Determinant Maximization with Linear Matrix Inequality Constraints

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The problem of maximizing the determinant of a matrix subject to linear matrix inequalities arises in many fields, including computational geometry, statistics, system identification, experiment design, and information and communication theory. It can also be considered as a generalization of the semidefinite programming problem. We give an overview of the applications of the determinant maximization problem, pointing out simple cases where specialized algorithms or analytical solutions are known. We then describe an interior-point method, with a simplified analysis of the worst-case complexity and numerical results that indicate that the method is very efficient, both in theory and in practice. Compared to existing specialized algorithms (where they are available), the interior-point method will generally be slower; the advantage is that it handles a much wider variety of problems.

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