

ITERATIVE METHODS FOR ROBUST ESTIMATION UNDER BIVARIATE DISTRIBUTIONAL UNCERTAINTY

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We propose an iterative algorithm to approximate the solution to an optimization problem that arises in estimating the value of a performance metric in a distributionally robust manner. The optimization formulation seeks to find a bivariate distribution that provides the worst-case estimate within a specified statistical distance from a nominal distribution and satisfies certain independence condition. This formulation is in general non-convex and no closed-form solution is known. We use recent results that characterize the local “sensitivity” of the estimation to the distribution used, and propose an iterative procedure on the space of probability distributions. We establish that the iterations of solutions are always feasible and that the sequence is provably improving the estimate. We describe conditions under which this sequence can be shown to converge to a locally optimal solution. Numerical experiments illustrate the effectiveness of this approach for a variety of nominal distributions.