

Stochastic ALNS for Two-Stage Stochastic Routing and Scheduling Problems

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Abstract. We present a general local search framework for scenario-based two-stage combinatorial stochastic programming problems. The framework is based on Adaptive Large Neighborhood Search (ALNS), where an upper-level local search method operates on the first-stage decision variables, while a number of lower-level local search methods optimize the individual scenarios. As a demonstration of the Stochastic ALNS algorithm, the framework is tested on the two-stage stochastic Prize-collecting Vehicle Routing Problem, and stochastic Team Orienteering Problem. In all problems, the customers, demands and travel times can be stochastic as long as they can be represented by a number of scenarios. Computational experiments show that the algorithm scales well with the number of scenarios, making it possible to solve instances with up to 1000 customers in short time.