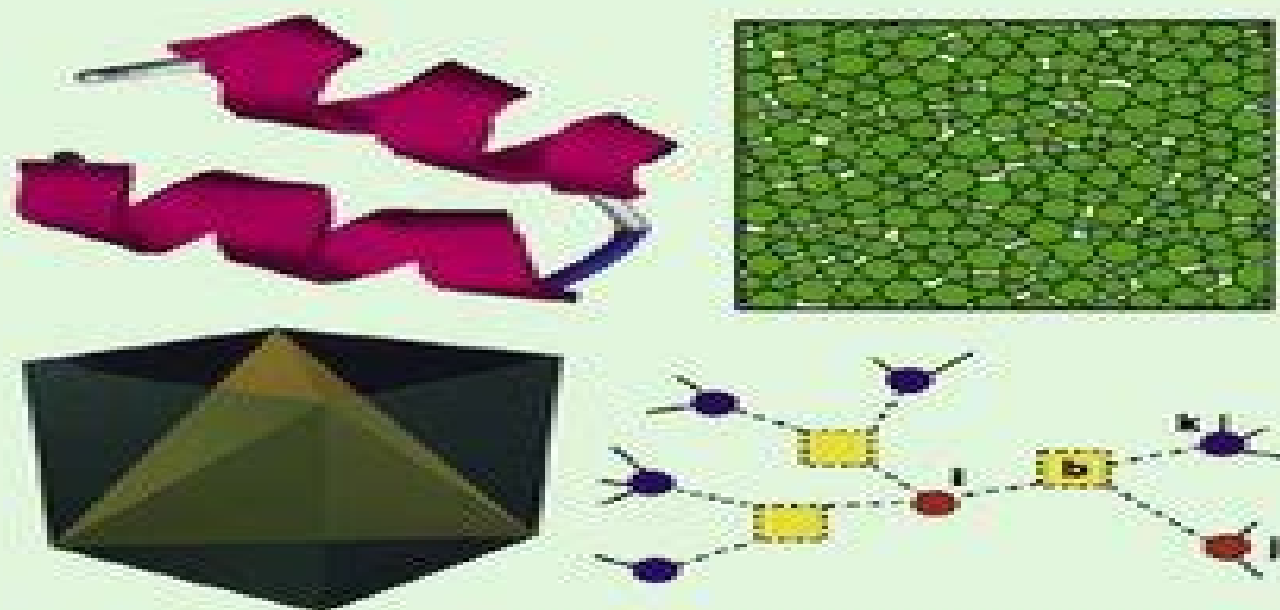


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New Optimization Algorithms in Physics



New Optimization Algorithms In Physics

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New Optimization Algorithms In Physics:

New Optimization Algorithms in Physics Alexander K. Hartmann, Heiko Rieger, 2006-03-06 Many physicists are not aware of the fact that they can solve their problems by applying optimization algorithms Since the number of such algorithms is steadily increasing many new algorithms have not been presented comprehensively until now This presentation of recently developed algorithms applied in physics including demonstrations of how they work and related results aims to encourage their application and as such the algorithms selected cover concepts and methods from statistical physics to optimization problems emerging in theoretical computer science

Optimization Algorithms in Physics Alexander K. Hartmann, Heiko Rieger, 2002-02-25 The past few years have witnessed a substantial growth in the number of applications for optimization algorithms in solving problems in the field of physics Examples include determining the structure of molecules estimating the parameters of interacting galaxies the ground states of electronic quantum systems the behavior of disordered magnetic materials and phase transitions in combinatorial optimization problems This book serves as an introduction to the field while also presenting a complete overview of modern algorithms The authors begin with the relevant foundations from computer science graph theory and statistical physics before moving on to thoroughly explain algorithms backed by illustrative examples They include pertinent mathematical transformations which in turn are used to make the physical problems tractable with methods from combinatorial optimization Throughout a number of interesting results are shown for all physical examples The final chapter provides numerous practical hints on software development testing programs and evaluating the results of computer experiments

A New Meta-heuristic Optimization Algorithm Based on the String Theory Paradigm from Physics Oscar Castillo, Luis Rodriguez, 2021-08-18 This book focuses on the fields of nature inspired algorithms optimization problems and fuzzy logic In this book a new metaheuristic based on String Theory from Physics is proposed It is important to mention that we have proposed the new algorithm to generate new potential solutions in optimization problems in order to find new ways that could improve the results in solving these problems We are presenting the results for the proposed method in different cases of study The first case is optimization of traditional benchmark mathematical functions The second case is the optimization of benchmark functions of the CEC 2015 Competition and we are also presenting results of the CEC 2017 Competition on Constrained Real Parameter Optimization that are problems that contain the presence of constraints that alter the shape of the search space making them more difficult to solve Finally in the third case we are presenting the optimization of a fuzzy inference system specifically for finding the optimal design of a fuzzy controller for an autonomous mobile robot It is important to mention that in all study cases we are presenting statistical tests in order to validate the performance of proposed method In summary we believe that this book will be of great interest to a wide audience ranging from engineering and science graduate students to researchers and professors in computational intelligence metaheuristics optimization robotics and control

Innovative Computational Intelligence: A Rough Guide to

134 *Clever Algorithms* Bo Xing, Wen-Jing Gao, 2013-12-13 The first notable feature of this book is its innovation Computational intelligence CI a fast evolving area is currently attracting lots of researchers attention in dealing with many complex problems At present there are quite a lot competing books existing in the market Nevertheless the present book is markedly different from the existing books in that it presents new paradigms of CI that have rarely mentioned before as opposed to the traditional CI techniques or methodologies employed in other books During the past decade a number of new CI algorithms are proposed Unfortunately they spread in a number of unrelated publishing directions which may hamper the use of such published resources These provide us with motivation to analyze the existing research for categorizing and synthesizing it in a meaningful manner The mission of this book is really important since those algorithms are going to be a new revolution in computer science We hope it will stimulate the readers to make novel contributions or even start a new paradigm based on nature phenomena Although structured as a textbook the book s straightforward self contained style will also appeal to a wide audience of professionals researchers and independent learners We believe that the book will be instrumental in initiating an integrated approach to complex problems by allowing cross fertilization of design principles from different design philosophies The second feature of this book is its comprehensiveness Through an extensive literature research there are 134 innovative CI algorithms covered in this book

Decision Science in Action Kusum Deep, Madhu Jain, Said Salhi, 2018-09-12 This book provides essential insights into a range of newly developed numerical optimization techniques with a view to solving real world problems Many of these problems can be modeled as nonlinear optimization problems but due to their complex nature it is not always possible to solve them using conventional optimization theory Accordingly the book discusses the design and applications of non conventional numerical optimization techniques including the design of benchmark functions and the implementation of these techniques to solve real world optimization problems The book s twenty chapters examine various interesting research topics in this area including Pi fraction based optimization of the Pantoja Bretones Martin PBM antenna benchmarks benchmark function generators for single objective robust optimization algorithms convergence of gravitational search algorithms on linear and quadratic functions and an algorithm for the multi variant evolutionary synthesis of nonlinear models with real valued chromosomes Delivering on its promise to explore real world scenarios the book also addresses the seismic analysis of a multi story building with optimized damper properties the application of constrained spider monkey optimization to solve portfolio optimization problems the effect of upper body motion on a bipedal robot s stability an ant colony algorithm for routing alternate fuel vehicles in multi depot vehicle routing problems enhanced fractal dimension based feature extraction for thermal face recognition and an artificial bee colony based hyper heuristic for the single machine order acceptance and scheduling problem The book will benefit not only researchers but also organizations active in such varied fields as Aerospace Automotive Biotechnology Consumer Packaged Goods Electronics Finance Business Banking Oil Gas Geosciences and Pharma to name a few

Decision-Making

Models Tofigh Allahviranloo, Witold Pedrycz, Amir Seyyedabbasi, 2024-07-24 Decision Making Models A Perspective of Fuzzy Logic and Machine Learning presents the latest developments in the field of uncertain mathematics and decision science The book aims to deliver a systematic exposure to soft computing techniques in fuzzy mathematics as well as artificial intelligence in the context of real life problems and is designed to address recent techniques to solving uncertain problems encountered specifically in decision sciences Researchers professors software engineers and graduate students working in the fields of applied mathematics software engineering and artificial intelligence will find this book useful to acquire a solid foundation in fuzzy logic and fuzzy systems optimization problems and artificial intelligence practices as well as how to analyze IoT solutions with applications and develop decision making mechanisms realized under uncertainty Introduces mathematics of intelligent systems which provides the usage of mathematical rigor such as precise definitions theorems results and proofs Provides extended and new comprehensive methods which can be used efficiently in a fuzzy environment as well as optimization problems and related fields Covers applications and elaborates on the usage of the developed methodology in various fields of industry such as software technologies biomedicine image processing and communications

Smart Maintenance for Human-Robot Interaction Bo Xing, Tshilidzi Marwala, 2017-09-08 This self contained book written by active researchers presents up to date information on smart maintenance strategies for human robot interaction HRI and the associated applications of novel search algorithms in a single volume eliminating the need to consult scattered resources Unlike other books it addresses maintaining a smart HRI from three dimensions namely hardware cyberware and hybrid asset management covering problems encountered in each through a wide variety of representative examples and elaborated illustrations Further the diverse mathematical models and intelligent systems constructions make the book highly practical It enables readers interested in maintenance robotics and intelligent systems but perplexed by myriads of interrelated issues to grasp basic methodologies At the same time the referenced literature can be used as a roadmap for conducting deeper researches

Applied Science, Materials Science and Information Technologies in Industry D.L. Liu, X.B. Zhu, K.L. Xu, D.M. Fang, 2014-02-06 Selected peer reviewed papers from the 2014 International Conference on Advances in Materials Science and Information Technologies in Industry AMSITI 2014 January 11 12 2014 Xi an China

Mathematical Reviews, 2005

New Optimization Techniques in Engineering Godfrey C. Onwubolu, B. V. Babu, 2013-03-14 Presently general purpose optimization techniques such as Simulated Annealing and Genetic Algorithms have become standard optimization techniques Concerted research efforts have been made recently in order to invent novel optimization techniques for solving real life problems which have the attributes of memory update and population based search solutions The book describes a variety of these novel optimization techniques which in most cases outperform the standard optimization techniques in many application areas New Optimization Techniques in Engineering reports applications and results of the novel optimization techniques considering a multitude of practical problems in the different engineering disciplines presenting both the

background of the subject area and the techniques for solving the problems **Distributed Computer Control Systems**
,1995 The British National Bibliography Arthur James Wells,2004 **American Book Publishing Record** ,2003

New Technical Books New York Public Library,1979 *KI-96: Advances in Artificial Intelligence* Günther Görz,Steffen Hölldobler,1996-09-04 This book constitutes the refereed proceedings of the 20th Annual German Conference on Artificial Intelligence KI 96 held in Dresden Germany in September 1996 The book presents three invited papers together with 23 revised full research papers nine posters and four systems demonstrations All contributions were carefully selected from a larger number of excellent submissions of which a considerable part had been submitted from abroad The papers address many subareas of AI however there is a certain focus on new developments in theorem proving knowledge representation and reasoning The Traveling Salesman Gerhard Reinelt,1994 This book is devoted to the famous traveling salesman problem TSP which is the task of finding a route of shortest possible length through a given set of cities The TSP attracts interest from several scientific communities and from numerous application areas First the theoretical prerequisites are summarized Then the emphasis shifts to computational solutions for practical TSP applications Detailed computational experiments are used to show how to find good or acceptable routes for large problem instances in reasonable time In total this book meets a tremendous professional need for effective algorithms it is the most comprehensive and up to date survey available on heuristic approaches to TSP solving PUBLISHER S WEBSITE **Intelligent Engineering Systems Through Artificial Neural Networks** Cihan H. Dagli,1996 **GMD Research Series** ,1998 *Operations Research Proceedings 1995* Peter Kleinschmidt,1996-03-11 Das Buch entht lt ausgew hlte Vortr ge die anl lich des Symposiums ber Operations Research SOR 95 in der Zeit vom 13 15 9 1995 an der Universit t Passau gehalten wurden Der Leser erh lt einen Einblick in neueste Forschungsergebnisse auf dem Gebiet des Operations Research Der Sammelband demonstriert eindrucksvoll das weite Spektrum der vom Operations Research heute behandelten Thematiken Neben prim r methodischen Fragestellungen bilden praxisorientierte Themen wie Anwendungsberichte aus der Praxis im Umweltschutz der Logistik und Verkehrsplanung einen Schwerpunkt Deutlich wird auch die Ausstrahlung des Operations Research in andere wissenschaftliche Disziplinen wie Informatik konomie und Wirtschaftsinformatik *Evolution and Optimum Seeking* Hans-Paul Schwefel,1995-01-23 Presents numerical optimization methods and algorithms applied to computer calculations The methods consist of the adaptation of simple evolutionary rules to a computer procedure which is to search for optimal parameters within a simulation model of a technical device Accompanied by a diskette containing the algorithms presented in the book

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