ENTROPY OPTIMIZATION AND MATHEMATICAL PROGRAMMING

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Entropy Optimization And Mathematical Programming International Series In Operations Research Management Science

Eugene A. Feinberg,Adam Shwartz

Entropy Optimization And Mathematical Programming International Series In Operations Research Management Science:

   Entropy Optimization and Mathematical Programming Shu-Cherng Fang,J.R. Rajasekera,H.S.J. Tsao,2012-12-06 Entropy optimization is a useful combination of classical engineering theory entropy with mathematical optimization The resulting entropy optimization models have proved their usefulness with successful applications in areas such as image reconstruction pattern recognition statistical inference queuing theory spectral analysis statistical mechanics transportation planning urban and regional planning input output analysis portfolio investment information analysis and linear and nonlinear programming While entropy optimization has been used in different fields a good number of applicable solution methods have been loosely constructed without sufficient mathematical treatment A systematic presentation with proper mathematical treatment of this material is needed by practitioners and researchers alike in all application areas The purpose of this book is to meet this need Entropy Optimization and Mathematical Programming offers perspectives that meet the needs of diverse user communities so that the users can apply entropy optimization techniques with complete comfort and ease With this consideration the authors focus on the entropy optimization problems in finite dimensional Euclidean space such that only some basic familiarity with optimization is required of the reader   **Operations Research/Management Science at Work** Erhan Kozan,Azuma Ohuchi,2012-12-06 The principle aim of this book entitled Operations ResearchlManagement Science at Work is to provide a summary snapshot of recent research in and applications of Operations Research OR Management Science MS in the Asia pacific region The book emphasises research having potential industry interest covering a wide range of topics from major fields of ORIMS in a systematic and coherent fashion and shows the elegance of their implementations The book is intended to serve the needs of applied researchers who are interested in applications of ORIMS algorithms The book includes descriptions of many real world problems together with their solutions we hope the reader will appreciate their applicability The Asia pacific region has embraced business applications of decision support systems in recent years Given that many of these applications are unaffected by legacy models or systems it has meant that state of the art ORIMS techniques have been embedded in them Moreover the increased use of OR MS techniques in this region provides opportunities for identifying methodological advances that are taking place as a result of the unique nature of the applications These also provide opportunities for exploring synergies and interfaces that exist between OR MS from the point of view of applications as well as theoretical advances   **Operations Research and Health Care** Margaret L. Brandeau,Francois Sainfort,William P. Pierskalla,2006-04-04 In both rich and poor nations public resources for health care are inadequate to meet demand Policy makers and health care providers must determine how to provide the most effective health care to citizens using the limited resources that are available This chapter describes current and future challenges in the delivery of health care and outlines the role that operations research OR models can play in helping to solve those

problems The chapter concludes with an overview of this book its intended audience the areas covered and a description of the subsequent chapters KEY WORDS Health care delivery Health care planning HEALTH CARE DELIVERY PROBLEMS AND CHALLENGES 3 1 1 WORLDWIDE HEALTH THE PAST 50 YEARS Human health has improved significantly in the last 50 years In 1950 global life expectancy was 46 years 1 That figure rose to 61 years by 1980 and to 67 years by 1998 2 Much of these gains occurred in low and middle income countries and were due in large part to improved nutrition and sanitation medical innovations and improvements in public health infrastructure **Proportional Optimization and Fairness** Wieslaw Kubiak,2008-11-16 Proportional Optimization and Fairness is a long needed attempt to reconcile optimization with apportionment in just in time JIT sequences and find the common ground in solving problems ranging from sequencing mixed model just in time assembly lines through just in time batch production balancing workloads in event graphs to bandwidth allocation internet gateways and resource allocation in computer operating systems The book argues that apportionment theory and optimization based on deviation functions provide natural benchmarks for a process and then looks at the recent research and developments in the field Individual chapters look at the theory of apportionment and just in time sequences minimization of just in time sequence deviation optimality of cyclic sequences and the oneness bottleneck minimization competition free instances Fraenkel s Conjecture and optimal admission sequences response time variability applications to the Liu Layland Problem and pinwheel scheduling temporal capacity constraints and supply chain balancing fair queuing and stride scheduling and smoothing and batching **Principles of Mathematics in Operations Research** Levent Kandiller,2006-12-18 Principles of Mathematics in Operations Research is a comprehensive survey of the mathematical concepts and principles of industrial mathematics Its purpose is to provide students and professionals with an understanding of the fundamental mathematical principles used in Industrial Mathematics OR in modeling problems and application solutions All the concepts presented in each chapter have undergone the learning scrutiny of the author and his students The conceptual relationships within the chapter material have been developed in the classroom experience working with the students level of understanding The illustrative material throughout the book i e worked out problems and examples of the mathematical principles was refined for student comprehension as the manuscript developed through its iterations and the chapter exercises are refined from the previous year s exercises In sum the author has carefully developed a pedagogically strong survey textbook of OR and Industrial Mathematics **Design and Analysis of Simulation Experiments** Jack P.C. Kleijnen,2007-11-15 Simulation is a widely used methodology in all Applied Science disciplines This textbook focuses on this crucial phase in the overall process of applying simulation and includes the best of both classic and modern methods of simulation experimentation This book will be the standard reference book on the topic for both researchers and sophisticated practitioners and it will be used as a textbook in courses or seminars focusing on this topic *Project Selection Under Uncertainty* Stylianos Kavadias,Christoph H. Loch,2012-12-06 Project Selection Under Uncertainty is the result of a five year

research program on the selection of projects in New Product Development NPD Choosing the New Product Development portfolio is of critical importance in today s business environment The NPD portfolio has considerable strategic effect on the middle term success of a business This book takes a step in developing a theory that addresses the need for quantitative prioritization criteria within the broader strategic context of the R D portfolios Its foundation lies in mathematical theory of resource constrained optimization with the goal to maximize quantitative returns The book seeks to broaden the portfolio discussion in two ways First simplified models appropriate for the data poor NPD context are developed which attempt to illuminate the structure of the choice problem and robust qualitative rules of thumb rather than detailed algorithmic decision support Such robust rules can be applied in the R D environment of poor data availability Second the annual portfolio review is not the only important choice in resource allocation In addition the book discusses how ideas might be pre screened as they emerge and how projects should be prioritized once they are funded and ongoing **Product Variety Management** Teck-Hua Ho,Christopher S. Tang,2012-12-06 Product proliferation has become a common phenomenon Most companies now offer hundreds if not thousands of stock keeping units SKUs in order to compete in the market place Companies with expanding product and service varieties face with problems of obtaining accurate demand forecasts controlling production and inventory costs and providing high quality and good delivery performance for the customers Marketing managers often advocate widening product lines for increasing revenue and market share However the breadth of product line can also decrease the efficiency of manufacturing processes and distribution systems Thus firms must weigh the benefits of product variety against its cost in order to determine the optimal level of product variety to offer to their customers Academics and practitioners are interested in several fundamental questions about product variety For instance why do companies extend their product lines Do consumers care about product variety Will a brand with more variety enjoy higher market share How should product variety be measured How can a company exploit its product and process design to deliver a higher level of product variety quickly and cheaply What should the level of product variety be and what should the price of each of the product variants be What kind of challenges would a company face in offering a high level of product variety and how can these obstacles be overcome The solutions to these questions span multiple functions and disciplines **Energy and Environmental Policy Modeling** John Weyant,2012-12-06 A Simple Model of Electric Power Network 48 Power flow equations 48 Social welfare action 49 A Market Mechanism 50 An efficient trading rule 51 Competitive equilibrium and social optimum 52 A Dynamic Trading Process 54 An Illustrative Example 56 Alternative Implementation Plans 59 Conclusions 59 Appendix 60 References 64 Endnotes 64 Chapter 5 The Berlin Mandate The Design ofCost Effictive Mitigation Strategies 67 Introduction 68 The Models 69 Future Emissions 70 The Costs of Alternative Commitments 73 Some Final Comments 80 Endnotes 82 Chapter 6 Some Implications of Improved CO Emissions Control Technology in The Context of Global Climate Change 85 Introduction 85 The CET A R Model 86 Economic system 86 Climate system 87 Uncertain losses from

temperature rise 87 Technology Assumptions 88 Implications of Loss Probability and Technology Assumptions 89 Improved Technology and the Value of Infonnation About Damage 94 Value of Information about Technology and Benefits of Improved Technology 95 Sununary and Conclusions 97 References 97 Endnotes 98 Chapter 7 Determining an Optimal Afforestation Policy A Cost Benefit Analysis 99 Introduction Motivation and afforestation 99 Afforesting and halting deforestation domestic verses global solutions l 01 Research Objectives l 02 Integrated assessment 102 Time horizon and discounting 103 Carbon sequestration time path l 03 vi Interactions with other markets 104 Structural Overview l 04 Traditional timberland module 106 Afforestation module 106 Timber market module l 08 Sequestration calculations 109 bjective function 109 Regionalization and Model Data 110 Southern submodel data 111 Pacific submodel data   **Multicriteria Decision Making** Tomas Gal,Theodor Stewart,Thomas Hanne,2013-03-09 At a practical level mathematical programming under multiple objectives has emerged as a powerful tool to assist in the process of searching for decisions which best satisfy a multitude of conflicting objectives and there are a number of distinct methodologies for multicriteria decision making problems that exist These methodologies can be categorized in a variety of ways such as form of model e g linear non linear stochastic characteristics of the decision space e g finite or infinite or solution process e g prior specification of preferences or interactive Scientists from a variety of disciplines mathematics economics and psychology have contributed to the development of the field of Multicriteria Decision Making MCDM or Multicriteria Decision Analysis MCDA Multiattribute Decision Making MADM Multiobjective Decision Making MODM etc over the past 30 years helping to establish MCDM as an important part of management science MCDM has become a central component of studies in management science economics and industrial engineering in many universities worldwide Multicriteria Decision Making Advances in MCDM Models Algorithms Theory and Applications aims to bring together state of the art reviews and the most recent advances by leading experts on the fundamental theories methodologies and applications of MCDM This is aimed at graduate students and researchers in mathematics economics management and engineering as well as at practicing management scientists who wish to better understand the principles of this new and fast developing field   **Applied Probability and Stochastic Processes** J. George Shanthikumar,Ushio Sumita,2012-12-06 Applied Probability and Stochastic Processes is an edited work written in honor of Julien Keilson This volume has attracted a host of scholars in applied probability who have made major contributions to the field and have written survey and state of the art papers on a variety of applied probability topics including but not limited to perturbation method time reversible Markov chains Poisson processes Brownian techniques Bayesian probability optimal quality control Markov decision processes random matrices queueing theory and a variety of applications of stochastic processes The book has a mixture of theoretical algorithmic and application chapters providing examples of the cutting edge work that Professor Keilson has done or influenced over the course of his highly productive and energetic career in applied probability and stochastic processes The book will be of interest to academic researchers

students and industrial practitioners who seek to use the mathematics of applied probability in solving problems in modern society   **Decision Criteria and Optimal Inventory Processes** Baoding Liu,Augustine O. Esogbue,2012-12-06 Decision Criteria and Optimal Inventory Processes provides a theoretical and practical introduction to decision criteria and inventory processes Inventory theory is presented by focusing on the analysis and processes underlying decision criteria Included are many state of the art criterion models as background material These models are extended to the authors newly developed fuzzy criterion models which constitute a general framework for the study of stochastic inventory models with special focus on the real world inventory theoretic reservoir operations problems The applications of fuzzy criterion dynamic programming models are illustrated by reservoir operations including the integrated network of reservoir operation and the open inventory network problems An interesting feature of this book is the special attention it pays to the analysis of some theoretical and applied aspects of fuzzy criteria and dynamic fuzzy criterion models thus opening up a new way of injecting the much needed type of non cost intuitive and easy to use methods into multi stage inventory processes This is accomplished by constructing and optimizing the fuzzy criterion models developed for inventory processes Practitioners in operations research management science and engineering will find numerous new ideas and strategies for modeling real world multi stage inventory problems and researchers and applied mathematicians will find this work a stimulating and useful reference

   Handbook of Markov Decision Processes Eugene A. Feinberg,Adam Shwartz,2012-12-06 Eugene A Feinberg Adam Shwartz This volume deals with the theory of Markov Decision Processes MDPs and their applications Each chapter was written by a leading expert in the re spective area The papers cover major research areas and methodologies and discuss open questions and future research directions The papers can be read independently with the basic notation and concepts ofSection 1 2 Most chap ters should be accessible by graduate or advanced undergraduate students in fields of operations research electrical engineering and computer science 1 1 AN OVERVIEW OF MARKOV DECISION PROCESSES The theory of Markov Decision Processes also known under several other names including sequential stochastic optimization discrete time stochastic control and stochastic dynamic programming studiessequential optimization ofdiscrete time stochastic systems The basic object is a discrete time stochas tic system whose transition mechanism can be controlled over time Each control policy defines the stochastic process and values of objective functions associated with this process The goal is to select a good control policy In real life decisions that humans and computers make on all levels usually have two types ofimpacts i they cost orsavetime money or other resources or they bring revenues as well as ii they have an impact on the future by influencing the dynamics In many situations decisions with the largest immediate profit may not be good in view offuture events MDPs model this paradigm and provide results on the structure and existence of good policies and on methods for their calculation   **Level Crossing Methods in Stochastic Models** Percy H. Brill,2008-12-03 From 1972 to 1974 I was working on a PhD thesis entitled Multiple Server Queues with Service Time Depending on Waiting Time The method of

analysis was the embedded Markov chain technique described in the papers 82 and 77 My analysis involved lengthy tedious deri tions of systems of integral equations for the probability density function pdf of the waiting time After pondering for many months whether there might be a faster easier way to derive the integral equations I nally discovered the basic theorems for such a method in August 1974 The theorems establish a connection between sample path level crossing rates of the virtual wait process and the pdf of the waiting time This connection was not found anywhere else in the literature at the time I immediately developed a comprehensive new methodology for deriving the integral equations based on these theorems and called it system point theory Subsequently it was called system point method or system point level crossing method SPLC or simply LC I rewrote the entire PhD thesis from November 1974 to March 1975 using LC to reach solutions The new thesis was called System Point Theory in Exponential Queues On June 12 1975 I presented an invited talk on the new methodology at the Fifth Conference on Stochastic Processes and their Applications at the University of Maryland Many queueing theorists were present   **Project Scheduling** Jan Weglarz,2012-12-06 Project scheduling problems are generally speaking the problems of allocating scarce resources over time to perform a given set of activities The resources are nothing other than the arbitrary means which activities complete for Also the activities can have a variety of interpretations Thus project scheduling problems appear in a large spectrum of real world situations and in consequence they have been intensively studied for almost fourty years Almost a decade has passed since the multi author monograph R Slowinski 1 W glarz eds Advances in Project Scheduling Elsevier 1989 summarizing the state of the art across project scheduling problems was published Since then considerable progress has been made in all directions of modelling and finding solutions to these problems Thus the proposal by Professor Frederick S Hillier to edit a handbook which reports on the recent advances in the field came at an exceptionally good time and motivated me to accept the challenge Fortunately almost all leading experts in the field have accepted my invitation and presented their completely new advances often combined with expository surveys Thanks to them the handbook stands a good chance of becoming a key reference point on the current state of the art in project scheduling as well as on new directions in the area The contents are divided into four parts The first one dealing with classical models exact algorithms is preceded by a proposition of the classification scheme for scheduling problems

   Designing Competitive Electricity Markets Hung-po Chao,Hillard G. Huntington,2013-12-01 The authors are prominent economists operation researchers and engineers who have been instrumental in the development of the conceptual framework for electric power restructuring both in the United States and in other countries Rather than espousing a particular market design for the industry s future each author focuses on an important issue or set of issues and tries to frame the questions for designing electricity markets using an international perspective The book focuses on the economic and technical questions important in understanding the industry s long term development rather than providing immediate answers for the current political debates on industry competition   *Quality, Warranty and Preventive*

Maintenance Izzet Sahin,Hakan Polatoglu,2012-12-06 Quality Warranty and Preventive Maintenance examines the impact of product quality on warranty and maintenance costs and strategies from the perspectives of both manufacturers and users In addition the theories of warranty and preventive maintenance are introduced and discussed Common wisdom supports the notion that better product quality means lower warranty costs for the manufacturer and lower maintenance costs for the users of a manufactured product This proposition is examined in some detail on the basis of failure time models The authors investigate what exactly better quality means in warranty and maintenance management and how it impacts warranty policies and costs for the manufacturer and replacement and maintenance strategies and costs for the users In measuring quality improvement the main concepts and tools used are those of stochastic ordering and mixture models The theoretical base of the work is a time varying failure rectification process This process includes as special cases replacement minimal repair and imperfect repair as alternative rectification modes that may be available to the manufacturer or the user in warranty servicing or maintaining a product In addition to serving as a unifying base for the entire monograph the use of this process enables one to investigate jointly optimal repair effort warranty policy and repair effort maintenance strategy configurations for repairable units This book should be of interest to researchers in industry and academia and to quality warranty and maintenance professionals specialists and managers with a technical background It is suitable as a textbook to support graduate level seminar courses in OR MS IE and business administration curricula **Generalized Concavity in Fuzzy Optimization and Decision Analysis** Jaroslav Ramík,Milan Vlach,2012-12-06 Convexity of sets in linear spaces and concavity and convexity of functions lie at the root of beautiful theoretical results that are at the same time extremely useful in the analysis and solution of optimization problems including problems of either single objective or multiple objectives Not all of these results rely necessarily on convexity and concavity some of the results can guarantee that each local optimum is also a global optimum giving these methods broader application to a wider class of problems Hence the focus of the first part of the book is concerned with several types of generalized convex sets and generalized concave functions In addition to their applicability to nonconvex optimization these convex sets and generalized concave functions are used in the book s second part where decision making and optimization problems under uncertainty are investigated Uncertainty in the problem data often cannot be avoided when dealing with practical problems Errors occur in real world data for a host of reasons However over the last thirty years the fuzzy set approach has proved to be useful in these situations It is this approach to optimization under uncertainty that is extensively used and studied in the second part of this book Typically the membership functions of fuzzy sets involved in such problems are neither concave nor convex They are however often quasiconcave or concave in some generalized sense This opens possibilities for application of results on generalized concavity to fuzzy optimization Despite this obvious relation applying the interface of these two areas has been limited to date It is hoped that the combination of ideas and results from the field of generalized concavity on the one hand and fuzzy optimization on the other

hand outlined and discussed in Generalized Concavity in Fuzzy Optimization and Decision Analysis will be of interest to both communities Our aimis to broaden the classes of problems that the combination of these two areas can satisfactorily address and solve   Stochastic Modeling and Optimization of Manufacturing Systems and Supply Chains J. George Shanthikumar,David D. Yao,W.H.M. Zijm,2012-12-06 This volume originates from two workshops both focusing on themes that are reflected in the title of the volume The first workshop took place at Eindhoven University of Technology April 24 26 2001 on the occasion of the University granting a doctorate honoris causa to Profes sor John A Buzacott The second workshop was held on June 15 2002 at Cornell University preceding the annual INFORMSjMSOM Confer ence honoring John s retirement and his lifetime contributions Each of the two workshops consisted of about a dozen technical presentations The objective of the volume however is not to simply publish the proceedings of the two workshops Rather our objective is to put to gether a select set of articles each organized into a well written chapter focusing on a timely topic Collected into a single volume these chapters aim to serve as a useful reference for researchers and practitioners alike and also as reading materials for graduate courses or seminars   Supply Chain Structures Jing-Sheng Song,David D. Yao,2013-06-29 In the foreword to Supply Chain Structures Professor Paul Zipkin notes three global changes that have enabled the recent vast developments in the field of supply chains Moreover these changes may be only the beginning and more change is likely in the fast moving field of supply chain management These global changes are the explosive growth of the Internet the growth in free market economies with the corresponding political interest in global economic stability and the emergence of a global managerial culture focused on performance quality and service Professor Zipkin goes on to say In Supply Chain Structures the editors Jeannette Song and David Yao have collected a spectrum of approaches to these challenges from some of the leading scholars of supply chains from both the academic and commercial worlds Each of the articles offers an interesting and illuminating way to think about the key issues in supply chain management Some also offer practical techniques to solve important problems Together they provide an excellent survey of the current state of the art in research and practice

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