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Title: **FAIPA_GSDP - A Feasible Arc Interior Point Algorithm for General Nonlinear SDP**

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We consider optimization problems with an objective function subject to equality and inequality constraints as well as semidefinite constraints on symmetric matrix-valued functions. The involved functions are not necessarily linear or convex.

The present algorithm is an extension of FAIPA for nonlinear constrained optimization. FAIPA_SDP makes iteration in the primal and dual variables to solve first order optimality conditions of the problem. Given an initial interior point, FAIPA generates a descent interior sequence, converging to a local solution of the problem.

At each iteration, FAIPA_SDP defines a feasible descent arc and makes a line search along this arc, looking for a new interior point with lower objective. It requires the solution of three systems of linear equations with the same matrix. The first one generates a descent direction of the cost function. In the second linear system, a precisely defined perturbation in the left hand side is done and, as a consequence, a descent feasible direction is obtained. The third system computes an estimate of constraint's curvature in order to get a feasible descent arc. An inexact line search along this arc is then performed, to ensure that the new iterate is interior and the objective is lower.

We describe two formulations; one of them takes advantage of the matrices symmetry while the other maintains unchanged the structure of the constraint matrices. This is relevant in the case of applications where the SDP matrices has a favorable structure.

Some models for structural optimization involving SDP are presented and a set of test problems is solved. The problems were solved very efficiently without need of tuning parameters, suggesting robustness of the present approach.

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