An Analysis of Local Search for the Bi-objective Bidimensional Knapsack Problem

Supplementary Material

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Abstract. Local search techniques are increasingly often used in multi-objective combinatorial optimization due to their ability to improve the performance of metaheuristics. The efficiency of multi-objective local search techniques heavily depends on factors such as (i) neighborhood operators, (ii) pivoting rules and (iii) bias towards good regions of the objective space. In this work, we conduct an extensive experimental campaign to analyze such factors in a Pareto local search (PLS) algorithm for the bi-objective bidimensional knapsack problem (bBKP). In the first set of experiments, we investigate PLS as a stand-alone algorithm, starting from random and greedy solutions. In the second set, we analyze PLS as a post-optimization procedure.

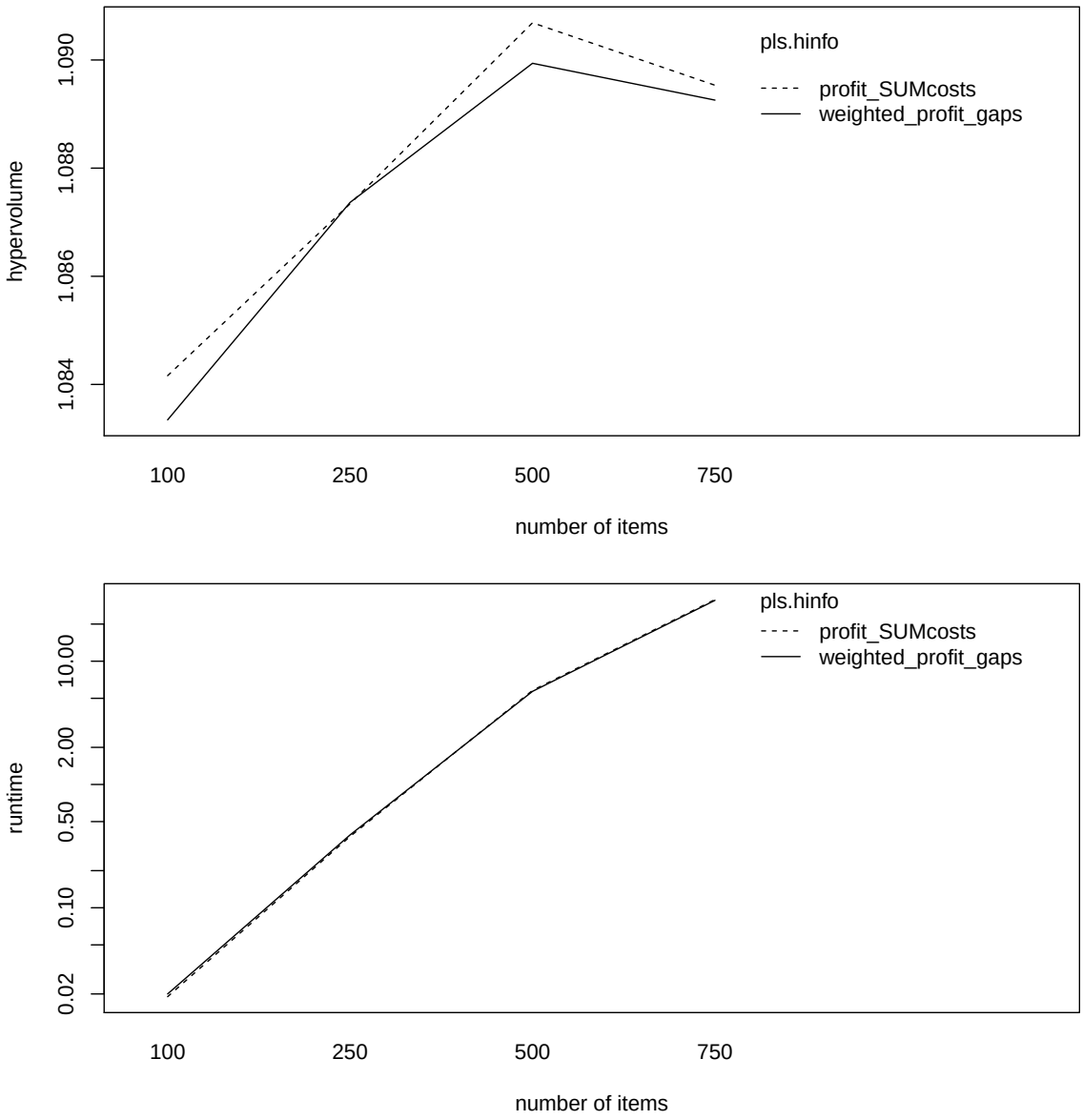

Fig. 1: Median hypervolume (top) and runtime (bottom) of different heuristics for PLS starting from greedy solutions and $r = 1$.

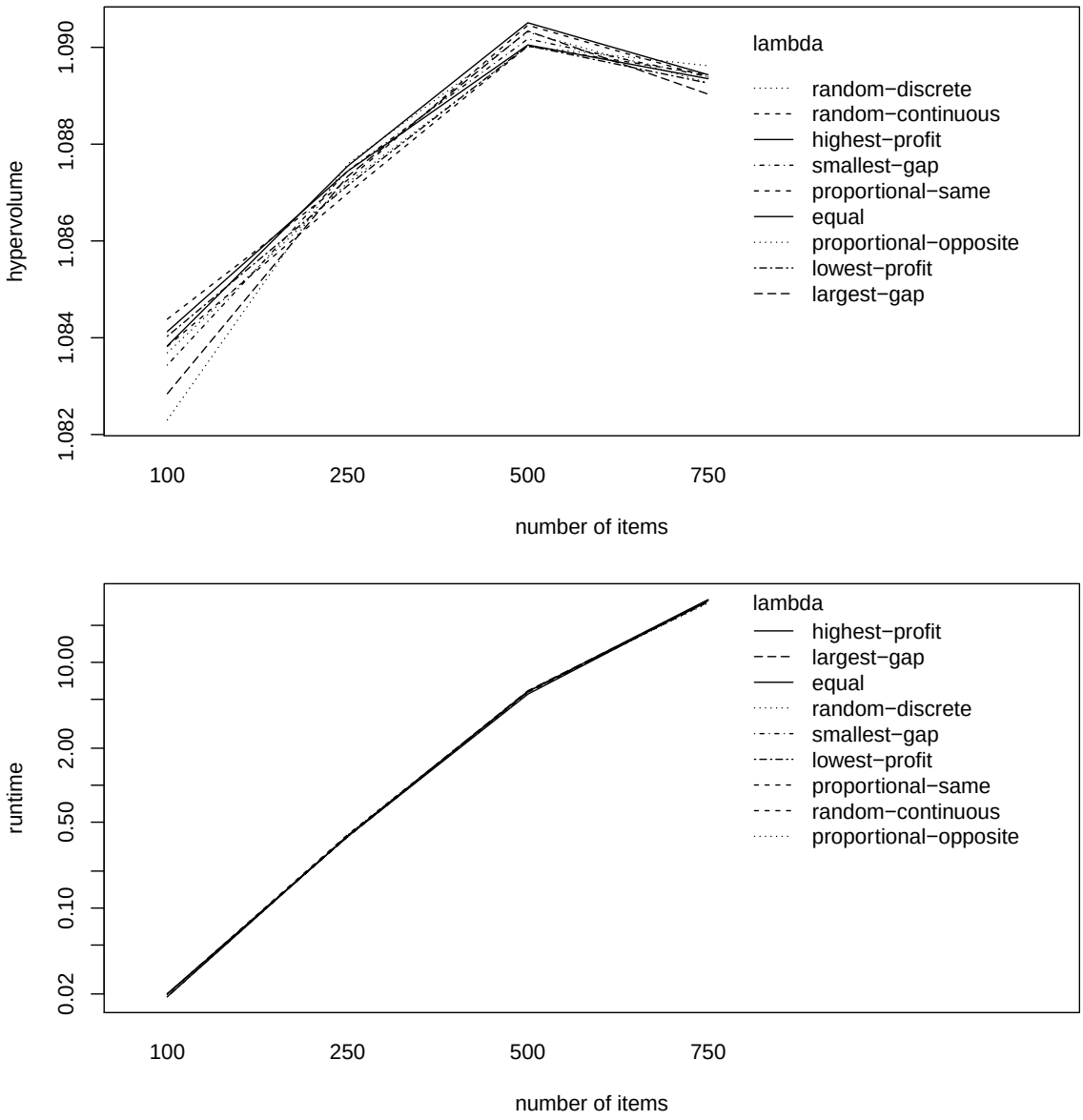

Fig. 2: Median hypervolume (top) and runtime (bottom) of different lambda generation methods for PLS starting from greedy solutions and $r = 1$.

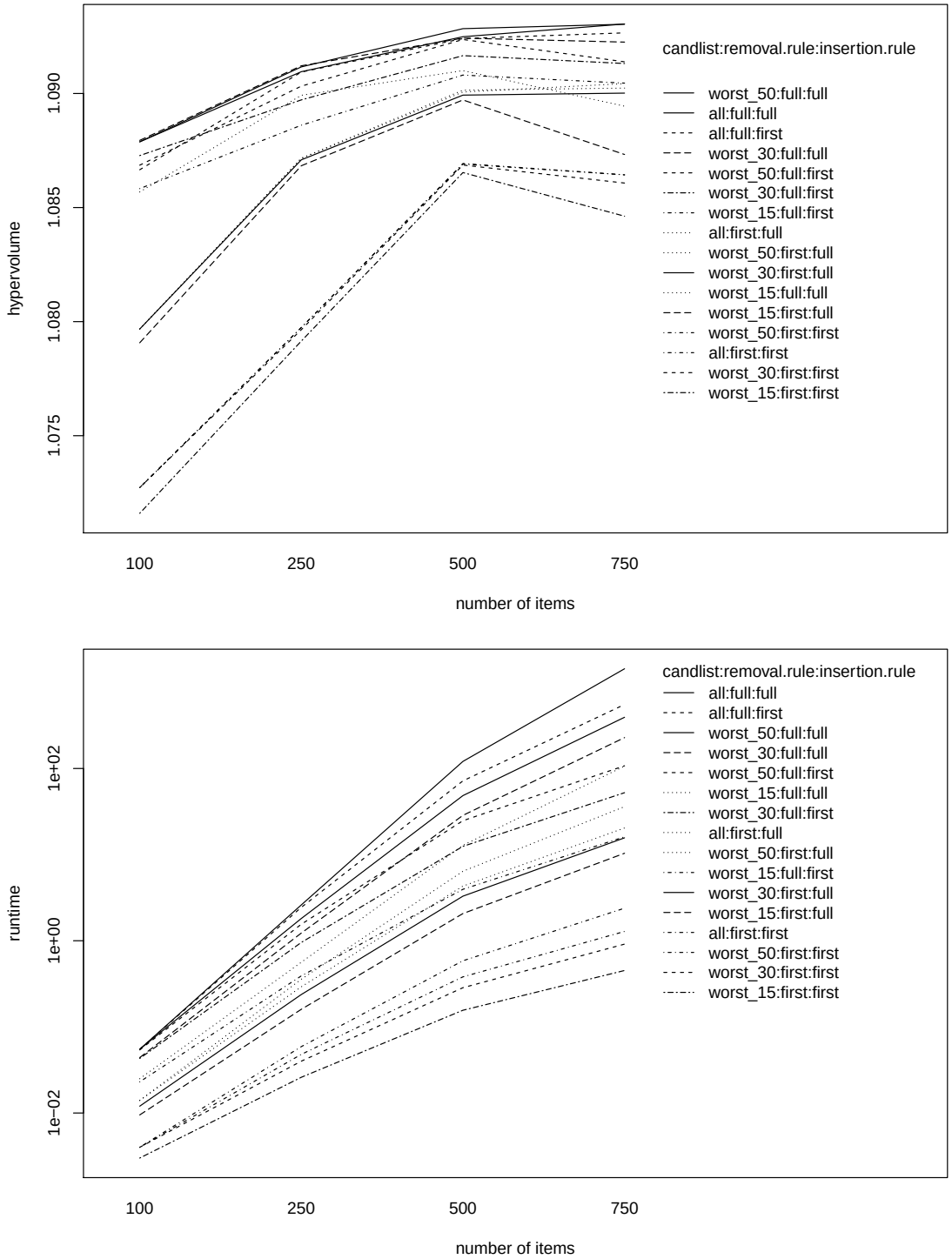

Fig. 3: Median hypervolume (top) and runtime (bottom) of different candidate list options and pivoting rules for PLS starting from greedy solutions and $r = 1$.

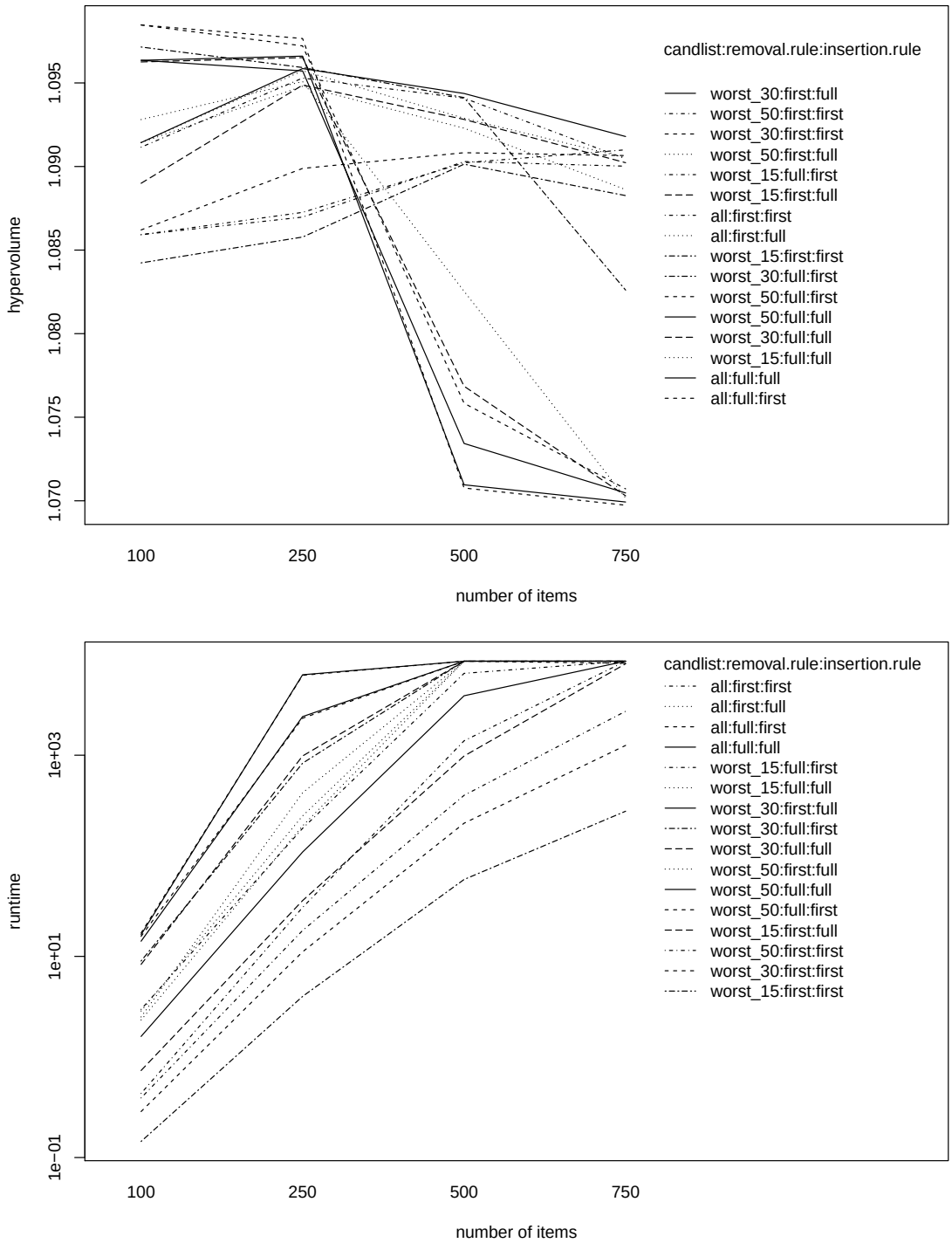

Fig. 4: Median hypervolume (top) and runtime (bottom) of different candidate list options and pivoting rules for PLS starting from greedy solutions and $r = 2$.