

Application of a primal-dual interior point algorithm using exact second order information with a novel non-monotone line search method to generally constrained minimax optimization problems

ABSTRACT

This work presents the application of a primal-dual interior point method to minimax optimisation problems. The algorithm differs significantly from previous approaches as it involves a novel non-monotone line search procedure, which is based on the use of standard penalty methods as the merit function used for line search. The crucial novel concept is the discretisation of the penalty parameter used over a finite range of orders of magnitude and the provision of a memory list for each such order. An implementation within a logarithmic barrier algorithm for bounds handling is presented with capabilities for large scale application. Case studies presented demonstrate the capabilities of the proposed methodology, which relies on the reformulation of minimax models into standard nonlinear optimisation models. Some previously reported case studies from the open literature have been solved, and with significantly better optimal solutions identified. We believe that the nature of the non-monotone line search scheme allows the search procedure to escape from local minima, hence the encouraging results obtained.

Keyword: Mathematical programming; Multi-objective; Non-linear programming; Optimisation