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# Simple Yet Effective Approximations for Optimization under Uncertainty

*jeudi 31 juillet 2025 10:45 (45 minutes)*

This talk focus on developing computationally efficient approximations for solving optimization problem under uncertainty. We first present a novel and simple modeling method called harmonizing optimization (HO), which integrates SAA and DRO with moment by adaptively adjusting the weights of data and information based on sample size N. This allows HO to amplify data effects in large samples while emphasizing information in smaller ones. More importantly, HO performs well across varying data sizes without needing to classify them as large or small. We provide practical methods for determining these weights and demonstrate that HO offers finite-sample performance guarantee. Moreover, to solve HO efficiently, we propose an optimized dimensionality reduction approach by integrating the dimensionality reduction of random parameters with the subsequent optimization problems. As an application, HO can be used to enhance scenario reduction by retaining critical information from reduced scenarios, thereby improving approximation quality and reducing completion time. Numerical results show significant advantages of HO in solution quality compared to other benchmark approaches, and highlight its effectiveness in scenario reduction.

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