On the comparison of CMSA versus LNS for solving Combinatorial Optimization problems with different solution sizes

Resum

Both, Construct, Merge Solve and Adapt (CMSA) and Large Neighborhood Search (LNS), are hybrid algorithms that are based on iteratively solving sub-instances of the original problem instances, if possible, to optimality. This is done by reducing the search space of the tackled problem instance in algorithm-specific ways which differ from one technique to the other. In this paper we provide first experimental evidence for the intuition that, conditioned by the way in which the search space is reduced, LNS should generally work better than CMSA in the context of problems in which solutions are rather large, and the opposite is the case for problems in which solutions are rather small. The size of a solution is hereby measured by the number of components of which the solution is composed, in comparison to the total number of solution components. In this ongoing work we are conducting experiments in the context of the multi-dimensional knapsack problem, the minimum-weight dominating set, and the single-source capacitated facility location problem.