

Exact converging bounds for Stochastic Dual Dynamic Programming

Vincent Leclère

Université Paris-Est, CERMICS (ENPC)

Pierre Carpentier

UMA, ENSTA ParisTech, Université Paris-Saclay

Jean-Philippe Chancelier

Université Paris-Est, CERMICS (ENPC)

François Pacaud

CERMICS (ENPC) - Efficacity

Résumé. The Stochastic Dual Dynamic Programming (SDDP) algorithm has become one of the main tools to address convex multistage stochastic optimal control problem. Recently a large amount of work has been devoted to improve the convergence speed of the algorithm through cut-selection and regularization, or to extend the field of applications to non-linear, integer or risk-averse problems. However one of the main downside of the algorithm remains the difficulty to give an upper bound of the optimal value, usually estimated through Monte Carlo methods and therefore difficult to use in the algorithm stopping criterion.

In this paper we present a dual SDDP algorithm that yields a converging exact upper bound for the optimal value of the optimization problem. Incidentally we show how to compute an alternative control policy based on an inner approximation of Bellman value functions instead of the outer approximation given by the standard SDDP algorithm. We illustrate the approach on an energy production problem involving zones of production and transportation links between the zones. The numerical experiments we carry out on this example show the effectiveness of the method.

Mots-clefs : Stochastic Programming, Stochastic Dual Dynamic Programming

Références

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