APPLIED OPTIMIZATION

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METAHEURISTICS
COMPUTER DECISION-MAKING

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Metaheuristics Computer Decisionmaking:

   Metaheuristics Mauricio G.C. Resende,J. Pinho de Sousa,2003-11-30 Combinatorial optimization is the process of finding the best or optimal so lution for problems with a discrete set of feasible solutions Applications arise in numerous settings involving operations management and logistics such as routing scheduling packing inventory and production management lo cation logic and assignment of resources The economic impact of combi natorial optimization is profound affecting sectors as diverse as transporta tion airlines trucking rail and shipping forestry manufacturing logistics aerospace energy electrical power petroleum and natural gas telecommu nications biotechnology financial services and agriculture While much progress has been made in finding exact provably optimal so lutions to some combinatorial optimization problems using techniques such as dynamic programming cutting planes and branch and cut methods many hard combinatorial problems are still not solved exactly and require good heuristic methods Moreover reaching optimal solutions is in many cases meaningless as in practice we are often dealing with models that are rough simplifications of reality The aim of heuristic methods for combinatorial op timization is to quickly produce good quality solutions without necessarily providing any guarantee of solution quality Metaheuristics are high level procedures that coordinate simple heuristics such as local search to find solu tions that are of better quality than those found by the simple heuristics alone Modem metaheuristics include simulated annealing genetic algorithms tabu search GRASP scatter search ant colony optimization variable neighborhood search and their hybrids   **Metaheuristics** Marco Caserta,Stefan Voß,2016-01-07 This volume is centered on exemplifying how metaheuristics have acquired a prominent role in supporting the decision making process of practitioners dealing with complex real world problems arising in different fields and realms of application The conference was centered on presenting original and innovative approaches dealing with metaheuristic algorithms from two broad perspectives Application oriented perspective A large number of contributions can be labelled application oriented since they present successful application of metaheuristics to real world problems arising in different fields Methodological perspective In line with recent trends in metaheuristics researchers have devoted a great deal of attention to the hows and whys of metaheuristics studying e g what is the impact of a given feature of a metaheuristic on the final performance of the algorithm how to fine tune and calibrate a metaheuristic how to properly design and combine neighborhoods and so forth The conference was organized for the benefit of researchers and practitioners from 25 different countries A total of 117 attendees were present for the conference in Hamburg During the conference a total of 94 presentations were given in these subject areas representing both research and applications Of these 37 papers were submitted for publication in the post conference volume These papers were peer reviewed resulting in a select number of high quality papers that are represented in this volume The organization of this volume follows the more general structure of the conference itself The volume can be broadly divided into two main sections Methodology and Applications Within each chapter of the Methodology section the

reader is driven inside a metaheuristic with the aim of grasping how and why a certain feature works how neighborhoods can be effectively designed combined and implemented how a metaheuristic should be fine tuned along with other methodological issues The focus of these chapters lies more on the metaheuristic itself as opposed to a more application oriented approach of the second part of the book The second part of the book Applications presents a number of contributions that illustrate how metaheuristics have been successfully employed to tackle either classical problems from the literature or real world problems from the industry   An Introduction to Metaheuristics for Optimization Bastien Chopard,Marco Tomassini,2018-11-02 The authors stress the relative simplicity efficiency flexibility of use and suitability of various approaches used to solve difficult optimization problems The authors are experienced interdisciplinary lecturers and researchers and in their explanations they demonstrate many shared foundational concepts among the key methodologies This textbook is a suitable introduction for undergraduate and graduate students researchers and professionals in computer science engineering and logistics   *Metaheuristics for Business Analytics* Abraham Duarte,Manuel Laguna,Rafael Marti,2017-11-24 This essential metaheuristics tutorial provides descriptions and practical applications in the area of business analytics It addresses key problems in predictive and prescriptive analysis while also illustrating how problems that arise in business analytics can be modelled and how metaheuristics can be used to find high quality solutions Readers will be introduced to decision making problems for which metaheuristics offer the most effective solution technique The book not only shows business problem modelling on a spreadsheet but also how to design and create a Visual Basic for Applications code Extra Material can be downloaded at http extras springer com 978 3 319 68117 7   **Metaheuristics** Mauricio G.C. Resende,J. Pinho de Sousa,2013-06-29 Combinatorial optimization is the process of finding the best or optimal so lution for problems with a discrete set of feasible solutions Applications arise in numerous settings involving operations management and logistics such as routing scheduling packing inventory and production management lo cation logic and assignment of resources The economic impact of combi natorial optimization is profound affecting sectors as diverse as transporta tion airlines trucking rail and shipping forestry manufacturing logistics aerospace energy electrical power petroleum and natural gas telecommu nications biotechnology financial services and agriculture While much progress has been made in finding exact provably optimal so lutions to some combinatorial optimization problems using techniques such as dynamic programming cutting planes and branch and cut methods many hard combinatorial problems are still not solved exactly and require good heuristic methods Moreover reaching optimal solutions is in many cases meaningless as in practice we are often dealing with models that are rough simplifications of reality The aim of heuristic methods for combinatorial op timization is to quickly produce good quality solutions without necessarily providing any guarantee of solution quality Metaheuristics are high level procedures that coordinate simple heuristics such as local search to find solu tions that are of better quality than those found by the simple heuristics alone Modem metaheuristics include simulated annealing genetic algorithms tabu

search GRASP scatter search ant colony optimization variable neighborhood search and their hybrids   *2008 Tutorials in Operations Research: State-of-the-Art Decision-Making Tools in the Information-Intensive Age* ,   **Fuzzy and Multi-Level Decision Making: Soft Computing Approaches** Chi-Bin Cheng,Hsu-Shih Shih,E. Stanley Lee,2018-12-14 This book offers a comprehensive overview of cutting edge approaches for decision making in hierarchical organizations It presents soft computing based techniques including fuzzy sets neural networks genetic algorithms and particle swarm optimization and shows how these approaches can be effectively used to deal with problems typical of this kind of organization After introducing the main classical approaches applied to multiple level programming the book describes a set of soft computing techniques demonstrating their advantages in providing more efficient solutions to hierarchical decision making problems compared to the classical methods Based on the book Fuzzy and Multi Level Decision Making Springer 2001 by Lee E S and Shih H this second edition has been expanded to include the most recent findings and methods and a broader spectrum of soft computing approaches All the algorithms are presented in detail together with a wealth of practical examples and solutions to real world problems providing students researchers and professionals with a timely practice oriented reference guide to the area of interactive fuzzy decision making multi level programming and hierarchical optimization   **Handbook of Industrial and Systems Engineering** Adedeji B. Badiru,2005-12-15 Responding to the demand by researchers and practitioners for a comprehensive reference Handbook of Industrial and Systems Engineering offers full and easy access to a wide range of industrial and systems engineering tools and techniques in a concise format Providing state of the art coverage from more than 40 contributing authors many of whom a   Optimization and Computing using Intelligent Data-Driven Approaches for Decision-Making Irfan Ali,Umar Muhammad Modibbo,Asaju La'aro Bolaji,Harish Garg,2024-12-26 This book comprehensively discusses nature inspired algorithms deep learning methods applications of mathematical programming and artificial intelligence techniques It further covers important topics such as the use of machine learning and the Internet of Things and multi objective optimization under Fermatean hesitant fuzzy and uncertain environment This book Addresses solving practical problems such as supply chain management smart manufacturing and healthcare analytics using intelligent computing and discusses solving the fuzzy inference system in ant colony optimization for traveling salesman problem Presents an overview of artificial intelligence AI and explainable AI decision making XAIDM and illustrates a data driven optimization concept for modeling environmental and economic sustainability Discusses machine learning based multi objective optimization technique for load balancing in integrated fog cloud environment Explains the use of heuristics and metaheuristics in supply chain networks and the use of fuzzy optimization in sustainable development goals Discusses sustainable transit of hazardous waste green fractional transportation system perishable inventory M estimation of functional regression operator and intuitionistic fuzzy sets applications The text is primarily written for graduate students and academic researchers in diverse fields including operations research mathematics statistics computer science information and

communication technology and industrial engineering **Modeling, Analysis, and Applications in Metaheuristic Computing: Advancements and Trends** Yin, Peng-Yeng,2012-03-31 This book is a collection of the latest developments models and applications within the transdisciplinary fields related to metaheuristic computing providing readers with insight into a wide range of topics such as genetic algorithms differential evolution and ant colony optimization Provided by publisher Recent Developments in Metaheuristics Lionel Amodeo,El-Ghazali Talbi,Farouk Yalaoui,2017-09-18 This book highlights state of the art developments in metaheuristics research It examines all aspects of metaheuristic research including new algorithmic developments applications new research challenges theoretical developments implementation issues in depth experimental studies The book is divided into two sections Part I is focused on new optimization and modeling techniques based on metaheuristics The chapters in this section cover topics from multi objective problems with fuzzy data with triangular valued objective functions to hyper heuristics optimization methodology designing genetic algorithms and also the cuckoo search algorithm The techniques described help to enhance the usability and increase the potential of metaheuristic algorithms Part II showcases advanced metaheuristic approaches to solve real life applications issues This includes an examination of scheduling the vehicle routing problem multimedia sensor network supplier selection bin packing objects tracking and radio frequency identification In the fields covered in the chapters are of high impact applications of metaheuristics The chapters offer innovative applications of metaheuristics that have a potential of widening research frontiers Altogether this book offers a comprehensive look at how researchers are currently using metaheuristics in different domains of design and application Soft Computing Based Optimization and Decision Models David A. Pelta,Carlos Cruz Corona,2017-08-03 This book offers a timely snapshot of current soft computing research and solutions to decision making and optimization problems which are ubiquitous in the current social and technological context addressing fields including logistics transportation and data analysis Written by leading international experts from the United States Brazil and Cuba as well as the United Kingdom France Finland and Spain it discusses theoretical developments in and practical applications of soft computing in fields where these methods are crucial to obtaining better models including intelligent transportation systems maritime logistics portfolio selection decision making fuzzy cognitive maps and fault detection The book is dedicated to Professor Jos L Verdegay a pioneer who has been actively pursuing research in fuzzy sets theory and soft computing since 1982 in honor of his 65th birthday **Metaheuristics** Patrick Siarry,2016-12-24 Metaheuristics exhibit desirable properties like simplicity easy parallelizability and ready applicability to different types of optimization problems After a comprehensive introduction to the field the contributed chapters in this book include explanations of the main metaheuristics techniques including simulated annealing tabu search evolutionary algorithms artificial ants and particle swarms followed by chapters that demonstrate their applications to problems such as multiobjective optimization logistics vehicle routing and air traffic management The authors are leading researchers in this domain with considerable teaching and applications experience and

the book will be of value to industrial practitioners graduate students and research academics   <u>Tutorials in Operations Research</u> Institute for Operations Research and the Management Sciences. National Meeting,2008   **Interfaces in Computer Science and Operations Research** R. S. Barr,R.V. Helgason,Jeffrey L. Kennington,1996-12-31 The disciplines of computer science and operations research OR have been linked since their origins each contributing to the dramatic advances of the other This work explores the connections between these key technologies how high performance computing methods have led to advances in OR de ployment and how OR has contributed to the design and development of ad vanced systems The collected writings from researchers and practitioners in Computer Science Operations Research Management Science and Artificial Intelligence were among those delivered at the Fifth INFORMS Computer Science Technical Section Conference in Dallas Texas January 8 10 1996 The articles advance both theory and practice Presented are new approaches to complex problems based on metaheuristics neural networks genetic al gorithms and Tabu Search optimization and mathematical programming stochastic methods constraint programming and logical analysis These ad vanced methodologies are applied to new applications in such areas as telecom munications network design financial engineering manufacturing project man agement and forecasting airline and machine scheduling vehicle routing mod eling and decision support systems Featured is a remarkable paper by keynote speaker Fred Glover creator of the Tabu Search family of metaheuristics In it he develops the principles of memory based heuristic methods contrasts them with the popular genetic algorithms and simulated annealing provides a sweeping survey of application vignettes and points to promising avenues for future research   **Mathematical Reviews** ,2005   **Experimental and Efficient Algorithms** ,2004   *Practice and Theory of Automated Timetabling* ,2000   *Principles and Practice of Constraint Programming* ,2004   *Proceedings* ,2003

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