



Bounding Multistage Stochastic Programs

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ABSTRACT

Multistage stochastic optimization problems are formulated on the basis of continuous distributions. Such "infinite" problems are practically impossible to solve as they are formulated and finite tree approximations of the underlying stochastic processes are used as proxies.

In this talk, bounding methods for multistage stochastic optimization problems are discussed. First we consider bounds based on the assumption that a sufficiently large discretized scenario tree describing the problem uncertainty is given but is unsolvable. Monotonic bounds based on group subproblems of the large scenario tree will be discussed and compared in terms of computational complexity [1]. Current work on optimal scenario grouping in order to obtain the best monotonic chain of lower bounds will be also discussed [2].

Secondly, we demonstrate how one can find guaranteed bounds, i.e. finite tree models, for which the optimal values give upper and lower bounds for the optimal values of the original infinite problem. We consider approximations in the first order stochastic sense and in the convex order sense [3]. Their use is shown in a multistage risk-averse production problem.

Work done in collaboration with Prof. Georg Pflug (University of Vienna).

References

- [1] Maggioni F. and Pflug, G. (2016) Bounds and approximations for multistage stochastic programs, *Siam J. Optim.*, 26(1), 831–855.
- [2] Maggioni, F., Cavagnini, R. Optimization Driven Monotonic Bounds in Stochastic Programming, (in preparation).
- [3] Maggioni, F. and Pflug, G. Guaranteed Bounds for General Non-discrete Multistage Risk-Averse Stochastic Optimization Programs, *Siam J. Optim.*, 29(1), 454–483.

BIOGRAPHY

Francesca Maggioni has obtained a Ph.D. in Pure and Applied Mathematics from the University of Milano-Bicocca, as well as the Italian National Scientific Qualification as Associate and Full Professor of Operations Research and Associate and Full Professor of Mathematical Methods for Economics and Finance. Currently, she is affiliated with the University of Bergamo, Italy. Her research interests center on optimization of sequential decision problems under uncertainty using Stochastic and Distributionally Robust Optimization, as well as their application to logistics, energy, and biology problems. Francesca Maggioni is an elected member and the secretary of the Managerial Board of the European Working Group on Stochastic Programming, treasurer of the Managerial Board of the Committee on Stochastic Programming, and a member of the Research Council of the Department of Management, Economics and Quantitative Methods, University of Bergamo. She is Associate Editor of the Journal Computational Management Science and guest Editor of several special issues.



EVENT DETAILS

DATE:

Monday, April 8th

TIME:

4:30-5:30pm

LOCATION:

Peirce 220
Stevens Institute of
Technology

ATTENDANCE:

Faculty, Staff, Students and
Guests

Refreshments will be
served