

Genetic Algorithms Theory And Applications Jku

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. 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-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

This comprehensive book gives an overview of the latest discussions in the application of genetic algorithms to solve engineering problems. Featuring real-world applications and an accompanying disk, giving the reader the opportunity to use an interactive genetic algorithms demonstration program.

Parallel Genetic Algorithms

Evolutionary Algorithms and Neural Networks

Introduction to Neural Networks, Fuzzy Logic & Genetic Algorithms

Theory and Applications in Signal Processing, Control and Communications

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

Evolutionary Computation: Theory and Applications

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 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. An analysis of the learning behavior of genetic algorithms in economic systems with mutual interaction, such as markets. These systems are characterized by a state-dependent fitness function and - for the first time - mathematical results characterizing the long-term outcome of genetic learning in such systems are provided. The usefulness of such results is illustrated by many simulations in evolutionary games and economic models.

The series Advances in Industrial Control aims to report and encourage technology transfer in control engineering. The rapid development of control technology impacts all areas of the control discipline. New theory, new controllers, actuators, sensors, new industrial processes, computer methods, new applications, new philosophies, . . . , new challenges. Much of this development work resides in industrial reports, feasibility study papers and the reports of advanced collaborative projects. The series offers

an opportunity for researchers to present an extended exposition of such new work in all aspects of industrial control for wider and rapid dissemination. The emerging technologies in control include fuzzy logic, intelligent control, neural networks and hardware developments like micro-electro-mechanical systems and autonomous vehicles. This volume describes the biological background, basic construction and application of the emerging technology of Genetic Algorithms. Dr Kim Man and his colleagues have written a book which is both a primer introducing the basic concepts and a research text which describes some of the more advanced applications of the genetic algorithmic method. The applications described are especially useful since they indicate the power of the GA method in solving a wide range of problems. These sections are also instructive in showing how the mechanics of the GA solutions are obtained thereby acting as a template for similar types of problems. The volume is a very welcome contribution to the Advances in Industrial Control Series. M. J. Grimble and M. A.

Adaptive Learning by Genetic Algorithms

New Frontiers, Volume II

Theory & Applications

Genetic Algorithms for Control and Signal Processing

Nature-Inspired Computation and Swarm Intelligence

Theory and Real World Applications

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 the 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: 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 encourages 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 have been used in science and engineering as adaptive algorithms for solving practical problems and as computational models of natural evolutionary systems. This 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 provides 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, control theory, molecular biology, ecology, evolutionary biology, and population genetics, underscoring the exciting "general purpose" nature of genetic algorithms as search methods that are 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 (including 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 book provides a collection of forty articles containing new material on both theoretical aspects of Evolutionary Computing (EC), and demonstrating the usefulness/success of 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.

Recent Developments in the Evolution Strategies of Genetic Algorithms

Algorithms, Theory and Applications

Mixed PTL/static Logic Synthesis Using Genetic Algorithms

Evolutionary Algorithms for Solving Multi-Objective Problems

Genetic Algorithms and Genetic Programming

Genetic Algorithms and Applications for Stock Trading Optimization

The book covers different aspects of real-world applications of optimization algorithms. It provides insights from the Fourth International Conference on Harmony Search, Soft Computing and Applications held at BML Munjal University, Gurgaon, India on February 7–9, 2018. It consists of research articles on novel and newly proposed optimization algorithms; the theoretical study of nature-inspired optimization algorithms; numerically established results of nature-inspired optimization algorithms; and real-world applications of optimization algorithms and synthetic benchmarking of optimization algorithms.

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.

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 Algorithms

A comprehensive approach to genetic algorithms in optimization and learning

Theory and Applications of Genetic Algorithms for Scheduling Optimisation

An Introduction to Genetic Algorithms

Evolutionary Algorithms in Management Applications

Theory and Applications, ICHSA 2018

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

Evolutionary computation is the study of computational systems which use ideas and get inspiration from natural evolution and adaptation. This book is devoted to the theory and application of evolutionary computation. It is a self-contained volume which covers both introductory material and selected advanced topics. The book can roughly be divided into two major parts: the introductory one and the one on selected advanced topics. Each part consists of several chapters which present an in-depth discussion of selected topics. A strong connection is established between evolutionary algorithms and traditional search algorithms. This connection enables us to incorporate ideas in more established fields into evolutionary algorithms. The book is aimed at a wide range of readers. It does not require previous exposure to the field since introductory material is included. It will be of interest to anyone who is interested in adaptive optimization and learning. People in computer science, artificial intelligence, operations research, and various engineering fields will find it particularly interesting. Contents: Introduction (X Yao) Evolutionary Computation in Behavior Engineering (M Colombetti & M Dorigo) A General Method for Incremental Self-Improvement and Multi-Agent Learning (J Schmidhuber) Teacher: A Genetics-Based System for Learning and for Generalizing Heuristics (B W Wah & A Ieumwananonthachai) Automatic Discovery of Protein Motifs Using Genetic Programming (J R Koza & D Andre) The Role of Self Organization in Evolutionary Computations (A C Tsoi & J Shaw) Virus-Evolutionary Genetic Algorithm and Its Application to Traveling Salesman Problem (T Fukuda et al.) Hybrid Evolutionary Optimization Algorithm for Constrained Problems (J-H Kim & H Myung) CAM-BRAIN – The Evolutionary Engineering of a Billion Neuron Artificial Brain (H de Garis) An Evolutionary Approach to the N-Player Iterated Prisoner's Dilemma Game (X Yao & Darwen) Readership: Graduate students, practitioners and researchers in engineering and electronics and computer science. keywords: Genetic Algorithms; Evolutionary Computation; Evolutionary Algorithms; Genetic Programming; Evolutionary Robotics; Global Optimization; Evolutionary Games; Global Optimization; Machine Learning; Artificial Intelligence

This textbook is a second edition of Evolutionary Algorithms for Solving Multi-Objective Problems, significantly expanded and adapted for the classroom. The various features of multi-objective evolutionary algorithms are presented here in an innovative and student-friendly fashion, incorporating state-of-the-art research. The book disseminates the application of evolutionary algorithm techniques to a variety of practical problems. It contains exhaustive appendices, index and bibliography and links to a complete set of teaching tutorials, exercises and solutions.

New Frontier In Evolutionary Algorithms: Theory And Applications

Evolution in Action: Past, Present and Future

Adaptive Control Via Genetic Algorithms

Variants of Evolutionary Algorithms for Real-World Applications

Concepts and Designs

The Practical Handbook of Genetic Algorithms

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.

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 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 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

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.

Genetic Algorithms in Optimisation, Simulation and Modelling

Real-World Applications of Genetic Algorithms

Genetic Algorithms in Applications

Contributions to the Theory and Applications of Genetic Algorithms

Theory and Application

Harmony Search Algorithm. Theory and Applications

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 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.

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 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.

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.

Advances in Evolutionary Computing

Harmony Search and Nature Inspired Optimization Algorithms

Learning Algorithms
theory and applications

Proceedings of the First International Conference on Genetic Algorithms and their Applications
Advances in Evolutionary Algorithms

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 (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.

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

Theory and Applications

A Festschrift in Honor of Erik D. Goodman

Evolutionary Multi-Objective System Design

Analytical Results and Applications to Economical Models

An Introduction to Theory and Applications with Matlab

Practical Genetic Algorithms

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.

Evolutionary Algorithms (EA) are powerful search and optimisation techniques inspired by the mechanisms of natural evolution. They imitate, on an abstract level, biological principles such as a population based approach, the inheritance of information, the variation of information via crossover/mutation, and the selection of individuals based on fitness. The most well-known class of EA are Genetic Algorithms (GA), which have received much attention not only in the scientific community lately. Other variants of EA, in particular Genetic Programming, Evolution Strategies, and Evolutionary Programming are less popular, though very powerful too. Traditionally, most practical applications of EA have appeared in the technical sector. Management problems, for a long time, have been a rather neglected field of EA-research. This is surprising, since the great potential of evolutionary approaches for the business and economics domain was recognised in pioneering publications quite a while ago. John Holland, for instance, in his seminal book *Adaptation in Natural and Artificial Systems* (The University of Michigan Press, 1975) identified economics as one of the prime targets for a theory of adaptation, as formalised in his reproductive plans (later called Genetic Algorithms).

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 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.

Evolutionary Intelligence

Theory, Design and Practice

Modern Concepts and Practical Applications

Doctoral Thesis / Dissertation from the year 2018 in the subject Computer Sciences - Artificial Intelligence, grade: A, Indian Institute of Technology Roorkee, language: English, abstract: The aim of this book is to introduce Harmony Search algorithm in the context of solving real life problems. Harmony Search (HS) is a musician's behavior inspired metaheuristic algorithm developed in 2001, though it is a relatively new meta heuristic algorithm, its effectiveness and advantages have been demonstrated in various applications like traffic routing, multi objective optimization, design of municipal water distribution networks, load dispatch problem in electrical engineering, rostering problems, clustering, structural design, classification and feature selection to name a few. Optimization is the process of finding the best alternate solution among a given set of solutions under some given constraints. The process of finding the maximum or minimum possible value, which a function can attain in its domain, is known as optimization. One of the most striking trends that emerged in the optimization field is the simulation of natural processes as efficient global search methods. The natural processes or phenomena are firstly analyzed mathematically and then coded as computer programs for solving complex nonlinear real-world problems. The resulting methods are called Nature Inspired Algorithms that can often outperform classic methods. The advantages of these methods are their ability to solve various standard or application-based problems successfully without any prior knowledge of the problem space. Moreover, these algorithms are more likely to obtain the global optima of a given problem. They do not require any continuity and differentiability of the objective functions. Also, they work on a randomly generated population of solutions instead of one solution. They are easy to program and can be easily implemented on a computer. Some of the examples of Nature Inspired Optimization Techniques are Genetic Algorithm, Particle Swarm Optimization, Artificial Bee Colony Optimization and Ant Colony Optimization.

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.