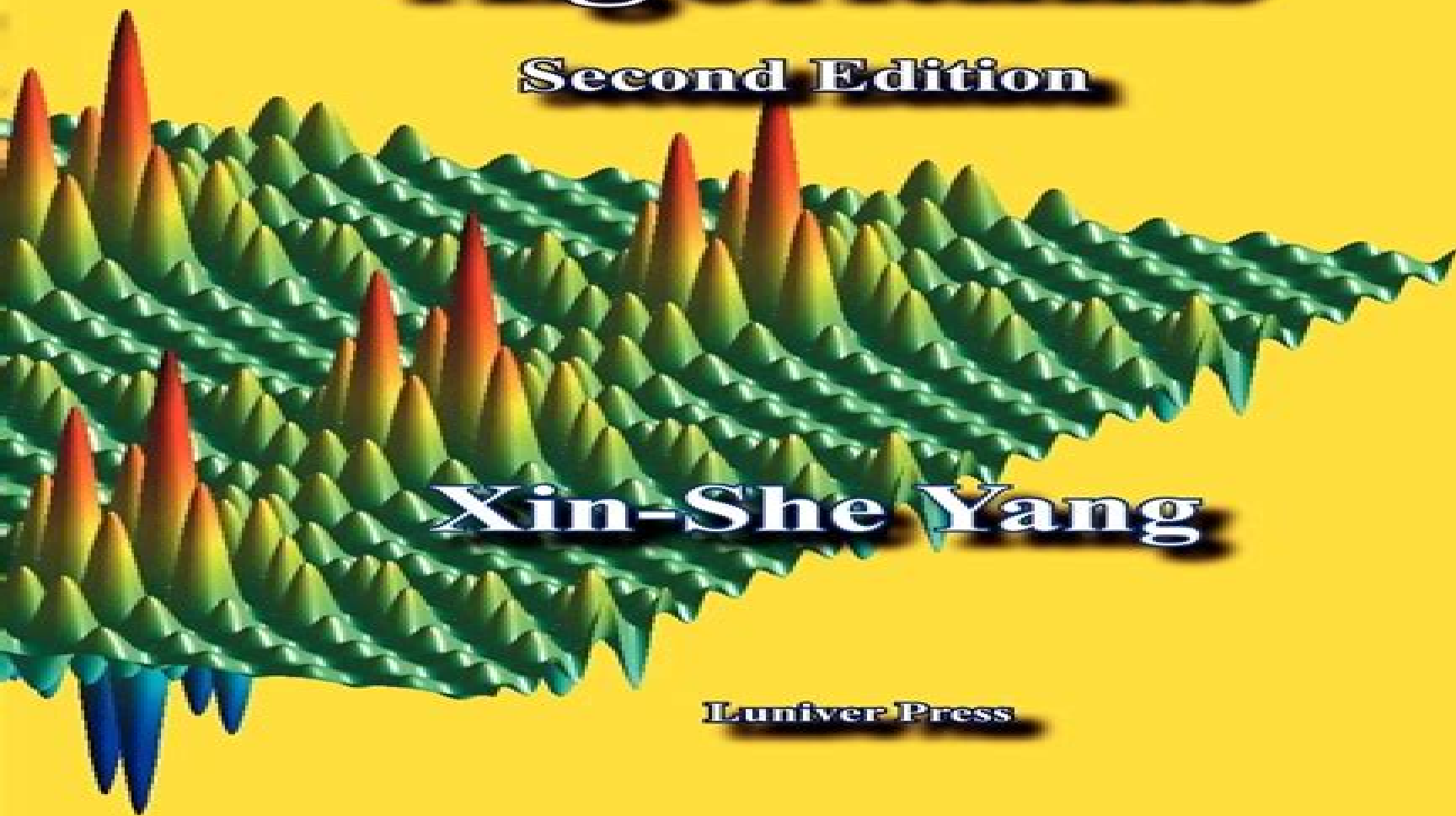# Nature-Inspired Metaheuristic Algorithms

Second Edition

Xin-She Yang

Luniver Press

Nature Inspired Metaheuristic Algorithms Second Edition

Anuj Kumar,Sangeeta Pant,Mangey Ram,Om Yadav

Nature Inspired Metaheuristic Algorithms Second Edition:

<u>Nature-inspired Metaheuristic Algorithms</u> Xin-She Yang,2010 Modern metaheuristic algorithms such as particle swarm optimization and cuckoo search start to demonstrate their power in dealing with tough optimization problems and even NP hard problems This book reviews and introduces the state of the art nature inspired metaheuristic algorithms for global optimization including ant and bee algorithms bat algorithm cuckoo search differential evolution firefly algorithm genetic algorithms harmony search particle swarm optimization simulated annealing and support vector machines In this revised edition we also include how to deal with nonlinear constraints Worked examples with implementation have been used to show how each algorithm works This book is thus an ideal textbook for an undergraduate and or graduate course as well as for self study As some of the algorithms such as the cuckoo search and firefly algorithms are at the forefront of current research this book can also serve as a reference for researchers   **Fuzzy Logic Hybrid Extensions of Neural and Optimization Algorithms: Theory and Applications** Oscar Castillo,Patricia Melin,2021-03-24 We describe in this book recent developments on fuzzy logic neural networks and optimization algorithms as well as their hybrid combinations and their application in areas such as intelligent control and robotics pattern recognition medical diagnosis time series prediction and optimization of complex problems The book contains a collection of papers focused on hybrid intelligent systems based on soft computing There are some papers with the main theme of type 1 and type 2 fuzzy logic which basically consists of papers that propose new concepts and algorithms based on type 1 and type 2 fuzzy logic and their applications There also some papers that presents theory and practice of meta heuristics in different areas of application Another group of papers describe diverse applications of fuzzy logic neural networks and hybrid intelligent systems in medical applications There are also some papers that present theory and practice of neural networks in different areas of application In addition there are papers that present theory and practice of optimization and evolutionary algorithms in different areas of application Finally there are some papers describing applications of fuzzy logic neural networks and meta heuristics in pattern recognition problems   **10th Manufacturing Engineering Society International Conference (MESIC 2023)** Domingo Morales-Palma,Andrés J. Martínez-Donaire,Marcos Borrego Puche,Gabriel Centeno Báez,Carpoforo Vallellano,2023-10-02 Selected peer reviewed full text papers from the 10th Manufacturing Engineering Society International Conference MESIC 2023 Selected peer reviewed full text papers from the 10th Manufacturing Engineering Society International Conference MESIC 2023 June 28 30 2023 Sevilla Spain   **Meta-heuristic Optimization Techniques** Anuj Kumar,Sangeeta Pant,Mangey Ram,Om Yadav,2022-01-19 This book offer a thorough overview of the most popular and researched meta heuristic optimization techniques and nature inspired algorithms Their wide applicability makes them a hot research topic and an efficient tool for the solution of complex optimization problems in various field of sciences engineering and in numerous industries   **Data Science and Its Applications** Aakanksha Sharaff,G R Sinha,2021-08-17 The term data being

mostly used experimented analyzed and researched Data Science and its Applications finds relevance in all domains of research studies including science engineering technology management mathematics and many more in wide range of applications such as sentiment analysis social medial analytics signal processing gene analysis market analysis healthcare bioinformatics etc The book on Data Science and its applications discusses about data science overview scientific methods data processing extraction of meaningful information from data and insight for developing the concept from different domains highlighting mathematical and statistical models operations research computer programming machine learning data visualization pattern recognition and others The book also highlights data science implementation and evaluation of performance in several emerging applications such as information retrieval cognitive science healthcare and computer vision The data analysis covers the role of data science depicting different types of data such as text image biomedical signal etc useful for a wide range of real time applications The salient features of the book are Overview Challenges and Opportunities in Data Science and Real Time Applications Addressing Big Data Issues Useful Machine Learning Methods Disease Detection and Healthcare Applications utilizing Data Science Concepts and Deep Learning Applications in Stock Market Education Behavior Analysis Image Captioning Gene Analysis and Scene Text Analysis Data Optimization Due to multidisciplinary applications of data science concepts the book is intended for wide range of readers that include Data Scientists Big Data Analysists Research Scholars engaged in Data Science and Machine Learning applications   Smart Antennas with MATLAB, Second Edition Frank Gross,2015-02-09 The most complete current guide to smart antenna design and performance Featuring new coverage of reconfigurable antennas vector antennas and direction finding antennas this up to date resource offers a rigorous review of the basic electromagnetic principles that drive smart antenna design and deployment Case studies and worked examples using MATLAB are provided End of chapter assignments reinforce the concepts presented Thoroughly revised to reflect recent developments and the latest technologies this is a comprehensive reference for all professionals students and researchers in the field of smart antennas Smart Antennas with MATLAB Second Edition covers Fundamentals of electromagnetic fields Antenna fundamentals Array fundamentals Principles of random variables and processes Propagation channel characteristics Angle of arrival estimation Smart antennas Direction finding Electromagnetic vector sensors Smart antenna design and optimization   *Artificial Intelligence Applications in Electrical Transmission and Distribution Systems Protection* Almoataz Y. Abdelaziz,Shady Hossam Eldeen Abdel Aleem,Anamika Yadav,2021-10-21 Artificial intelligence AI can successfully help in solving real world problems in power transmission and distribution systems because AI based schemes are fast adaptive and robust and are applicable without any knowledge of the system parameters This book considers the application of AI methods for the protection of different types and topologies of transmission and distribution lines It explains the latest pattern recognition based methods as applicable to detection classification and location of a fault in the transmission and distribution lines and to manage smart power systems including

all the pertinent aspects FEATURES Provides essential insight on uses of different AI techniques for pattern recognition classification prediction and estimation exclusive to power system protection issues Presents an introduction to enhanced electricity system analysis using decision making tools Covers AI applications in different protective relaying functions Discusses issues and challenges in the protection of transmission and distribution systems Includes a dedicated chapter on case studies and applications This book is aimed at graduate students researchers and professionals in electrical power system protection stability and smart grids   Nature-Inspired Optimization Algorithms Xin-She Yang,2020-09-09 Nature Inspired Optimization Algorithms Second Edition provides an introduction to all major nature inspired algorithms for optimization The book s unified approach balancing algorithm introduction theoretical background and practical implementation complements extensive literature with case studies to illustrate how these algorithms work Topics include particle swarm optimization ant and bee algorithms simulated annealing cuckoo search firefly algorithm bat algorithm flower algorithm harmony search algorithm analysis constraint handling hybrid methods parameter tuning and control and multi objective optimization This book can serve as an introductory book for graduates for lecturers in computer science engineering and natural sciences and as a source of inspiration for new applications Discusses and summarizes the latest developments in nature inspired algorithms with comprehensive timely literature Provides a theoretical understanding and practical implementation hints Presents a step by step introduction to each algorithm Includes four new chapters covering mathematical foundations techniques for solving discrete and combination optimization problems data mining techniques and their links to optimization algorithms and the latest deep learning techniques background and various applications

Nature-Inspired Methods for Metaheuristics Optimization Fouad Bennis,Rajib Kumar Bhattacharjya,2020-01-17 This book gathers together a set of chapters covering recent development in optimization methods that are inspired by nature The first group of chapters describes in detail different meta heuristic algorithms and shows their applicability using some test or real world problems The second part of the book is especially focused on advanced applications and case studies They span different engineering fields including mechanical electrical and civil engineering and earth environmental science and covers topics such as robotics water management process optimization among others The book covers both basic concepts and advanced issues offering a timely introduction to nature inspired optimization method for newcomers and students and a source of inspiration as well as important practical insights to engineers and researchers   **Nature-inspired Methods for Metaheuristics Optimization** ,2020 This book gathers together a set of chapters covering recent development in optimization methods that are inspired by nature The first group of chapters describes in detail different meta heuristic algorithms and shows their applicability using some test or real world problems The second part of the book is especially focused on advanced applications and case studies They span different engineering fields including mechanical electrical and civil engineering and earth environmental science and covers topics such as robotics water management process

optimization among others The book covers both basic concepts and advanced issues offering a timely introduction to nature inspired optimization method for newcomers and students and a source of inspiration as well as important practical insights to engineers and researchers   4th IEEE International Workshop on Factory Communication Systems ,2002

   Proceedings ,2002   Transportation Science ,2004   **Index to Theses with Abstracts Accepted for Higher Degrees by the Universities of Great Britain and Ireland and the Council for National Academic Awards** ,1995 Theses on any subject submitted by the academic libraries in the UK and Ireland   **Survey Review** ,2013   A Nature-inspired Metaheuristic ,2015   **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 or der 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   **Multi-Objective Optimization in Theory and Practice II: Metaheuristic Algorithms** André A. Keller,2019-03-28 Multi Objective Optimization in Theory and Practice is a simplified two part approach to multi objective optimization MOO problems This second part focuses on the use of metaheuristic algorithms in more challenging practical cases The book includes ten chapters that cover several advanced MOO techniques These include the determination of Pareto optimal sets of solutions metaheuristic algorithms genetic search algorithms and evolution strategies decomposition algorithms hybridization of different metaheuristics and many objective more than three objectives optimization and parallel computation The final section of the book presents information about the design and types of fifty test problems for which the Pareto optimal front is approximated For each of them the package NSGA II is used to approximate the Pareto optimal front It is an essential handbook for students and teachers involved in advanced optimization courses in engineering information science and mathematics degree programs   **Nature Inspired Cooperative Strategies for Optimization (NICSO 2008)** Natalio Krasnogor,Belén Melián-Batista,José Andrés

Moreno-Pérez,J. Marcos Moreno-Vega,David Alejandro Pelta,2009-09-14 The inspiration from Biology and the Natural Evolution process has become a research area within computer science For instance the description of the arti cial neuron given by McCulloch and Pitts was inspired from biological observations of neural mechanisms the power of evolution in nature in the diverse species that make up our world has been related to a particular form of problem solving based on the idea of survival of the ttest similarly ti cial immune systems ant colony optimisation automated self assembling programming membrane computing etc also have their roots in natural phenomena The rst and second editions of the International Workshop on Nature Inspired Cooperative Strategies for Optimization NICSO were held in Granada Spain 2006 and in Acireale Italy 2007 respectively As in these two previous editions the aim of NICSO 2008 held in Tenerife Spain was to provide a forum were the latest ideas and state of the art research related to nature inspired cooperative strategies for problem solving were discussed The contributions collected in this book were strictly peer reviewed by at least three members of the international programme committee to whom we are indebted for their support and assistance The topics covered by the contributionsincludenature inspiredtechniqueslikeGeneticAlgorithms Ant Colonies Amorphous Computing Arti cial Immune Systems Evolutionary Robotics Evolvable Systems Membrane Computing Quantum Computing Software Self Assembly Swarm Intelligence etc **Nature-Inspired Design of Hybrid Intelligent Systems** Patricia Melin,Oscar Castillo,Janusz Kacprzyk,2016-12-08 This book highlights recent advances in the design of hybrid intelligent systems based on nature inspired optimization and their application in areas such as intelligent control and robotics pattern recognition time series prediction and optimization of complex problems The book is divided into seven main parts the first of which addresses theoretical aspects of and new concepts and algorithms based on type 2 and intuitionistic fuzzy logic systems The second part focuses on neural network theory and explores the applications of neural networks in diverse areas such as time series prediction and pattern recognition The book s third part presents enhancements to meta heuristics based on fuzzy logic techniques and describes new nature inspired optimization algorithms that employ fuzzy dynamic adaptation of parameters while the fourth part presents diverse applications of nature inspired optimization algorithms In turn the fifth part investigates applications of fuzzy logic in diverse areas such as time series prediction and pattern recognition The sixth part examines new optimization algorithms and their applications Lastly the seventh part is dedicated to the design and application of different hybrid intelligent systems

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