Interior-point polynomial algorithms in convex programming

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Abstrak

Written for specialists working in optimization, mathematical programming, or control theory. The general theory of path-following and potential reduction interior point polynomial time methods, interior point methods, interior point methods for linear and quadratic programming, polynomial time methods for nonlinear convex programming, efficient computation methods for control problems and variational inequalities, and acceleration of path-following methods are covered.
In this book, the authors describe the first unified theory of polynomial-time interior-point methods. Their approach provides a simple and elegant framework in which all known polynomial-time interior-point methods can be explained and analyzed; this approach yields polynomial-time interior-point methods for a wide variety of problems beyond the traditional linear and quadratic programs.
The book contains new and important results in the general theory of convex programming, e.g., their "conic" problem formulation in which duality theory is completely symmetric. For each algorithm described, the authors carefully derive precise bounds on the computational effort required to solve a given family of problems to a given precision. In several cases they obtain better problem complexity estimates than were previously known. Several of the new algorithms described in this book, e.g., the projective method, have been implemented, tested on "real world" problems, and found to be extremely efficient in practice.