

Raymond Chiong
Thomas Weise
Zbigniew Michalewicz
Editors

Variants of Evolutionary Algorithms for Real-World Applications

 Springer

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**Raymond Chiong, Thomas
Weise, Zbigniew Michalewicz**



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Variants of Evolutionary Algorithms for Real-World Applications Raymond Chiong, Thomas Weise, Zbigniew Michalewicz, 2011-11-13 Evolutionary Algorithms EAs are population based stochastic search algorithms that mimic natural evolution Due to their ability to find excellent solutions for conventionally hard and dynamic problems within acceptable time EAs have attracted interest from many researchers and practitioners in recent years This book Variants of Evolutionary Algorithms for Real World Applications aims to promote the practitioner s view on EAs by providing a comprehensive discussion of how EAs can be adapted to the requirements of various applications in the real world domains It comprises 14 chapters including an introductory chapter re visiting the fundamental question of what an EA is and other chapters addressing a range of real world problems such as production process planning inventory system and supply chain network optimisation task based jobs assignment planning for CNC based work piece construction mechanical ship design tasks that involve runtime intense simulations data mining for the prediction of soil properties automated tissue classification for MRI images and database query optimisation among others These chapters demonstrate how different types of problems can be successfully solved using variants of EAs and how the solution approaches are constructed in a way that can be understood and reproduced with little prior knowledge on optimisation

Real-life Applications with Membrane Computing Gexiang Zhang, Mario J. Pérez-Jiménez, Marian Gheorghe, 2017-04-05 This book thoroughly investigates the underlying theoretical basis of membrane computing models and reveals their latest applications In addition to date there have been no illustrative case studies or complex real life applications that capitalize on the full potential of the sophisticated membrane systems computational apparatus gaps that this book remedies By studying various complex applications including engineering optimization power systems fault diagnosis mobile robot controller design and complex biological systems involving data modeling and process interactions the book also extends the capabilities of membrane systems models with features such as formal verification techniques evolutionary approaches and fuzzy reasoning methods As such the book offers a comprehensive and up to date guide for all researchers PhDs and undergraduate students in the fields of computer science engineering and the bio sciences who are interested in the applications of natural computing models

Analysis and Comparison of Metaheuristics Erik Cuevas, Omar Avalos, Jorge Gálvez, 2022-11-02 This book presents a comparative perspective of current metaheuristic developments which have proved to be effective in their application to several complex problems The study of biological and social entities such as animals humans or insects that manifest a cooperative behavior has produced several computational models in metaheuristic methods Although these schemes emulate very different processes or systems the rules used to model individual behavior are very similar Under such conditions it is not clear to identify which are the advantages or disadvantages of each metaheuristic technique The book is compiled from a teaching perspective For this reason the book is primarily intended for undergraduate and postgraduate students of Science Electrical

Engineering or Computational Mathematics It is appropriate for courses such as Artificial Intelligence Electrical Engineering Evolutionary Computation The book is also useful for researchers from the evolutionary and engineering communities Likewise engineer practitioners who are not familiar with metaheuristic computation concepts will appreciate that the techniques discussed are beyond simple theoretical tools since they have been adapted to solve significant problems that commonly arise in engineering areas

Simulated Evolution and Learning Lam Thu Bui, Yew Soon Ong, Nguyen Xuan Hoai, Hisao Ishibuchi, Ponnuthurai Nagarathnam Suganthan, 2012-12-02 This volume constitutes the proceedings of the 9th International Conference on Simulated Evolution and Learning SEAL 2012 held in Hanoi Vietnam in December 2012 The 50 full papers presented were carefully reviewed and selected from 91 submissions The papers are organized in topical sections on evolutionary algorithms theoretical developments swarm intelligence data mining learning methodologies and real world applications

Artificial Life and Computational Intelligence Tapabrata Ray, Ruhul Sarker, Xiaodong Li, 2016-01-22 This book constitutes the proceedings of the Second Australasian Conference on Artificial Life and Computational Intelligence ACALCI 2016 held in Canberra ACT Australia in February 2016 The 30 full papers presented in this volume were carefully reviewed and selected from 41 submissions They are organized in topical sections named mathematical modeling and theory learning and optimization planning and scheduling feature selection and applications and games

Recent Trends in Mechanical Engineering Ambrish Maurya, Animesh Kumar Srivastava, Pradeep Kumar Jha, Shailesh Mani Pandey, 2023-06-07 This book contains the select papers presented at the International Conference on Progressive Research in Industrial Mechanical Engineering PRIME 2021 held at the National Institute of Technology NIT Patna India The book discusses various aspects related and relevant to core areas of mechanical engineering including engineering design production engineering industrial engineering automobile engineering thermal and fluids engineering mechatronics control and robotics and other inter disciplinary emerging topics for potential use in a spectrum of applications The book will be a valuable reference for students researchers and professionals interested in mechanical engineering and allied fields

New Frontier In Evolutionary Algorithms: Theory And Applications Hitoshi Iba, Nasimul Noman, 2011-08-26 This book delivers theoretical and practical knowledge of Genetic Algorithms GA for the purpose of practical applications It provides a methodology for a GA based search strategy with the integration of several Artificial Life and Artificial Intelligence techniques such as memetic concepts swarm intelligence and foraging strategies The development of such tools contributes to better optimizing methodologies when addressing tasks from areas such as robotics financial forecasting and data mining in bioinformatics The emphasis of this book is on applicability to the real world Tasks from application areas optimization of the trading rule in foreign exchange FX and stock prices economic load dispatch in power system exit door placement for evacuation planning and gene regulatory network inference in bioinformatics are studied and the resultant empirical investigations demonstrate how successful the proposed approaches are when solving real world tasks of great importance

Algorithms for Scheduling Problems Frank Werner, Larysa Burtseva, Yuri Sotskov MDPI, 2018-08-24 This book is a printed edition of the Special Issue Algorithms for Scheduling Problems that was published in Algorithms

Application and Theory of Petri Nets and Concurrency Lars Michael Kristensen, Jan Martijn van der Werf, 2024-06-12 This book constitutes the proceedings of the 45th International Conference on Application and Theory of Petri Nets and Concurrency PETRI NETS 2024 held in Geneva Switzerland during June 26-28, 2024. The 19 full papers and 2 invited papers included in this book were carefully reviewed and selected from 42 submissions. They were organized in topical sections as follows: Business Process Modelling and Mining; Semantics and Complexity; Reachability Verification and Model Checking; Applications and Tools.

Python-Based Evolutionary Algorithms for Engineers Pankaj Jayaraman, 2025-02-20 Python-Based Evolutionary Algorithms for Engineers is a comprehensive guide designed to empower engineers with the knowledge and skills needed to harness the power of evolutionary algorithms in optimization tasks. We seamlessly integrate theoretical foundations with hands-on implementation, making it accessible to both beginners and seasoned practitioners. Starting with fundamental concepts, we progress to a dedicated exploration of Differential Evolution, a versatile optimization technique with a strong emphasis on practical Python implementations. Readers will delve into the intricacies of multi-objective optimization and discover the myriad applications of evolutionary algorithms across diverse engineering domains. Our book stands out by offering a hands-on approach, allowing readers to translate theoretical concepts into practical applications using Python. We provide clear explanations and real-world examples that equip engineers to implement and adapt powerful optimization techniques. We also explore multi-objective optimization, demonstrating the versatility of evolutionary algorithms in addressing complex engineering challenges. With a strong emphasis on applicability, our book serves as a guide for both newcomers and experienced practitioners, offering a pathway to proficiently leverage evolutionary algorithms for enhanced problem solving and innovation in engineering projects.

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