

Parametric Integer Programming

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Abstract

When analysing computer programs (especially numerical programs in which arrays are used extensively), one is often confronted with integer programming problems. These problems have three peculiarities:

- feasible points are ranked according to lexicographic order rather than the usual linear economic function;
- the feasible set depends on integer parameters;
- one is interested only in exact solutions.

The difficulty is somewhat alleviated by the fact that problems sizes are usually quite small. In this paper we show that:

- the classical simplex algorithm has no difficulty in handling lexicographic ordering;
- the algorithm may be executed in symbolic mode, thus giving the solution of continuous parametric problems;
- the method may be extended to problems in integers.

We prove that the resulting algorithm always terminates and give an estimate of its complexity.

Parametric Integer Programming

**Christodoulos A. Floudas, Panos M.
Pardalos**

Parametric Integer Programming:

Parametric Integer Optimization Bernd Bank, Reinhard Mandel, 2021-11-22 Keine ausführliche Beschreibung für
Parametric Integer Optimization verfügbare **Parametric Integer Programming** Thomas L. Morin, Roy Earl Marsten, Roy
A. Marsten, National Bureau of Economic Research, 1975 A family of integer programs is considered whose right hand sides
lie on a given line segment L . This family is called a parametric integer program PIP. Solving a PIP means finding an optimal
solution for every program in the family. It is shown how a simple generalization of the conventional branch and bound
approach to integer programming makes it possible to solve such a PIP. The usual bounding test is extended from a
comparison of two point values to a comparison of two functions defined on the line segment L . The method is illustrated on a
small example and computational results for some larger problems are reported **Parametric Integer Programming the**

Right Hand Side Case, 1975 A family of integer programs is considered whose right hand sides lie on a given line segment
 L . This family is called a parametric integer program PIP. Solving a PIP means finding an optimal solution for every program in
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comparison of two functions defined on the line segment L . The method is illustrated on a small example and computational
results for some larger problems are reported **Parametric Integer Programming Using a Branch-and-bound**

Algorithm and Parametric Linear Programming Chi Hung Chan, 1989 **Parametric Integer Programming** Robert M.
Nauss, 1979 Characteristics and properties of particular parameterizations Problem dependent techniques for improving
algorithmic efficiency Scheduling solution priorities for PILPs The parametric generalized assignment problem The
parametric capacitated facility location problem Extensions to the general PILP and areas for future research

Parametric Integer Programming Roy E. Marsten, 2016-06-23 Excerpt from Parametric Integer Programming The
Right Hand Side Case The research reported here was partially supported by National Science Foundation Grant gj 1154x3
to the National Bureau for Economic Research The computer implementation of the algorithm was done by Lee About the
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vast majority of imperfections successfully any imperfections that remain are intentionally left to preserve the state of such
historical works **Parametric Integer Programming Using Cutting Planes** Mason Gene Bailey, 1978 **Multi-level**

Mixed-Integer Optimization Styliani Avraamidou, Efstratios Pistikopoulos, 2022-06-06 This book provides the fundamental
underlying mathematical theory numerical algorithms and efficient computational tools for the solution of multi-level

mixedinteger optimization problems It can enable a vast array of decision makers and engineers e g process engineers bioengineers chemical and civil engineers and economists to model formulate and solve hierarchical decision making problems The book gives detailed insights on multi level optimization by comprehensive explanations step by step numerical examples and case studies plots and diagrams *Parametric Mixed Integer Programming by Elimination* Volker Weispfenning,Rui Xue,1995

Multi-parametric Optimization and Control Efstratios N. Pistikopoulos,Nikolaos A. Diangelakis,Richard Oberdieck,2020-11-10 Recent developments in multi parametric optimization and control Multi Parametric Optimization and Control provides comprehensive coverage of recent methodological developments for optimal model based control through parametric optimization It also shares real world research applications to support deeper understanding of the material Researchers and practitioners can use the book as reference It is also suitable as a primary or a supplementary textbook Each chapter looks at the theories related to a topic along with a relevant case study Topic complexity increases gradually as readers progress through the chapters The first part of the book presents an overview of the state of the art multi parametric optimization theory and algorithms in multi parametric programming The second examines the connection between multi parametric programming and model predictive control from the linear quadratic regulator over hybrid systems to periodic systems and robust control The third part of the book addresses multi parametric optimization in process systems engineering A step by step procedure is introduced for embedding the programming within the system engineering which leads the reader into the topic of the PAROC framework and software platform PAROC is an integrated framework and platform for the optimization and advanced model based control of process systems Uses case studies to illustrate real world applications for a better understanding of the concepts presented Covers the fundamentals of optimization and model predictive control Provides information on key topics such as the basic sensitivity theorem linear programming quadratic programming mixed integer linear programming optimal control of continuous systems and multi parametric optimal control An appendix summarizes the history of multi parametric optimization algorithms It also covers the use of the parametric optimization toolbox POP which is comprehensive software for efficiently solving multi parametric programming problems *Parametric Integer Optimization* B R Bank Mandel,R. Mandel,B. Bank,1988-12-31

Encyclopedia of Optimization Christodoulos A. Floudas,Panos M. Pardalos,2008-09-04 The goal of the Encyclopedia of Optimization is to introduce the reader to a complete set of topics that show the spectrum of research the richness of ideas and the breadth of applications that has come from this field The second edition builds on the success of the former edition with more than 150 completely new entries designed to ensure that the reference addresses recent areas where optimization theories and techniques have advanced Particularly heavy attention resulted in health science and transportation with entries such as Algorithms for Genomics Optimization and Radiotherapy Treatment Design and Crew Scheduling

Advances in Computational and Stochastic Optimization, Logic Programming, and Heuristic Search David L.

Woodruff,2013-03-14 Computer Science and Operations Research continue to have a synergistic relationship and this book as a part of the Operations Research and Computer Science Interface Series sits squarely in the center of the confluence of these two technical research communities The research presented in the volume is evidence of the expanding frontiers of these two intersecting disciplines and provides researchers and practitioners with new work in the areas of logic programming stochastic optimization heuristic search and post solution analysis for integer programs The chapter topics span the spectrum of application level Some of the chapters are highly applied and others represent work in which the application potential is only beginning In addition each chapter contains expository material and reviews of the literature designed to enhance the participation of the reader in this expanding interface *Apors: Development In Diversity And Hearmony - Proceedings Of The Third Conference* Kaoru Tone,Masanori Fushimi,1995-02-28 This book consists of selected papers presented at the Third Conference of the Asian Pacific Operational Research Societies The selected papers cover broad areas of operations research ranging from traditional to new directions in theory algorithm and applications Typical topics are linear and nonlinear programming interior point method combinatorial programming scheduling queueing theory simulation forecasting inventory telecommunication finance organizational intelligence analytic hierarchy process data envelopment analysis fuzzy programming and others Parametric mixed integer programming by elimination Volker Weispfenning,Xue Rui,1995

Reconfigurable Computing: Architectures, Tools and Applications Andreas Koch,Ram Krishnamurthy,John McAllister,Roger Woods,Tarek El-Ghazawi,2011-03-15 This book constitutes the refereed proceedings of the 7th International Symposium on Reconfigurable Computing Architectures Tools and Applications ARC 2011 held in Belfast UK in March 2011 The 40 revised papers presented consisting of 24 full papers 14 poster papers and the abstracts of 2 plenary talks were carefully reviewed and selected from 88 submissions The topics covered are reconfigurable accelerators design tools reconfigurable processors applications device architecture methodology and simulation and system architecture

Advances in Multi-parametric Mixed-integer Programming and Its Applications Martina Wittmann-Hohlbein,2013

Parametric Analysis for Integer Programming Problems Søren Holm,Dieter Klein,1975 **Parametric Integer Linear Programming: a Synthesis of Branch and Bound with Cutting Planes** Suzanne Lynn Knauer Rountree,1979

Parametric Integer Linear Programming ,1980 A branch and bound algorithm is designed to solve the general integer linear programing problem with parametric right hand sides The right hand sides have the form $b \leq \Theta d$ where b and d are conformable vectors d consists of nonnegative constants and Θ varies from zero to one The method consists of first determining all possible right hand side integer constants and appending this set of integer constants to the initial tableau to form an expanded problem with a finite number of family members The implicit enumeration method gives a lower bound on the integer solutions The branch and bound method is used with fathoming tests that allow one family member possibly to fathom other family members A cutting plane option applies a finite number of cuts to each node before branching

In addition the cutting plane method is invoked whenever some members are feasible at a node and others are infeasible. The branching and cutting process is repeated until the entire family of problems has been solved. 3 tables

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