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Relative Value Iteration for Infinite-Horizon SDDP: Application to Hydroelectric Problem

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This work addresses the challenges of applying Stochastic Dual Dynamic Programming (SDDP) to infinite-horizon hydroelectric water management problems with continuous state and control spaces. While SDDP has proven effective in finite-horizon settings, its extension to the infinite-horizon case with a discount factor close to one introduces numerical difficulties when the discount rate is close to 1. To improve convergence, we propose a modified SDDP algorithm inspired by relative value iteration, incorporating additive shifts to accelerate the relevance of generated cuts. Numerical experiments highlight the practical benefits of our approach for long-term planning.

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