A matheuristic algorithm for multistage stochastic optimization

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A matheuristic algorithm is presented as a spin-off from the exact Branch-and-Fix Coordination (BFC) algorithm [1, 4] for solving multistage stochastic mixed 0-1 problems. Some steps to guarantee the solution's optimality are relaxed in the BFC algorithm, such that an incomplete backward branching scheme is considered for solving large sized problems. Additionally, a new branching criterion is considered, based on dynamically-guided and stage-wise ordering schemes, such that fewer Twin Node Families are expected to be visited during the execution of the so-called H-DBFC algorithm. The inner parallelization of the new approach, IH-DBFC, allows to solve in parallel scenario clusters MIP submodels at different steps of the algorithm. The outer parallel version, OH-DBFC, considers independent executions and allows iterative incumbent solution values exchanges to obtain tighter bounds of the solution value of the original problem. A broad computational experience is reported, see also [2], for assessing the quality of the matheuristic solution for large sized instances, including a comparison with our Stochastic Dynamic Programming algorithm [3]. The goodness gap of the H-DBFC solution value versus the one obtained by a state-of-the-art MIP solver is very small, if any. An analysis of extending the H-DBFC algorithm to consider risk averse strategies as opposed to the risk neutral one is also discussed.

References

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