



Hybrid Evolutionary Algorithms for the Efficient Solution of Planning Problems under Uncertainty

By Thomas Tometzki

Shaker Verlag Aug 2011, 2011. Taschenbuch. Condition: Neu. Neuware - An important aspect of real-world planning problems is the presence of uncertainty in the problem data. The information and decision structure of planning under uncertainty enables recourse actions which correct the here-and-now decisions. This situation is reflected by a recourse model with a finite number of uncertainty scenarios in the form of a two-stage stochastic mixed-integer linear program. A stage decomposition based hybrid evolutionary algorithm employs an evolutionary algorithm to determine the here-and-now decisions and a standard mathematical method to optimize the recourse decisions. Empirical investigations exhibit that for problems with a high number of scenarios the hybrid algorithm generates good feasible solutions more quickly than a state-of-the-art exact algorithm. New systematic initialization techniques for the evolutionary algorithms are proposed which exploit the two-stage stochastic mixed-integer linear program in a preprocessing step. Three initialization approaches are presented which generate solutions of different quality in different preprocessing times. Two approaches are based on solutions of integer relaxations of the corresponding two-stage stochastic mixed-integer linear program. While the first approach uses the integer relaxation of all decisions, the second approach is based on integer relaxation of all recourse decisions only. The third initialization...



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