

Operations Research/Computer Science Interfaces Series

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Metaheuristics for Production Systems



 Springer

Metaheuristics Production Operations Research Interfaces

**Farouk Yalaoui, Lionel Amodeo, El-
Ghazali Talbi**



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Metaheuristics for Production Systems El-Ghazali Talbi, Farouk Yalaoui, Lionel Amodeo, 2015-11-26 This book discusses the main techniques and newest trends to manage and optimize the production and service systems The book begins by examining the three main levels of decision systems in production the long term strategic the middle term tactical and short term operational It also considers online management as a new level a sub level of the short term As each level encounters specific problems appropriate approaches to deal with these are introduced and explained These problems include the line design the line balancing optimization the physical layout of the production or service system the forecasting optimization the inventory management the scheduling etc Metaheuristics for Production Systems then explores logistic optimization from two different perspectives internal production management addressing issues of scheduling layout and line designs and external supply chain management focusing on transportation optimization supply chain evaluation and location of production The book also looks at NP hard problems that are common in production management These complex configurations may mean that optimal solutions may not be reached due to variables but the authors help provide a good solution for such problems The effective new results and solutions offered in this book should appeal to researchers managers and engineers in the production and service industries

Metaheuristics for Production Scheduling Bassem Jarboui, Patrick Siarry, Jacques Teghem, 2013-06-12 This book describes the potentialities of metaheuristics for solving production scheduling problems and the relationship between these two fields For the past several years there has been an increasing interest in using metaheuristic methods to solve scheduling problems The main reasons for this are that such problems are generally hard to solve to optimality as well as the fact that metaheuristics provide very good solutions in a reasonable time The first part of the book presents eight applications of metaheuristics for solving various mono objective scheduling problems The second part is itself split into two the first section being devoted to five multi objective problems to which metaheuristics are adapted while the second tackles various transportation problems related to the organization of production systems Many real world applications are presented by the authors making this an invaluable resource for researchers and students in engineering economics mathematics and computer science

Heuristics for Optimization and Learning Farouk Yalaoui, Lionel Amodeo, El-Ghazali Talbi, 2020-12-15 This book is a new contribution aiming to give some last research findings in the field of optimization and computing This work is in the same field target than our two previous books published Recent Developments in Metaheuristics and Metaheuristics for Production Systems books in Springer Series in Operations Research Computer Science Interfaces The challenge with this work is to gather the main contribution in three fields optimization technique for production decision general development for optimization and computing method and wider spread applications The number of researches dealing with decision maker tool and optimization method grows very quickly these last years and in a large number of fields We may be able to read nice and worthy works from research developed in

chemical mechanical computing automotive and many other fields **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 **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 **Manufacturing Scheduling Systems** Jose M.

Framinan,Rainer Leisten,Rubén Ruiz García,2014-02-19 The book is devoted to the problem of manufacturing scheduling which is the efficient allocation of jobs orders over machines resources in a manufacturing facility It offers a comprehensive and integrated perspective on the different aspects required to design and implement systems to efficiently and effectively support manufacturing scheduling decisions Obtaining economic and reliable schedules constitutes the core of excellence in customer service and efficiency in manufacturing operations Therefore scheduling forms an area of vital importance for competition in manufacturing companies However only a fraction of scheduling research has been translated into practice due to several reasons First the inherent complexity of scheduling has led to an excessively fragmented field in which different sub problems and issues are treated in an independent manner as goals themselves therefore lacking a unifying view of the scheduling problem Furthermore mathematical brilliance and elegance has sometimes taken preference over practical general purpose hands on approaches when dealing with these problems Moreover the paucity of research on

implementation issues in scheduling has restricted translation of valuable research insights into industry Manufacturing Scheduling Systems An Integrated View on Models Methods and Tools presents the different elements constituting a scheduling system along with an analysis the manufacturing context in which the scheduling system is to be developed Examples and case studies from real implementations of scheduling systems are presented in order to drive the presentation of the theoretical insights The book is intended for an ample readership including industrial engineering operations post graduate students and researchers business managers and readers seeking an introduction to the field

2008 Tutorials in Operations Research: State-of-the-Art Decision-Making Tools in the Information-Intensive Age , Handbook of Approximation Algorithms and Metaheuristics Teofilo F. Gonzalez, 2018-05-15 Handbook of Approximation Algorithms and Metaheuristics Second Edition reflects the tremendous growth in the field over the past two decades Through contributions from leading experts this handbook provides a comprehensive introduction to the underlying theory and methodologies as well as the various applications of approximation algorithms and metaheuristics Volume 1 of this two volume set deals primarily with methodologies and traditional applications It includes restriction relaxation local ratio approximation schemes randomization tabu search evolutionary computation local search neural networks and other metaheuristics It also explores multi objective optimization reoptimization sensitivity analysis and stability Traditional applications covered include bin packing multi dimensional packing Steiner trees traveling salesperson scheduling and related problems Volume 2 focuses on the contemporary and emerging applications of methodologies to problems in combinatorial optimization computational geometry and graphs problems as well as in large scale and emerging application areas It includes approximation algorithms and heuristics for clustering networks sensor and wireless communication bioinformatics search streams virtual communities and more About the Editor Teofilo F Gonzalez is a professor emeritus of computer science at the University of California Santa Barbara He completed his Ph D in 1975 from the University of Minnesota He taught at the University of Oklahoma the Pennsylvania State University and the University of Texas at Dallas before joining the UCSB computer science faculty in 1984 He spent sabbatical leaves at the Monterrey Institute of Technology and Higher Education and Utrecht University He is known for his highly cited pioneering research in the hardness of approximation for his sublinear and best possible approximation algorithm for k tMM clustering for introducing the open shop scheduling problem as well as algorithms for its solution that have found applications in numerous research areas as well as for his research on problems in the areas of job scheduling graph algorithms computational geometry message communication wire routing etc

Metaheuristic Optimization via Memory and Evolution Cesar Rego, Bahram Alidaee, 2006-03-30 Tabu Search TS and more recently Scatter Search SS have proved highly effective in solving a wide range of optimization problems and have had a variety of applications in industry science and government The goal of Metaheuristic Optimization via Memory and Evolution Tabu Search and Scatter Search is to report original research on

algorithms and applications of tabu search scatter search or both as well as variations and extensions having adaptive memory programming as a primary focus Individual chapters identify useful new implementations or new ways to integrate and apply the principles of TS and SS or that prove new theoretical results or describe the successful application of these methods to real world problems

Production Systems and Supply Chain Management in Emerging Countries: Best Practices Gonzalo Mejía, Nubia Velasco, 2012-05-31 The book presents several highly selected cases in emerging countries where the production logistics systems have been optimized or improved with the support of mathematical models The book contains a selection of papers from the 5th International Conference on Production Research ICPR Americas 2010 held on July 21-23 in Bogotá Colombia The main topic of the conference was Technologies in Logistics and Manufacturing for Small and Medium Enterprises which is perfectly aligned with the realities of emerging countries The book presents methodologies and case studies related to a wide variety of production logistics systems such as dairy production auto parts steel and iron production and financial services It is focused but not limited to Small Medium Enterprises

Production Planning and Control for Semiconductor Wafer Fabrication Facilities Lars Mönch, John W. Fowler, Scott J. Mason, 2012-09-14 Over the last fifty plus years the increased complexity and speed of integrated circuits have radically changed our world Today semiconductor manufacturing is perhaps the most important segment of the global manufacturing sector As the semiconductor industry has become more competitive improving planning and control has become a key factor for business success This book is devoted to production planning and control problems in semiconductor wafer fabrication facilities It is the first book that takes a comprehensive look at the role of modeling analysis and related information systems for such manufacturing systems The book provides an operations research and computer science based introduction into this important field of semiconductor manufacturing related research

Metaheuristics for Scheduling in Industrial and Manufacturing Applications Fatos Xhafa, Ajith Abraham, 2008-06-21 During the past decades scheduling has been among the most studied optimization problems and it is still an active area of research Scheduling appears in many areas of science engineering and industry and takes different forms depending on the restrictions and optimization criteria of the operating environments

8 For instance in optimization and computer science scheduling has been defined as the allocation of tasks to resources over time in order to achieve optimality in one or more objective criteria in an efficient way and in production as production schedule i.e. the planning of the production or the sequence of operations according to which jobs pass through machines and is optimal with respect to certain optimization criteria Although there is a standardized form of stating any scheduling problem namely efficient allocation of jobs on machines which can process no more than one activity at a time with the objective to optimize some objective function of the job completion times scheduling is in fact a family of problems Indeed several parameters intervene in the problem definition a job characteristics preemptive or not precedence constraints release dates etc b resource environment single vs parallel machines unrelated machines identical or uniform machines etc c

optimization criteria minimize total tardiness the number of late jobs makespan overtime etc maximize resource utilization etc and d scheduling environment static vs dynamic in the former then the number of jobs to be considered and their ready times are available while in the latter the number of jobs and their characteristics change over time

The Palgrave Handbook of Operations Research Saïd Salhi, John Boylan, 2022-07-07 Operations Research OR is a fast evolving field which is having a significant impact on its neighbouring disciplines of Business Analytics and Data Science and on contemporary business and management practices This handbook provides a comprehensive and cutting edge collection of studies in the area Views differ on what should be included within the scope of OR The editors of this volume have taken the view that an inclusive stance is the most helpful both for theory and practice Real world problems often require consideration from both softer and harder perspectives and need consideration of both predictive and prescriptive problems In accordance with this inclusive approach to OR the book is divided into six parts covering Discrete Optimization Continuous Optimization Heuristic Search Optimization Forecasting Simulation and Prediction Problem Structuring and Behavioural OR and finally some recent OR Applications This wide ranging handbook includes a culturally diverse collection of authors with different perspectives and backgrounds around Operations Research It will be of tremendous value to researchers students and practitioners in the field of OR

Hybrid Metaheuristics Christian Blum, Günther R. Raidl, 2016-05-23 This book explains the most prominent and some promising new general techniques that combine metaheuristics with other optimization methods A first introductory chapter reviews the basic principles of local search prominent metaheuristics and tree search dynamic programming mixed integer linear programming and constraint programming for combinatorial optimization purposes The chapters that follow present five generally applicable hybridization strategies with exemplary case studies on selected problems incomplete solution representations and decoders problem instance reduction large neighborhood search parallel non independent construction of solutions within metaheuristics and hybridization based on complete solution archives The authors are among the leading researchers in the hybridization of metaheuristics with other techniques for optimization and their work reflects the broad shift to problem oriented rather than algorithm oriented approaches enabling faster and more effective implementation in real life applications This hybridization is not restricted to different variants of metaheuristics but includes for example the combination of mathematical programming dynamic programming or constraint programming with metaheuristics reflecting cross fertilization in fields such as optimization algorithmics mathematical modeling operations research statistics and simulation The book is a valuable introduction and reference for researchers and graduate students in these domains

Applied Mathematics and Computational Intelligence Anna M. Gil-Lafuente, José M. Merigó, Bal Kishan Dass, Rajkumar Verma, 2018-03-06 This book gathers selected papers presented at the conference of the Forum for Interdisciplinary Mathematics FIM held at Palau Macaya Barcelona on 18 to 20 November 2015 The event was co organized by the University of Barcelona Spain the Spanish Royal Academy of Economic and Financial Sciences Spain and the Forum

for Interdisciplinary Mathematics India This instalment of the conference was presented with the title Applied Mathematics and Computational Intelligence and particularly focused on the use of Mathematics and Computational Intelligence techniques in a diverse range of scientific disciplines as well as their applications in real world problems The book presents thirty peer reviewed research papers organised into four topical sections on Mathematical Foundations Computational Intelligence and Optimization Techniques Modelling and Simulation Techniques and Applications in Business and Engineering This book will be of great interest to anyone working in the area of applied mathematics and computational intelligence and will be especially useful for scientists and graduate students pursuing research in these fields **Tutorials**

in Operations Research Institute for Operations Research and the Management Sciences. National Meeting, 2008

Intelligent Systems Design and Applications Ana Maria Madureira, Ajith Abraham, Dorabela Gamboa, Paulo Novais, 2017-02-22 This book comprises selected papers from the 16th International Conference on Intelligent Systems Design and Applications ISDA 16 which was held in Porto Portugal from December 1 to 16 2016 ISDA 2016 was jointly organized by the Portugal based Instituto Superior de Engenharia do Porto and the US based Machine Intelligence Research Labs MIR Labs to serve as a forum for the dissemination of state of the art research and development of intelligent systems intelligent technologies and applications The papers included address a wide variety of themes ranging from theories to applications of intelligent systems and computational intelligence area and provide a valuable resource for students and researchers in academia and industry alike *Advances in Artificial Intelligence* Jose A. Lozano, José A. Gámez, José A. Moreno-Pérez, 2011-10-28 This book constitutes the refereed proceedings of the 14th Conference of the Spanish Association for Artificial Intelligence CAEPIA 2009 held in La Laguna Canary Islands Spain in November 2011 The 50 revised full papers presented were carefully selected from 149 submissions The papers are organized in topical sections on agent based and multi agent systems machine learning knowledge representation logic search and planning multidisciplinary topics and applications vision and robotics soft computing Web intelligence and information retrieval

Tutorials on Emerging Methodologies and Applications in Operations Research Institute for Operations Research and the Management Sciences. National Meeting, 2005 Operations Research emerged as a quantitative approach to problem solving in World War II Its founders who were physicists mathematicians and engineers quickly found peace time uses for this new field Moreover we can say that Operations Research OR was born in the same incubator as computer science and through the years it has spawned many new disciplines including systems engineering health care management and transportation science Fundamentally Operations Research crosses discipline domains to seek solutions on a range of problems and benefits diverse disciplines from finance to bioengineering Many disciplines routinely use OR methods Many scientific researchers engineers and others will find the methodological presentations in this book useful and helpful in their problem solving efforts OR's strengths are modeling analysis and algorithm design It provides a quantitative foundation for a

broad spectrum of problems from economics to medicine from environmental control to sports from e commerce to computational geometry The primary purpose of TUTORIALS ON EMERGING METHODOLOGIES AND APPLICATIONS IN OPERATIONS RESEARCH is to provide a reference for practitioners and academics who seek a clear concise presentation of developing methodologies hence providing themselves with the capability to apply these methods to new problems The field of Operations Research is always changing Its changes are driven by the technology it uses and that it extends and the applications that it affects Relevant changes in the field have a permanent effect on the conduct of OR and are vital to anyone who wants to be current in the field Each chapter presents a new developing methodology in Operations Research Each chapter examines each topic with clarity and depth and organizes the examination around the following questions 1 What the developing methodology basically is about 2 Why is it important and 3 Where can I learn more

Encyclopedia of Operations Research and Management Science Saul I. Gass, Carl M. Harris, 2001 Audience Anyone concerned with the science techniques and ideas of how decisions are made BOOK JACKET

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Table of Contents Metaheuristics Production Operations Research Interfaces

1. Understanding the eBook Metaheuristics Production Operations Research Interfaces
 - The Rise of Digital Reading Metaheuristics Production Operations Research Interfaces
 - Advantages of eBooks Over Traditional Books
2. Identifying Metaheuristics Production Operations Research Interfaces
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Metaheuristics Production Operations Research Interfaces
 - User-Friendly Interface
4. Exploring eBook Recommendations from Metaheuristics Production Operations Research Interfaces
 - Personalized Recommendations
 - Metaheuristics Production Operations Research Interfaces User Reviews and Ratings
 - Metaheuristics Production Operations Research Interfaces and Bestseller Lists
5. Accessing Metaheuristics Production Operations Research Interfaces Free and Paid eBooks
 - Metaheuristics Production Operations Research Interfaces Public Domain eBooks
 - Metaheuristics Production Operations Research Interfaces eBook Subscription Services

- Metaheuristics Production Operations Research Interfaces Budget-Friendly Options
- 6. Navigating Metaheuristics Production Operations Research Interfaces eBook Formats
 - ePub, PDF, MOBI, and More
 - Metaheuristics Production Operations Research Interfaces Compatibility with Devices
 - Metaheuristics Production Operations Research Interfaces Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Metaheuristics Production Operations Research Interfaces
 - Highlighting and Note-Taking Metaheuristics Production Operations Research Interfaces
 - Interactive Elements Metaheuristics Production Operations Research Interfaces
- 8. Staying Engaged with Metaheuristics Production Operations Research Interfaces
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Metaheuristics Production Operations Research Interfaces
- 9. Balancing eBooks and Physical Books Metaheuristics Production Operations Research Interfaces
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Metaheuristics Production Operations Research Interfaces
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Metaheuristics Production Operations Research Interfaces
 - Setting Reading Goals Metaheuristics Production Operations Research Interfaces
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Metaheuristics Production Operations Research Interfaces
 - Fact-Checking eBook Content of Metaheuristics Production Operations Research Interfaces
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
- 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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