and (CPMPDS). For (CPMP) their lower bound consists of three parts. Two of them are already presented by Bortfeldt and Foster. The third part is new. The authors claim, that their lower bound dominates the lower bound of Bortfeldt and Foster, but they do not substantiate this claim. Further, they propose a maximum knapsack method to approximate their third part of the lower bound. Again, they claim, that even their approximated lower bound dominates the one of Bortfeldt and Foster without any substantiation.

4. The authors say nothing about the quality of the lower bound. In my opinion, they should provide the calculated lower bound in the computational study. Otherwise it is not possible to see how useful this bound is.

5. All computational results (except the ones for CPMPDS) are compared with the results of Bortfeldt and Foster. The problem is, that the authors use a much faster PC than Bortfeldt and Foster. This makes the comparison of runtimes useless. In my opinion, the authors need to test the algorithm of Bortfeldt and Foster on the same machine to get a fair comparison.

Summing up, I recommend a major revision of the paper which considers all the points listed above.