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Stable two-stage scenario tree generation via game-theoretic optimisation

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Scenario generation methods constitute an important aspect towards efficient solution of Stochastic Programming (SP) problems and exploitation of big data. The ability of these methods to consistently provide scenario sets which guarantee stability on the solution of the stochastic programs is determinant of their performance. In this context, we present a modification of the existing Distribution and Moment Matching Problem (DMP) which is formulated as Mixed-Integer Linear Programming (MILP) model. The Nash bargaining approach is employed and the different statistical properties of the DMP are considered as players. Through this game-theoretic approach the impact of the user-defined parameters on the scenario generation procedure is investigated. Results from a capacity planning case study highlight the benefits of the proposed approach with respect to in-sample and out-of-sample stability.

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