



# On the accurate identification of active set for constrained minimax problems

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## ABSTRACT

In this paper, the problem of identifying the active constraints for constrained nonlinear programming and minimax problems at an isolated local solution is discussed. The correct identification of active constraints can improve the local convergence behavior of algorithms and considerably simplify algorithms for inequality constrained problems, so it is a useful adjunct to nonlinear optimization algorithms. Facchinei et al. [F. Facchinei, A. Fischer, C. Kanzow, On the accurate identification of active constraints, *SIAM J. Optim.* 9 (1998) 14–32] introduced an effective technique which can identify the active set in a neighborhood of a solution for nonlinear programming. In this paper, we first improve this conclusion to be more suitable for infeasible algorithms such as the strongly sub-feasible direction method and the penalty function method. Then, we present the identification technique of active constraints for constrained minimax problems without strict complementarity and linear independence. Some numerical results illustrating the identification technique are reported.

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## 1. Introduction

In this paper, of major interest in constrained nonlinear programming, as well as in constrained minimax problems, is the development of the correct identification of active constraints. Accurate identification of the active set is a useful adjunct to the algorithms of nonlinear programming and minimax problems, and is important from both the theoretical and practical points of view. It plays an important role in optimization theory. First, it can improve the local convergence behavior of these algorithms, since the study of the local convergence rate implicitly or explicitly depends on the fact that the active set is eventually identified. Second, identifying the active set can simplify algorithms for inequality constrained problems, as it removes the “combinatorial” aspect from the problem and locally reduces the inequality constraints to equality constraints which can be dealt with easily such as the interior point algorithm, so it can decrease the computation cost.

An earlier study of the active set identification technique can be found in [1,2]. Many satisfactory results have been reached for linear programming [3,4], and linear complementarity problems [5–8]. Recent works on the general nonlinear case are studied, e.g., [9,10]. Facchinei et al. [9] describe a technique based on the algebraic representation of the constraint set, which identifies active constraints in a neighborhood of a solution and which requires neither strict complementarity nor uniqueness of the multipliers. The extension to variational inequalities is also presented. We will discuss this identification

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