

Genetic Algorithms Theory And Applications Jku

A tutorial on genetic algorithms with an emphasis on practical applications. The rapidly expanding field of genetic algorithms has given rise to many new applications in a variety of disciplines. However, most of the existing books on the subject concentrate on theory. *Practical Genetic Algorithms* is the first introductory-level book to emphasize practical applications through the use of example problems. In an accessible style, the authors explain why the genetic algorithm is superior in many real-world applications, cover continuous parameter genetic algorithms, and provide in-depth trade-off analysis of genetic algorithm parameter selection. Written for the end user in engineering, science, and computer programming, as well as upper-level undergraduate and graduate students, *Practical Genetic Algorithms*:

- * Provides numerous practical example problems
- * Contains over 80 illustrations
- * Features many figures and tables
- * Includes three appendices: a glossary of terms, a list of genetic algorithm routines in pseudocode, and a list of symbols used in the book.

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

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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.

Over the past decade, interest in computational or non-symbolic artificial intelligence has grown. The algorithms involved have the ability to learn from past experience, and therefore have significant potential in the adaptive control of signals and systems. This book focuses on the theory and applications of learning algorithms-stochastic learning automata; artificial neural networks; and genetic algorithms, evolutionary strategies, and evolutionary programming. Hybrid combinations of various algorithms are also discussed. Chapter 1 provides a brief overview of the topics discussed and organization of the text. The first half of the book (Chapters 2 through 4) discusses the basic theory of the learning algorithms, with one chapter devoted to each type. In the second half (Chapters 5 through 7), the emphasis is on a wide range of applications drawn from adaptive signal processing, system identification, and adaptive control problems in telecommunication networks. Learning Algorithms: Theory and Applications in Signal Processing, Control and Communications is an excellent text for final year undergraduate and first year graduate students in engineering, computer science, and related areas. Professional engineers and everyone involved in the application of learning techniques in adaptive signal processing, control, and communications will

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find this text a valuable synthesis of theory and practical application of the most useful algorithms.

Nature-inspired computation and swarm intelligence have become popular and effective tools for solving problems in optimization, computational intelligence, soft computing and data science. Recently, the literature in the field has expanded rapidly, with new algorithms and applications emerging. *Nature-Inspired Computation and Swarm Intelligence: Algorithms, Theory and Applications* is a timely reference giving a comprehensive review of relevant state-of-the-art developments in algorithms, theory and applications of nature-inspired algorithms and swarm intelligence. It reviews and documents the new developments, focusing on nature-inspired algorithms and their theoretical analysis, as well as providing a guide to their implementation. The book includes case studies of diverse real-world applications, balancing explanation of the theory with practical implementation. *Nature-Inspired Computation and Swarm Intelligence: Algorithms, Theory and Applications* is suitable for researchers and graduate students in computer science, engineering, data science, and management science, who want a comprehensive review of algorithms, theory and implementation within the fields of nature inspired computation and swarm intelligence. Introduces nature-inspired algorithms and their fundamentals, including: particle swarm optimization, bat algorithm, cuckoo search, firefly algorithm, flower pollination algorithm, differential evolution and genetic algorithms as well as multi-objective optimization algorithms and others Provides a theoretical foundation and analyses of algorithms, including: statistical theory and Markov chain theory on the convergence and stability of algorithms, dynamical system theory, benchmarking of optimization, no-

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free-lunch theorems, and a generalized mathematical framework Includes a diversity of case studies of real-world applications: feature selection, clustering and classification, tuning of restricted Boltzmann machines, travelling salesman problem, classification of white blood cells, music generation by artificial intelligence, swarm robots, neural networks, engineering designs and others

Artificial Neural Nets and Genetic Algorithms

Volume 2: Applications of Fuzzy Control, Genetic Algorithms and Neural Networks

Fuzzy Logic Hybrid Extensions of Neural and Optimization Algorithms: Theory and Applications

Adaptive Control Via Genetic Algorithms

Theory and Applications of Genetic Algorithms for Scheduling Optimisation

Genetic algorithms (GAs) are based on Darwin's theory of natural selection and survival of the fittest. They are designed to competently look for solutions to big and multifaceted problems. Genetic algorithms are wide groups of interrelated events with divided steps. Each step has dissimilarities, which leads to a broad range of connected actions. Genetic algorithms are used to improve trading systems, such as to optimize a trading rule or parameters of a predefined multiple indicator market trading

system. Genetic Algorithms and Applications for Stock Trading Optimization is a complete reference source to genetic algorithms that explains how they might be used to find trading strategies, as well as their use in search and optimization. It covers the functions of genetic algorithms internally, computer implementation of pseudo-code of genetic algorithms in C++, technical analysis for stock market forecasting, and research outcomes that apply in the stock trading system. This book is ideal for computer scientists, IT specialists, data scientists, managers, executives, professionals, academicians, researchers, graduate-level programs, research programs, and post-graduate students of engineering and science.

Genetic and evolutionary algorithms (GEAs) have often achieved an enviable success in solving optimization problems in a wide range of disciplines. This book provides effective optimization algorithms for solving a broad class of problems quickly, accurately, and reliably by

employing evolutionary mechanisms. Genetic Programming Theory and Practice III provides both researchers and industry professionals with the most recent developments in GP theory and practice by exploring the emerging interaction between theory and practice in the cutting-edge, machine learning method of Genetic Programming (GP). The contributions developed from a third workshop at the University of Michigan's Center for the Study of Complex Systems, where leading international genetic programming theorists from major universities and active practitioners from leading industries and businesses meet to examine and challenge how GP theory informs practice and how GP practice impacts GP theory. Applications are from a wide range of domains, including chemical process control, informatics, and circuit design, to name a few.

** This book deals with the fundamentals of genetic algorithms and their applications in a variety of different areas of engineering and science * Most significant update to the second edition is the **MATLAB** codes that*

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*accompany the text * Provides a thorough discussion of hybrid genetic algorithms * Features more examples than first edition*

Genetic Algorithms and Genetic Programming

Genetic Programming Theory and Practice III

Genetic Algorithm Essentials

Theory and Real World Applications

Theories, Literature Reviews and Applications

Learning Algorithms

This book is the result of several years of research trying to better characterize parallel genetic algorithms (pGAs) as a powerful tool for optimization, search, and learning. Readers can learn how to solve complex tasks by reducing their high computational times. Dealing with two scientific fields (parallelism and GAs) is always difficult, and the book seeks at gracefully introducing from basic concepts to advanced topics. The presentation is structured in three parts. The first one is targeted to the algorithms themselves, discussing their components, the physical parallelism, and best practices in using and evaluating them. A second part deals with the theory for pGAs, with an eye on theory-to-practice issues. A final third part offers a very wide study of pGAs as practical problem solvers, addressing domains such as natural language processing, circuits design, scheduling, and genomics. This volume will be helpful

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both for researchers and practitioners. The first part shows pGAs to either beginners and mature researchers looking for a unified view of the two fields: GAs and parallelism. The second part partially solves (and also opens) new investigation lines in theory of pGAs. The third part can be accessed independently for readers interested in applications. The result is an excellent source of information on the state of the art and future developments in parallel GAs.

Genetic algorithms are playing an increasingly important role in studies of complex adaptive systems, ranging from adaptive agents in economic theory to the use of machine learning techniques in the design of complex devices such as aircraft turbines and integrated circuits. *Adaptation in Natural and Artificial Systems* is the book that initiated this field of study, presenting the theoretical foundations and exploring applications. In its most familiar form, adaptation is a biological process, whereby organisms evolve by rearranging genetic material to survive in environments confronting them. In this now classic work, Holland presents a mathematical model that allows for the nonlinearity of such complex interactions. He demonstrates the model's universality by applying it to economics, physiological psychology, game theory, and artificial intelligence and then outlines the way in which this approach modifies the traditional views of mathematical genetics. Initially applying his concepts to simply defined artificial systems with limited numbers of parameters, Holland goes on to explore their use in the study of a wide range of complex, naturally occurring processes, concentrating on systems having

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multiple factors that interact in nonlinear ways. Along the way he accounts for major effects of coadaptation and coevolution: the emergence of building blocks, or schemata, that are recombined and passed on to succeeding generations to provide, innovations and improvements.

Cellular Genetic Algorithms defines a new class of optimization algorithms based on the concepts of structured populations and Genetic Algorithms (GAs). The authors explain and demonstrate the validity of these cellular genetic algorithms throughout the book with equal and parallel emphasis on both theory and practice. This book is a key source for studying and designing cellular GAs, as well as a self-contained primary reference book for these algorithms.

Parallel Genetic Algorithms Theory and Applications IOS Press
Parallel Genetic Algorithms Theory and Real World Applications Springer Science & Business Media
New Frontiers, Volume II
Nature-Inspired Computing and Optimization
Evolutionary Multi-Objective System Design
Nature-Inspired Optimizers

A comprehensive approach to genetic algorithms in optimization and learning

Adaptation in Natural and Artificial Systems

This book introduces readers to genetic algorithms (GAs) with an emphasis on making the concepts, algorithms, and applications discussed as easy to understand as possible. Further, it avoids a great deal of formalisms and thus opens the subject to a broader audience in comparison to manuscripts

overloaded by notations and equations. The book is divided into three parts, the first of which provides an introduction to GAs, starting with basic concepts like evolutionary operators and continuing with an overview of strategies for tuning and controlling parameters. In turn, the second part focuses on solution space variants like multimodal, constrained, and multi-objective solution spaces. Lastly, the third part briefly introduces theoretical tools for GAs, the intersections and hybridizations with machine learning, and highlights selected promising applications.

The goal of the research out of which this monograph grew, was to make annealing as much as possible a general purpose optimization routine. At first glance this may seem a straight-forward task, for the formulation of its concept suggests applicability to any combinatorial optimization problem. All that is needed to run annealing on such a problem is a unique representation for each configuration, a procedure for measuring its quality, and a neighbor relation. Much more is needed however for obtaining acceptable results consistently in a reasonably short time. It is even doubtful whether the problem can be formulated such that annealing becomes an adequate approach for all instances of an optimization problem. Questions such as what is the best formulation for a given instance, and how should the process be

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controlled, have to be answered. Although much progress has been made in the years after the introduction of the concept into the field of combinatorial optimization in 1981, some important questions still do not have a definitive answer. In this book the reader will find the foundations of annealing in a self-contained and consistent presentation. Although the physical analogue from which the concept emanated is mentioned in the first chapter, all theory is developed within the framework of markov chains. To achieve a high degree of instance independence adaptive strategies are introduced.

Genetic Algorithms (GAs) are one of several techniques in the family of Evolutionary Algorithms - algorithms that search for solutions to optimization problems by "evolving" better and better solutions. Genetic Algorithms have been applied in science, engineering, business and social sciences. This book consists of 16 chapters organized into five sections. The first section deals with some applications in automatic control, the second section contains several applications in scheduling of resources, and the third section introduces some applications in electrical and electronics engineering. The next section illustrates some examples of character recognition and multi-criteria classification, and the last one deals with trading systems. These evolutionary techniques may

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be useful to engineers and scientists in various fields of specialization, who need some optimization techniques in their work and who may be using Genetic Algorithms in their applications for the first time. These applications may be useful to many other people who are getting familiar with the subject of Genetic Algorithms.

A gentle introduction to genetic algorithms. Genetic algorithms revisited: mathematical foundations.

Computer implementation of a genetic algorithm.

Some applications of genetic algorithms. Advanced operators and techniques in genetic search.

Introduction to genetics-based machine learning.

Applications of genetics-based machine learning. A look back, a glance ahead. A review of

combinatorics and elementary probability. Pascal with random number generation for fortran, basic,

and cobol programmers. A simple genetic algorithm (SGA) in pascal. A simple classifier system(SCS) in

pascal. Partition coefficient transforms for problem-coding analysis.

Genetic Algorithms in Applications

Applications of Multi-objective Evolutionary Algorithms

Cellular Genetic Algorithms

Genetic Algorithms in Search, Optimization, and Machine Learning

Practical Genetic Algorithms

The Annealing Algorithm

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The mathematics employed by genetic algorithms (GAs) are among the most exciting discoveries of the last few decades. But what exactly is a genetic algorithm? A genetic algorithm is a problem-solving method that uses genetics as its model of problem solving. It applies the rules of reproduction, gene crossover, and mutation to pseudo-organisms. Genetic algorithms have been used in science and engineering as adaptive algorithms for solving practical problems and as computational models of natural evolutionary systems. This brief, accessible introduction describes some of the most interesting research in the field and also enables readers to implement and experiment with genetic algorithms on their own. It focuses in depth on a small set of important and interesting topics—particularly in machine learning, scientific modeling, and artificial life—and reviews a broad span of research, including the work of Mitchell and her colleagues. The descriptions of applications and modeling projects stretch beyond the strict boundaries of computer science to include dynamical systems theory, game theory, molecular biology, ecology, evolutionary biology, and population genetics, underscoring the exciting "general purpose" nature of genetic algorithms as search methods that can be

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employed across disciplines. An Introduction to Genetic Algorithms is accessible to students and researchers in any scientific discipline. It includes many thought and computer exercises that build on and reinforce the reader's understanding of the text. The first chapter introduces genetic algorithms and their terminology and describes two provocative applications in detail. The second and third chapters look at the use of genetic algorithms in machine learning (computer programs, data analysis and prediction, neural networks) and in scientific models (interactions among learning, evolution, and culture; sexual selection; ecosystems; evolutionary activity). Several approaches to the theory of genetic algorithms are discussed in depth in the fourth chapter. The fifth chapter takes up implementation, and the last chapter poses some currently unanswered questions and surveys prospects for the future of evolutionary computation.

This edited research monograph brings together contributions from computer scientists, biologists, and engineers who are engaged with the study of evolution and how it may be applied to solve real-world problems. It also serves as a Festschrift dedicated to Erik D. Goodman, the founding director of the BEACON Center for the Study of Evolution in Action, a pioneering NSF

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Science and Technology Center headquartered at Michigan State University. The contributing authors are leading experts associated with the center, and they serve in top research and industrial establishments across the US and worldwide. Part I summarizes the history of the BEACON Center, with refreshingly personal chapters that describe Erik's working and leadership style, and others that discuss the development and successes of the center in the context of research funding, projects, and careers. The chapters in Part II deal with the evolution of genomes and evolvability. The contributions in Part III discuss the evolution of behavior and intelligence. Those in Part IV concentrate on the evolution of communities and collective dynamics. The chapters in Part V discuss selected evolutionary computing applications in domains such as arts and science, automated program repair, cybersecurity, mechatronics, and genomic prediction. Part VI deals with evolution in the classroom, using creativity in research, and responsible conduct in research training. The book concludes with a special chapter from Erik Goodman, a short biography that concentrates on his personal positive influences and experiences throughout his long career in academia and industry.

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Computer solutions to many difficult problems in science and engineering require the use of automatic search methods that consider a large number of possible solutions to the given problems. This book describes recent advances in the theory and practice of one such search method, called Genetic Algorithms. Genetic algorithms are evolutionary search techniques based on principles derived from natural population genetics, and are currently being applied to a variety of difficult problems in science, engineering, and artificial intelligence.

Algorithms, Theory and Applications

Evolutionary Intelligence

theory and applications

Contributions to the Theory and Applications of Genetic Algorithms

New Frontier In Evolutionary Algorithms: Theory And Applications

An Introduction to Theory and Applications with Matlab

The book addresses some of the most recent issues with the theoretical and methodological aspects, of evolutionary multi-objective optimization problems and the various design challenges using different hybrid intelligent approaches. Multi-objective optimization has been available for about two decades and its application in real-world problems is continuously increasing. Furthermore, many

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applications function more effectively using a hybrid systems approach. The book presents hybrid techniques based on Artificial Neural Network, Fuzzy Sets, Automata Theory, other metaheuristic or classical algorithms, etc. The book examines various examples of algorithms in different real-world application domains as graph growing problem, speech synthesis, traveling salesman problem, scheduling problems, antenna design, genes design, modeling of chemical and biochemical processes etc. This book examines the implementation and applications of genetic algorithms (GA) to the domain of AI. In recent years the trend towards, real world applications is gaining ground especially in GA. The general purpose nature of GA is examined from an interdisciplinary point of view. Despite the differences that may exist in between representations across domain problems the commonality of in the design of GA is upheld. This work provides an overview of the current developments in Europe a section is devoted to the programming of Parallel Genetic Algorithms (including GAME) and a section on Optimisation and Complex Modelling. Readers: researchers in AI, mathematics and computing.

The book provides readers with a snapshot of the state of the art in the field of nature-inspired computing and its application in optimization. The approach is mainly practice-oriented: each bio-inspired technique or algorithm is introduced together with one of its

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possible applications. Applications cover a wide range of real-world optimization problems: from feature selection and image enhancement to scheduling and dynamic resource management, from wireless sensor networks and wiring network diagnosis to sports training planning and gene expression, from topology control and morphological filters to nutritional meal design and antenna array design. There are a few theoretical chapters comparing different existing techniques, exploring the advantages of nature-inspired computing over other methods, and investigating the mixing time of genetic algorithms. The book also introduces a wide range of algorithms including the ant colony optimization, the bat algorithm, genetic algorithms, the collision-based optimization algorithm, the flower pollination algorithm, multi-agent systems and particle swarm optimization. This timely book is intended as a practice-oriented reference guide for students, researchers and professionals.

This is a comprehensive overview of the basics of fuzzy control, which also brings together some recent research results in soft computing, in particular fuzzy logic using genetic algorithms and neural networks. This book offers researchers not only a solid background but also a snapshot of the current state of the art in this field.

Theory and Application

Foundations of Generic Optimization

Recent Developments in the Evolution Strategies of Genetic Algorithms

Theory & Applications

Real-World Applications of Genetic Algorithms

Evolutionary Algorithms and Neural Networks

From the contents: Neural networks - theory and applications: NNs (= neural networks) classifier on continuous data domains- quantum associative memory - a new class of neuron-like discrete filters to image processing - modular NNs for improving generalisation properties - presynaptic inhibition modelling for image processing application - NN recognition system for a curvature primal sketch - NN based nonlinear temporal-spatial noise rejection system - relaxation rate for improving Hopfield network - Oja's NN and influence of the learning gain on its dynamics Genetic algorithms - theory and applications: transposition: a biological-inspired mechanism to use with GAs (= genetic algorithms) - GA for decision tree induction - optimising decision classifications using GAs - scheduling tasks with intertask communication onto multiprocessors by GAs - design of

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robust networks with GA - effect of degenerate coding on GAs - multiple traffic signal control using a GA - evolving musical harmonisation - niched-penalty approach for constraint handling in GAs - GA with dynamic population size - GA with dynamic niche clustering for multimodal function optimisation Soft computing and uncertainty: self-adaptation of evolutionary constructed decision trees by information spreading - evolutionary programming of near optimal NNs - Detailed MOEA applications discussed by international experts - State-of-the-art practical insights in tackling statistical optimization with MOEAs - A unique monograph covering a wide spectrum of real-world applications - Step-by-step discussion of MOEA applications in a variety of domains Real-world engineering problems often require concurrent optimization of several design objectives, which are conflicting in cases. This type of optimization is generally called multi-objective or multi-criterion optimization. The area of research that applies evolutionary methodologies to

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multi-objective optimization is of special and growing interest. It brings a viable computational solution to many real-world problems. Generally, multi-objective engineering problems do not have a straightforward optimal design. These kinds of problems usually inspire several solutions of equal efficiency, which achieve different trade-offs. Decision makers' preferences are normally used to select the most adequate design. Such preferences may be dictated before or after the optimization takes place. They may also be introduced interactively at different levels of the optimization process. Multi-objective optimization methods can be subdivided into classical and evolutionary. The classical methods usually aim at a single solution while the evolutionary methods provide a whole set of so-called Pareto-optimal solutions. Evolutionary Multi-Objective System Design: Theory and Applications provides a representation of the state-of-the-art in evolutionary multi-objective optimization research area and related new trends. It reports many

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innovative designs yielded by the application of such optimization methods. It also presents the application of multi-objective optimization to the following problems: Embrittlement of stainless steel coated electrodes Learning fuzzy rules from imbalanced datasets Combining multi-objective evolutionary algorithms with collective intelligence Fuzzy gain scheduling control Smart placement of roadside units in vehicular networks Combining multi-objective evolutionary algorithms with quasi-simplex local search Design of robust substitution boxes Protein structure prediction problem Core assignment for efficient network-on-chip-based system design 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

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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.

Theory and Applications in Signal Processing, Control and Communications Theory, Design and Practice
Mixed PTL/static Logic Synthesis Using

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Genetic Algorithms

Genetic Algorithms and Applications for Stock Trading Optimization

A Festschrift in Honor of Erik D. Goodman

Nature-Inspired Computation and Swarm Intelligence

This book covers the conventional and most recent theories and applications in the area of evolutionary algorithms, swarm intelligence, and meta-heuristics. Each chapter offers a comprehensive description of a specific algorithm, from the mathematical model to its practical application. Different kind of optimization problems are solved in this book, including those related to path planning, image processing, hand gesture detection, among others. All in all, the book offers a tutorial on how to design, adapt, and evaluate evolutionary algorithms. Source codes for most of the proposed techniques have been included as supplementary materials on a dedicated webpage.

This book provides a highly accessible introduction to evolutionary computation. It details basic concepts, highlights several applications of evolutionary computation, and includes solved problems using MATLAB software and C/C++. This book also outlines some ideas on when genetic algorithms and genetic programming should be used. The most difficult part of using a genetic algorithm is how to encode the population, and the

author discusses various ways to do this.

This book introduces readers to the fundamentals of artificial neural networks, with a special emphasis on evolutionary algorithms. At first, the book offers a literature review of several well-regarded evolutionary algorithms, including particle swarm and ant colony optimization, genetic algorithms and biogeography-based optimization. It then proposes evolutionary version of several types of neural networks such as feed forward neural networks, radial basis function networks, as well as recurrent neural networks and multi-layer perceptron. Most of the challenges that have to be addressed when training artificial neural networks using evolutionary algorithms are discussed in detail. The book also demonstrates the application of the proposed algorithms for several purposes such as classification, clustering, approximation, and prediction problems. It provides a tutorial on how to design, adapt, and evaluate artificial neural networks as well, and includes source codes for most of the proposed techniques as supplementary materials.

Genetic Algorithms and Genetic Programming: Modern Concepts and Practical Applications discusses algorithmic developments in the context of genetic algorithms (GAs) and genetic programming (GP). It applies the algorithms to significant combinatorial optimization problems and describes structure identification using HeuristicLab as a platform for algorithm

development. The book focuses on both theoretical and empirical aspects. The theoretical sections explore the important and characteristic properties of the basic GA as well as main characteristics of the selected algorithmic extensions developed by the authors. In the empirical parts of the text, the authors apply GAs to two combinatorial optimization problems: the traveling salesman and capacitated vehicle routing problems. To highlight the properties of the algorithmic measures in the field of GP, they analyze GP-based nonlinear structure identification applied to time series and classification problems. Written by core members of the HeuristicLab team, this book provides a better understanding of the basic workflow of GAs and GP, encouraging readers to establish new bionic, problem-independent theoretical concepts. By comparing the results of standard GA and GP implementation with several algorithmic extensions, it also shows how to substantially increase achievable solution quality.

Genetic Algorithms in Optimisation, Simulation and Modelling

Theory and Applications

An Introductory Analysis with Applications to Biology, Control, and Artificial Intelligence

Modern Concepts and Practical Applications

Advances in Evolutionary Algorithms

Proceedings of the International Conference in Portorož, Slovenia, 1999