Distributionally Robust Optimization under Decision-Dependent Ambiguity Set

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We introduce a new class of distributionally robust optimization problems under decision-dependent ambiguity sets. In particular, as our ambiguity sets, we consider balls centered on a decision-dependent probability distribution. The balls are based on a class of earth mover's distances that includes both the total variation distance and the Wasserstein metrics. We discuss the main computational challenges in solving the problems of interest, and provide an overview of various settings leading to tractable formulations. Some of the arising side results, such as the mathematical programming expressions for robustified risk measures in a discrete space, are also of independent interest. We describe how our results can be utilized to obtain tractable formulations for a class of network models with random component failures, with a particular focus on a stochastic pre-disaster investment planning problem.