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Computational Intelligence Paradigms for Optimization Problems Using MATLAB®/SIMULINK®



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Computational Intelligence Paradigms Optimization Simulinkebook

**Ajith Abraham,Aboul-Ella
Hassanien,Patrick Siarry,Andries
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Computational Intelligence Paradigms for Optimization Problems Using MATLAB/SIMULINK S. Sumathi,L. Ashok Kumar,P. Surekha,2016 Considered one of the most innovative research directions computational intelligence CI embraces techniques that use global search optimization machine learning approximate reasoning and connectionist systems to develop efficient robust and easy to use solutions amidst multiple decision variables complex constraints and tumultuous environments CI techniques involve a combination of learning adaptation and evolution used for intelligent applications Computational Intelligence Paradigms for Optimization Problems Using MATLABr Simulinkr explores the performance of CI in terms of knowledge representation adaptability optimality and processing speed for different real world optimization problems Focusing on the practical implementation of CI techniques this book Discusses the role of CI paradigms in engineering applications such as unit commitment and economic load dispatch harmonic reduction load frequency control and automatic voltage regulation job shop scheduling multidepot vehicle routing and digital image watermarking Explains the impact of CI on power systems control systems industrial automation and image processing through the above mentioned applications Shows how to apply CI algorithms to constraint based optimization problems using MATLABr m files and Simulinkr models Includes experimental analyses and results of test systems Computational Intelligence Paradigms for Optimization Problems Using MATLABr Simulinkr provides a valuable reference for industry professionals and advanced undergraduate postgraduate and research students

Computational

Intelligence for Optimization Nirwan Ansari, Edwin Hou, 2012-12-06 The field of optimization is interdisciplinary in nature and has been making a significant impact on many disciplines As a result it is an indispensable tool for many practitioners in various fields Conventional optimization techniques have been well established and widely published in many excellent textbooks However there are new techniques such as neural networks simulated annealing stochastic machines mean field theory and genetic algorithms which have been proven to be effective in solving global optimization problems This book is intended to provide a technical description on the state of the art development in advanced optimization techniques specifically heuristic search neural networks simulated annealing stochastic machines mean field theory and genetic algorithms with emphasis on mathematical theory implementation and practical applications The text is suitable for a first year graduate course in electrical and computer engineering computer science and operational research programs It may also be used as a reference for practicing engineers scientists operational researchers and other specialists This book is an outgrowth of a couple of special topic courses that we have been teaching for the past five years In addition it includes many results from our interdisciplinary research on the topic The aforementioned advanced optimization techniques have received increasing attention over the last decade but relatively few books have been produced *Foundations of Computational*

Intelligence Volume 3 Ajith Abraham, Aboul-Ella Hassanien, Patrick Siarry, Andries Engelbrecht, 2009-05-01 Global optimization is a branch of applied mathematics and numerical analysis that deals with the task of finding the absolutely best set of admissible conditions to satisfy certain criteria objective functions formulated in mathematical terms Global optimization includes nonlinear stochastic and combinatorial programming multiobjective programming control games geometry approximation algorithms for parallel architectures and so on Due to its wide usage and applications it has gained the attention of researchers and practitioners from a plethora of scientific domains Typical practical examples of global optimization applications include Traveling salesman problem and electrical circuit design minimize the path length safety engineering building and mechanical structures mathematical problems Kepler conjecture Protein structure prediction minimize the energy function etc Global Optimization algorithms may be categorized into several types Deterministic example branch and bound methods Stochastic optimization example simulated annealing Heuristics and meta heuristics example evolutionary algorithms etc Recently there has been a growing interest in combining global and local search strategies to solve more complicated optimization problems This edited volume comprises 17 chapters including several overview Chapters which provides an up to date and state of the art research covering the theory and algorithms of global optimization Besides research articles and expository papers on theory and algorithms of global optimization papers on numerical experiments and on real world applications were also encouraged The book is divided into 2 main parts

High-Performance Simulation-Based Optimization Thomas Bartz-Beielstein, Bogdan Filipič, Peter Korošec, El-Ghazali Talbi, 2019-06-01 This book presents the state of the art in designing high performance algorithms that combine simulation

and optimization in order to solve complex optimization problems in science and industry problems that involve time consuming simulations and expensive multi objective function evaluations As traditional optimization approaches are not applicable per se combinations of computational intelligence machine learning and high performance computing methods are popular solutions But finding a suitable method is a challenging task because numerous approaches have been proposed in this highly dynamic field of research That s where this book comes in It covers both theory and practice drawing on the real world insights gained by the contributing authors all of whom are leading researchers Given its scope it offers a comprehensive reference guide for researchers practitioners and advanced level students interested in using computational intelligence and machine learning to solve expensive optimization problems

Computational Intelligence, Optimization and Inverse Problems with Applications in Engineering Gustavo Mendes Platt,Xin-She Yang,Antônio José Silva Neto,2018-09-25 This book focuses on metaheuristic methods and its applications to real world problems in Engineering The first part describes some key metaheuristic methods such as Bat Algorithms Particle Swarm Optimization Differential Evolution and Particle Collision Algorithms Improved versions of these methods and strategies for parameter tuning are also presented both of which are essential for the practical use of these important computational tools The second part then applies metaheuristics to problems mainly in Civil Mechanical Chemical Electrical and Nuclear Engineering Other methods such as the Flower Pollination Algorithm Symbiotic Organisms Search Cross Entropy Algorithm Artificial Bee Colonies Population Based Incremental Learning Cuckoo Search and Genetic Algorithms are also presented The book is rounded out by recently developed strategies or hybrid improved versions of existing methods such as the Lightning Optimization Algorithm Differential Evolution with Particle Collisions and Ant Colony Optimization with Dispersion state of the art approaches for the application of computational intelligence to engineering problems The wide variety of methods and applications as well as the original results to problems of practical engineering interest represent the primary differentiation and distinctive quality of this book Furthermore it gathers contributions by authors from four countries some of which are the original proponents of the methods presented and 18 research centers around the globe

Computational Optimization, Methods and Algorithms Slawomir Koziel,Xin-She Yang,2011-06-17 Computational optimization is an important paradigm with a wide range of applications In virtually all branches of engineering and industry we almost always try to optimize something whether to minimize the cost and energy consumption or to maximize profits outputs performance and efficiency In many cases this search for optimality is challenging either because of the high computational cost of evaluating objectives and constraints or because of the nonlinearity multimodality discontinuity and uncertainty of the problem functions in the real world systems Another complication is that most problems are often NP hard that is the solution time for finding the optimum increases exponentially with the problem size The development of efficient algorithms and specialized techniques that address these difficulties is of primary importance for contemporary engineering science and industry This

book consists of 12 self contained chapters contributed from worldwide experts who are working in these exciting areas The book strives to review and discuss the latest developments concerning optimization and modelling with a focus on methods and algorithms for computational optimization It also covers well chosen real world applications in science engineering and industry Main topics include derivative free optimization multi objective evolutionary algorithms surrogate based methods maximum simulated likelihood estimation support vector machines and metaheuristic algorithms Application case studies include aerodynamic shape optimization microwave engineering black box optimization classification economics inventory optimization and structural optimization This graduate level book can serve as an excellent reference for lecturers

researchers and students in computational science engineering and industry **Applied Computational Intelligence and Soft Computing in Engineering** Khalid, Saifullah, 2017-09-13 Although computational intelligence and soft computing are both well known fields using computational intelligence and soft computing in conjunction is an emerging concept This combination can effectively be used in practical areas of various fields of research Applied Computational Intelligence and Soft Computing in Engineering is an essential reference work featuring the latest scholarly research on the concepts paradigms and algorithms of computational intelligence and its constituent methodologies such as evolutionary computation neural networks and fuzzy logic Including coverage on a broad range of topics and perspectives such as cloud computing sampling in optimization and swarm intelligence this publication is ideally designed for engineers academicians technology developers researchers and students seeking current research on the benefits of applying computational intelligence techniques to engineering and technology **Recent Advances on Hybrid Approaches for Designing Intelligent**

Systems Oscar Castillo, Patricia Melin, Witold Pedrycz, Janusz Kacprzyk, 2014-04-10 This book describes recent advances on hybrid intelligent systems using soft computing techniques for diverse areas of application such as intelligent control and robotics pattern recognition time series prediction and optimization complex problems Soft Computing SC consists of several intelligent computing paradigms including fuzzy logic neural networks and bio inspired optimization algorithms which can be used to produce powerful hybrid intelligent systems The book is organized in five main parts which contain a group of papers around a similar subject The first part consists of papers with the main theme of type 2 fuzzy logic which basically consists of papers that propose new models and applications for type 2 fuzzy systems The second part contains papers with the main theme of bio inspired optimization algorithms which are basically papers using nature inspired techniques to achieve optimization of complex optimization problems in diverse areas of application The third part contains papers that deal with new models and applications of neural networks in real world problems The fourth part contains papers with the theme of intelligent optimization methods which basically consider the proposal of new methods of optimization to solve complex real world optimization problems The fifth part contains papers with the theme of evolutionary methods and intelligent computing which are papers considering soft computing methods for applications related to diverse areas such as natural language

processing recommending systems and optimization **Intelligent Computational Optimization in Engineering** Mario Koeppen, Gerald Schaefer, Ajith Abraham, 2011-07-15 We often come across computational optimization virtually in all branches of engineering and industry Many engineering problems involve heuristic search and optimization and once discretized may become combinatorial in nature which gives rise to certain difficulties in terms of solution procedure Some of these problems have enormous search spaces are NP hard and hence require heuristic solution techniques Another difficulty is the lack of ability of classical solution techniques to determine appropriate optima of non convex problems Under these conditions recent advances in computational optimization techniques have been shown to be advantageous and successful compared to classical approaches This Volume presents some of the latest developments with a focus on the design of algorithms for computational optimization and their applications in practice Through the chapters of this book researchers and practitioners share their experience and newest methodologies with regard to intelligent optimization and provide various case studies of the application of intelligent optimization techniques in real world applications This book can serve as an excellent reference for researchers and graduate students in computer science various engineering disciplines and the industry

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