Guaranteed Bounds for Multistage Stochastic Optimization Programs through stochastic dominance

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In general, multistage stochastic optimization problems are formulated on the basis of continuous distributions for the random parameters. Such “infinite” problems are practically impossible to solve as they are formulated and finite tree approximations are used as proxies.

In this talk, we propose guaranteed bounds provided by finite tree models which give upper and lower bounds for the optimal value of the infinite problem. The finite tree approximations are built based on the first order stochastic dominance and in the convex order sense. We show that the gap between the lower and upper bounds can be made arbitrarily small by making the approximating trees bushier and we demonstrate their use in a multistage risk-averse production problem.

References

[1] Maggioni, F., Pflug, G. Guaranteed Bounds for Infinite Multistage Risk-Averse Stochastic Optimization Programs, Optimization Online 2016.