Stochastic Linear Programming Algorithms

A Comparison Based on a Model Management System

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Stochastic Linear Programming Algorithms

John Philip Matthews

Stochastic Linear Programming Algorithms:

Stochastic Linear Programming Algorithms Janos Mayer,2022-04-19 A computationally oriented comparison of solution algorithms for two stage and jointly chance constrained stochastic linear programming problems this is the first book to present comparative computational results with several major stochastic programming solution approaches The following methods are considered regularized decomposition stochastic decomposition and successive discrete approximation methods for two stage problems cutting plane methods and a reduced gradient method for jointly chance constrained problems The first part of the book introduces the algorithms including a unified approach to decomposition methods and their regularized counterparts The second part addresses computer implementation of the methods describes a testing environment based on a model management system and presents comparative computational results with the various algorithms Emphasis is on the computational behavior of the algorithms **Stochastic Linear Programming** P. Kall,2012-12-06 Todaymanyeconomists engineers and mathematicians are familiar with linear programming and are able to apply it This is owing to the following facts during the last 25 years efficient methods have been developed at the same time sufficient computer capacity became available finally in many different fields linear programs have turned out to be appropriate models for solving practical problems However to apply the theory and the methods of linear programming it is required that the data determining a linear program be fixed known numbers This condition is not fulfilled in many practical situations e g when the data are demands technological coefficients available capacities cost rates and so on It may happen that such data are random variables In this case it seems to be common practice to replace these random variables by their mean values and solve the resulting linear program By 1960 various authors had already recog nized that this approach is unsound between 1955 and 1960 there were such papers as Linear Programming under Uncertainty Stochastic Linear Pro gramming with Applications to Agricultural Economics Chance Constrained Programming Inequalities for Stochastic Linear Programming Problems and An Approach to Linear Programming under Uncertainty Stochastic Decomposition Julia L. Higle,S. Sen,2013-11-27 Motivation Stochastic Linear Programming with recourse represents one of the more widely applicable models for incorporating uncertainty within in which the SLP optimization models There are several arenas model is appropriate and such models have found applications in air line yield management capacity planning electric power generation planning financial planning logistics telecommunications network planning and many more In some of these applications modelers represent uncertainty in terms of only a few seenarios and formulate a large scale linear program which is then solved using LP software However there are many applications such as the telecommunications planning problem discussed in this book where a handful of seenarios do not capture variability well enough to provide a reasonable model of the actual decision making problem Problems of this type easily exceed the capabilities of LP software by several orders of magnitude Their solution requires the use of algorithmic methods that exploit the structure of the SLP model in a

manner that will accommodate large scale applications   Stochastic Programming, Algorithms and Models Julia L. Higle,S. Sen,1996   **Stochastic Linear Programming** Peter Kall,János Mayer,2010-11-02 This new edition of Stochastic Linear Programming Models Theory and Computation has been brought completely up to date either dealing with or at least referring to new material on models and methods including DEA with stochastic outputs modeled via constraints on special risk functions generalizing chance constraints ICC s and CVaR constraints material on Sharpe ratio and Asset Liability Management models involving CVaR in a multi stage setup To facilitate use as a text exercises are included throughout the book and web access is provided to a student version of the authors SLP IOR software Additionally the authors have updated the Guide to Available Software and they have included newer algorithms and modeling systems for SLP The book is thus suitable as a text for advanced courses in stochastic optimization and as a reference to the field From Reviews of the First Edition The book presents a comprehensive study of stochastic linear optimization problems and their applications The presentation includes geometric interpretation linear programming duality and the simplex method in its primal and dual forms The authors have made an effort to collect the most useful recent ideas and algorithms in this area A guide to the existing software is included as well Darinka Dentcheva Mathematical Reviews Issue 2006 c This is a graduate text in optimisation whose main emphasis is in stochastic programming The book is clearly written This is a good book for providing mathematicians economists and engineers with an almost complete start up information for working in the field I heartily welcome its publication It is evident that this book will constitute an obligatory reference source for the specialists of the field Carlos Narciso Bouza Herrera Zentralblatt MATH Vol 1104 6 2007   An Algorithm for a Class of Stochastic Linear Programming Problems John Philip Matthews,1971   Computational Stochastic Programming Lewis Ntaimo,2024-04-04 This book provides a foundation in stochastic linear and mixed integer programming algorithms with a focus on practical computer algorithm implementation The purpose of this book is to provide a foundational and thorough treatment of the subject with a focus on models and algorithms and their computer implementation The book s most important features include a focus on both risk neutral and risk averse models a variety of real life example applications of stochastic programming decomposition algorithms detailed illustrative numerical examples of the models and algorithms and an emphasis on computational experimentation With a focus on both theory and implementation of the models and algorithms for solving practical optimization problems this monograph is suitable for readers with fundamental knowledge of linear programming elementary analysis probability and statistics and some computer programming background Several examples of stochastic programming applications areincluded providing numerical examples to illustrate the models and algorithms for both stochastic linear and mixed integer programming and showing the reader how to implement the models and algorithms using computer software   *Enhanced Algorithms for Stochastic Programming* ,1993 In this dissertation we present some of the recent advances made in solving two stage stochastic linear programming problems of large size and complexity

Decomposition and sampling are two fundamental components of techniques to solve stochastic optimization problems We describe improvements to the current techniques in both these areas We studied different ways of using importance sampling techniques in the context of Stochastic programming by varying the choice of approximation functions used in this method We have concluded that approximating the recourse function by a computationally inexpensive piecewise linear function is highly efficient This reduced the problem from finding the mean of a computationally expensive functions to finding that of a computationally inexpensive function Then we implemented various variance reduction techniques to estimate the mean of a piecewise linear function This method achieved similar variance reductions in orders of magnitude less time than when we directly applied variance reduction techniques directly on the given problem In solving a stochastic linear program the expected value problem is usually solved before a stochastic solution and also to speed up the algorithm by making use of the information obtained from the solution of the expected value problem We have devised a new decomposition scheme to improve the convergence of this algorithm   *Applications of Stochastic Programming* Stein W. Wallace,William T. Ziemba,2005-01-01 Consisting of two parts this book presents papers describing publicly available stochastic programming systems that are operational It presents a diverse collection of application papers in areas such as production supply chain and scheduling gaming environmental and pollution control financial modeling telecommunications and electricity   **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   *System Modeling and Optimization* F. Ceragioli,A. Dontchev,H. Furuta,K. Marti,L. Pandolfi,2006-06-07 We publish in this volume the plenary talks and a selection of the papers on numerics optimization and their applications presented at the 22nd Conference on System Modeling and Optimization held at the Politecnico di Torino in July 2005 The conference has been organized by the Mathematical Department of the Politecnico di Torino IFIP is a multinational federation of professional and technical organi tions concerned with information processes It was established in 1959 under the auspices of UNESCO IFIP still mantains friendly connections with s cialized agencies of the UN systems It consists of Technical Committees The Seventh Technical Committee established in 1972 was created in 1968 by A V Balakrishnan J L Lions and G I Marchuk with a joint conference held in Sanremo and Novosibirsk The present edition of the conference is dedicated to Camillo Possio lulled by a bomb during the last air raid over Torino in the sixtieth anniversary of his death The special session On the Possio equation and its special role in aeroelasticity was devoted to his achievements The special

session Shape Analysis and optimization commemorates the 100th anniversary of Pompeiu thesis **Stochastic Programming** Francesco Archetti,G. Di Pillo,Mario Lucertini,1986 Introduction to Stochastic Programming John R. Birge,François Louveaux,2006-04-06 This rapidly developing field encompasses many disciplines including operations research mathematics and probability Conversely it is being applied in a wide variety of subjects ranging from agriculture to financial planning and from industrial engineering to computer networks This textbook provides a first course in stochastic programming suitable for students with a basic knowledge of linear programming elementary analysis and probability The authors present a broad overview of the main themes and methods of the subject thus helping students develop an intuition for how to model uncertainty into mathematical problems what uncertainty changes bring to the decision process and what techniques help to manage uncertainty in solving the problems The early chapters introduce some worked examples of stochastic programming demonstrate how a stochastic model is formally built develop the properties of stochastic programs and the basic solution techniques used to solve them The book then goes on to cover approximation and sampling techniques and is rounded off by an in depth case study A well paced and wide ranging introduction to this subject **Stochastic Optimization** Stanislav Uryasev,Panos M. Pardalos,2001-05-31 Stochastic programming is the study of procedures for decision making under the presence of uncertainties and risks Stochastic programming approaches have been successfully used in a number of areas such as energy and production planning telecommunications and transportation Recently the practical experience gained in stochastic programming has been expanded to a much larger spectrum of applications including financial modeling risk management and probabilistic risk analysis Major topics in this volume include 1 advances in theory and implementation of stochastic programming algorithms 2 sensitivity analysis of stochastic systems 3 stochastic programming applications and other related topics Audience Researchers and academies working in optimization computer modeling operations research and financial engineering The book is appropriate as supplementary reading in courses on optimization and financial engineering **Stochastic linear programming** Peter Kall,1971 **A Reduced Gradient Based Procedure for Two-stage Stochastic Linear Programming** Alexander E. Pound,2000 Stochastic Linear Programming with Discrete Recourse Samuel Keith Eldersveld,1988 **Enhanced Algorithms for Stochastic Programming** Stanford University. Department of Operations Research. Systems Optimization Laboratory,Alamuru S. Krishna,1993 **Optimizations and Programming** Abdelkhalak El Hami,Bouchaib Radi,2021-04-08 This book is a general presentation of complex systems examined from the point of view of management There is no standard formula to govern such systems nor to effectively understand and respond to them The interdisciplinary theory of self organization is teeming with examples of living systems that can reorganize at a higher level of complexity when confronted with an external challenge of a certain magnitude Modern businesses considered as complex systems ideally know how to flexibly and resiliently adapt to their environment and also how to prepare for change via self organization Understanding sources of

potential crisis is essential for leaders though not all crises are necessarily bad news as creative firms know how to respond to challenges through innovation new products and markets organizational learning for collective intelligence and more

Introduction to Stochastic Programming John R. Birge,François Louveaux,2011-06-15 The aim of stochastic programming is to find optimal decisions in problems which involve uncertain data This field is currently developing rapidly with contributions from many disciplines including operations research mathematics and probability At the same time it is now being applied in a wide variety of subjects ranging from agriculture to financial planning and from industrial engineering to computer networks This textbook provides a first course in stochastic programming suitable for students with a basic knowledge of linear programming elementary analysis and probability The authors aim to present a broad overview of the main themes and methods of the subject Its prime goal is to help students develop an intuition on how to model uncertainty into mathematical problems what uncertainty changes bring to the decision process and what techniques help to manage uncertainty in solving the problems In this extensively updated new edition there is more material on methods and examples including several new approaches for discrete variables new results on risk measures in modeling and Monte Carlo sampling methods a new chapter on relationships to other methods including approximate dynamic programming robust optimization and online methods The book is highly illustrated with chapter summaries and many examples and exercises Students researchers and practitioners in operations research and the optimization area will find it particularly of interest Review of First Edition The discussion on modeling issues the large number of examples used to illustrate the material and the breadth of the coverage make Introduction to Stochastic Programming an ideal textbook for the area Interfaces 1998

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