Tractable Minmaxmin Problems

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Minmax optimization is of great importance for many real life applications as it is the election tool for dealing with decision making problems where the performance measure of any observed system is related to its worst-case behavior. Solving minmax optimization problems requires to deal explicitly with nonsmoothness of the objective function and, in some sense, the research in nonsmooth (or, equivalently, nondifferentiable) optimization has been strongly motivated by the need of tackling such family of problems.

The *minmaxmin* paradigm is a significant development of the *minmax* decision making approach; it is particularly suited for applications where both strategic and tactical decisions are to be made, at different points of time, in presence of uncertain scenarios.

The aim of the talk is to discuss some classes of minmaxmin problems, whose structure is well suited to represent some challenging real-life problems, and at the same time allows application of rather standard optimization techniques. The main contribution of the talk is in the treatment of a special class of minmaxmin problems, the bilinear minmaxmin problem, which reduces to solving a minmax problem where the max is taken over a finite set of concave, not necessarily differentiable functions. For such problems we provide an optimization scheme which is derived from standard approaches of nonsmooth optimization (bundle and conjugate subgradient methods) and exploits concavity of the component functions. We prove convergence of our method to a local minimum, and in addition we introduce a heuristic strategy for escaping from local minima. We report finally the results of some numerical experiments.