

NATURAL COMPUTING SERIES

Ashish Ghosh · Shigeyoshi Tsutsui (Eds.)

Advances in Evolutionary Computing

Theory and Applications

Volume I



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Advances In Evolutionary Computing

**Philip F. Hingston, Luigi C.
Barone, Zbigniew Michalewicz**



Advances In Evolutionary Computing:

Advances in Evolutionary Computing Ashish Ghosh, Shigeyoshi Tsutsui, 2002-11-26 This book provides a collection of forty articles containing new material on both theoretical aspects of Evolutionary Computing EC and demonstrating the usefulness success of it for various kinds of large scale real world problems Around 23 articles deal with various theoretical aspects of EC and 17 articles demonstrate the success of EC methodologies These articles are written by leading experts of the field from different countries all over the world

Advances in Evolutionary Computing Ashish Ghosh, Shigeyoshi Tsutsui, 2012-12-06 The term evolutionary computing refers to the study of the foundations and applications of certain heuristic techniques based on the principles of natural evolution thus the aim of designing evolutionary algorithms EAs is to mimic some of the processes taking place in natural evolution These algorithms are classified into three main categories depending more on historical development than on major functional techniques In fact their biological basis is essentially the same Hence EC GA uGP uES uEP EC Evolutionary Computing GA Genetic Algorithms GP Genetic Programming ES Evolution Strategies EP Evolutionary Programming Although the details of biological evolution are not completely understood even nowadays there is some strong experimental evidence to support the following points Evolution is a process operating on chromosomes rather than on organisms Natural selection is the mechanism that selects organisms which are well adapted to the environment to reproduce more often than those which are not The evolutionary process takes place during the reproduction stage that includes mutation which causes the chromosomes of offspring to be different from those of the parents and recombination which combines the chromosomes of the parents to produce the offspring Based upon these features the previously mentioned three models of evolutionary computing were independently and almost simultaneously developed An evolutionary algorithm EA is an iterative and stochastic process that operates on a set of individuals called a population

Advances in Evolutionary Computing for System Design Vasile Palade, Dipti Srinivasan, 2007-07-07 Evolutionary computing paradigms offer robust and powerful adaptive search mechanisms for system design This book's thirteen chapters cover a wide area of topics in evolutionary computing and applications including an introduction to evolutionary computing in system design evolutionary neuro fuzzy systems and evolution of fuzzy controllers The book will be useful to researchers in intelligent systems with interest in evolutionary computing as well as application engineers and system designers

Recent Advances in Evolutionary Computation for Combinatorial Optimization Carlos Cotta, Jano van Hemert, 2008-09-08 Combinatorial optimisation is a ubiquitous discipline whose usefulness spans vast applications domains The intrinsic complexity of most combinatorial optimisation problems makes classical methods unaffordable in many cases To acquire practical solutions to these problems requires the use of metaheuristic approaches that trade completeness for pragmatic effectiveness Such approaches are able to provide optimal or quasi optimal solutions to a plethora of difficult combinatorial optimisation problems The application of metaheuristics to combinatorial optimisation

is an active field in which new theoretical developments new algorithmic models and new application areas are continuously emerging This volume presents recent advances in the area of metaheuristic combinatorial optimisation with a special focus on evolutionary computation methods Moreover it addresses local search methods and hybrid approaches In this sense the book includes cutting edge theoretical methodological algorithmic and applied developments in the field from respected experts and with a sound perspective

Advances of Evolutionary Computation: Methods and Operators Erik Cuevas,Margarita Arimatea Díaz Cortés,Diego Alberto Oliva Navarro,2016-01-20 The goal of this book is to present advances that discuss alternative Evolutionary Computation EC developments and non conventional operators which have proved to be effective in the solution of several complex problems The book has been structured so that each chapter can be read independently from the others The book contains nine chapters with the following themes 1 Introduction 2 the Social Spider Optimization SSO 3 the States of Matter Search SMS 4 the collective animal behavior CAB algorithm 5 the Allostatic Optimization AO method 6 the Locust Search LS algorithm 7 the Adaptive Population with Reduced Evaluations APRE method 8 the multimodal CAB 9 the constrained SSO method

Design by Evolution Philip F. Hingston,Luigi C. Barone,Zbigniew Michalewicz,2008-09-30 Evolution is Nature s design process The natural world is full of wonderful examples of its successes from engineering design feats such as powered flight to the design of complex optical systems such as the mammalian eye to the merely stunningly beautiful designs of orchids or birds of paradise With increasing computational power we are now able to simulate this process with greater fidelity combining complex simulations with high performance evolutionary algorithms to tackle problems that used to be impractical This book showcases the state of the art in evolutionary algorithms for design The chapters are organized by experts in the following fields evolutionary design and intelligent design in biology art computational embryogeny and engineering The book will be of interest to researchers practitioners and graduate students in natural computing engineering design biology and the creative arts

Evolutionary Algorithms in Engineering and Computer Science K. Miettinen,1999-07-09 Evolutionary Algorithms in Engineering and Computer Science Edited by K Miettinen University of Jyväskylä Finland M M M kel University of Jyväskylä Finland P Neittaanmäki University of Jyväskylä Finland J P Riaux Dassault Aviation France What is Evolutionary Computing Based on the genetic message encoded in DNA and digitalized algorithms inspired by the Darwinian framework of evolution by natural selection Evolutionary Computing is one of the most important information technologies of our times Evolutionary algorithms encompass all adaptive and computational models of natural evolutionary systems genetic algorithms evolution strategies evolutionary programming and genetic programming In addition they work well in the search for global solutions to optimization problems allowing the production of optimization software that is robust and easy to implement Furthermore these algorithms can easily be hybridized with traditional optimization techniques This book presents state of the art lectures delivered by international academic and industrial experts in the field of evolutionary computing It bridges artificial

intelligence and scientific computing with a particular emphasis on real life problems encountered in application oriented sectors such as aerospace electronics telecommunications energy and economics This rapidly growing field with its deep understanding and assessment of complex problems in current practice provides an effective modern engineering tool This book will therefore be of significant interest and value to all postgraduates research scientists and practitioners facing complex optimization problems

Advances in Evolutionary Algorithms Witold Kosinski, 2008 With the recent trends towards massive data sets and significant computational power combined with evolutionary algorithmic advances evolutionary computation is becoming much more relevant to practice Aim of the book is to present recent improvements innovative ideas and concepts in a part of a huge EA field

Advances in Artificial Life, Evolutionary Computation and Systems Chemistry Federico Rossi, Fabio Mavelli, Pasquale Stano, Danilo Caivano, 2016-04-02 This book constitutes the revised selected papers of the 10th Italian Workshop on Advances in Artificial Life Evolutionary Computation and Systems Chemistry WIVACE 2015 held at Bari Italy in September 2015 The 18 papers presented have been thoroughly reviewed and selected from 45 submissions They cover the following topics evolutionary computation bioinspired algorithms genetic algorithms bioinformatics and computational biology modeling and simulation of artificial and biological systems complex systems synthetic and systems biology systems chemistry

Evolutionary Computation D. Dumitrescu, Beatrice Lazzerini, Lakhmi C. Jain, A. Dumitrescu, 2000-06-22 Rapid advances in evolutionary computation have opened up a world of applications a world rapidly growing and evolving Decision making neural networks pattern recognition complex optimization search tasks scheduling control automated programming and cellular automata applications all rely on evolutionary computation Evolutionary Com

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