

Bacterial Foraging Optimization Algorithm For Neural

This book highlights the latest research findings, innovative research results, methods and development techniques from both theoretical and practical perspectives related to the emerging areas of information networking and their applications. It includes the Proceedings of the 20th International Conference on Network-Based Information Systems (NBiS-2017), held on August 24–26, 2017 in Toronto, Canada. Today's networks and information systems are evolving rapidly. Further, there are dynamic new trends and applications in information networking such as wireless sensor networks, ad hoc networks, peer-to-peer systems, vehicular networks, opportunistic networks, grid and cloud computing, pervasive and ubiquitous computing, multimedia systems, security, multi-agent systems, high-speed networks, and web-based systems. These networks are expected to manage the increasing number of users, provide support for a range of services, guarantee the quality of service (QoS), and optimize their network resources. In turn, these demands are the source of various research issues and challenges that have to be overcome – and which these Proceedings address.

Bacterial foraging algorithms are a method used to optimize the behavior of a variable set with a determinable outcome. While the use of such algorithms is not entirely new in the field of orbital mechanics, the algorithm examined in this thesis, includes attraction-

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repellent parameters that, in theory, should speed and improve the solution of problems. To test the validity of this unexamined algorithm, it is applied to several important real-world problems for orbital mechanics. The first problem to be solved is the two-burn in-plane transfer which has the known optimal solution of the Hohmann transfer. After examining the accuracy and validity of this problems results, the problem complexity is increased to model a low-thrust transfer between Earth and Mars. At both stages of the successively more complex analysis, the accuracy and convergence of the attraction/repulsion bioforaging optimization (BFO) algorithm is evaluated. It is found that the extra steps involved in the swarming mechanic bring excessive computational time and can reduce accuracy of the results. Future work with this algorithm will include fine-tuning algorithm parameters and further increasing the trajectory complexity.

Bio-inspired Algorithms for Engineering builds a bridge between the proposed bio-inspired algorithms developed in the past few decades and their applications in real-life problems, not only in an academic context, but also in the real world. The book proposes novel algorithms to solve real-life, complex problems, combining well-known bio-inspired algorithms with new concepts, including both rigorous analyses and unique applications. It covers both theoretical and practical methodologies, allowing readers to learn more about the implementation of bio-inspired algorithms. This book is a useful resource for both academic and industrial engineers working on artificial intelligence, robotics, machine learning, vision,

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classification, pattern recognition, identification and control. Presents real-time implementation and simulation results for all the proposed schemes Offers a comparative analysis and rigorous analysis of the convergence of proposed algorithms Provides a guide for implementing each application at the end of each chapter Includes illustrations, tables and figures that facilitate the reader's comprehension of the proposed schemes and applications

This book is both a reference for engineers and scientists and a teaching resource, featuring tutorial chapters and research papers on feature extraction. Until now there has been insufficient consideration of feature selection algorithms, no unified presentation of leading methods, and no systematic comparisons.

The synchronized flashing of fireflies at night. The spiraling patterns of an aggregating slime mold. The anastomosing network of army-ant trails. The coordinated movements of a school of fish. Researchers are finding in such patterns--phenomena that have fascinated naturalists for centuries--a fertile new approach to understanding biological systems: the study of self-organization. This book, a primer on self-organization in biological systems for students and other enthusiasts, introduces readers to the basic concepts and tools for studying self-organization and then examines numerous examples of self-organization in the natural world. Self-organization refers to diverse pattern formation processes in the physical and biological world, from sand grains assembling into rippled dunes to cells combining to create highly structured tissues to individual

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insects working to create sophisticated societies. What these diverse systems hold in common is the proximate means by which they acquire order and structure. In self-organizing systems, pattern at the global level emerges solely from interactions among lower-level components. Remarkably, even very complex structures result from the iteration of surprisingly simple behaviors performed by individuals relying on only local information. This striking conclusion suggests important lines of inquiry: To what degree is environmental rather than individual complexity responsible for group complexity? To what extent have widely differing organisms adopted similar, convergent strategies of pattern formation? How, specifically, has natural selection determined the rules governing interactions within biological systems? Broad in scope, thorough yet accessible, this book is a self-contained introduction to self-organization and complexity in biology--a field of study at the forefront of life sciences research.

This volume contains the peer-reviewed proceedings of the International Conference on Modelling and Simulation (MS-17), held in Kolkata, India, 4th-5th November 2017, organized by the Association for the Advancement of Modelling and Simulation Techniques in Enterprises (AMSE, France) in association with the Institution of Engineering Technology (IET, UK), Kolkata Network. The contributions contained here showcase some recent advances in modelling and simulation across various aspects of science and technology. This book brings together articles describing applications of modelling and simulation techniques in fields as diverse

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as physics, mathematics, electrical engineering, industrial electronics, control, automation, power systems, energy and robotics. It includes a special section on mechanical, fuzzy, optical and opto-electronic control of oscillations. It provides a snapshot of the state of the art in modelling and simulation methods and their applications, and will be of interest to researchers and engineering professionals from industry, academia and research organizations.

This textbook provides a comprehensive introduction to nature-inspired metaheuristic methods for search and optimization, including the latest trends in evolutionary algorithms and other forms of natural computing. Over 100 different types of these methods are discussed in detail. The authors emphasize non-standard optimization problems and utilize a natural approach to the topic, moving from basic notions to more complex ones. An introductory chapter covers the necessary biological and mathematical backgrounds for understanding the main material. Subsequent chapters then explore almost all of the major metaheuristics for search and optimization created based on natural phenomena, including simulated annealing, recurrent neural networks, genetic algorithms and genetic programming, differential evolution, memetic algorithms, particle swarm optimization, artificial immune systems, ant colony optimization, tabu search and scatter search, bee and bacteria foraging algorithms, harmony search, biomolecular computing, quantum computing, and many others. General topics on dynamic, multimodal, constrained, and multiobjective optimizations are also

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described. Each chapter includes detailed flowcharts that illustrate specific algorithms and exercises that reinforce important topics. Introduced in the appendix are some benchmarks for the evaluation of metaheuristics. Search and Optimization by Metaheuristics is intended primarily as a textbook for graduate and advanced undergraduate students specializing in engineering and computer science. It will also serve as a valuable resource for scientists and researchers working in these areas, as well as those who are interested in search and optimization methods.

This carefully edited book combines symbolic and sub-symbolic techniques to construct more robust and reliable problem solving models. This volume focused on "Hybrid Artificial Intelligence Systems" contains a collection of papers that were presented at the 2nd International Workshop on Hybrid Artificial Intelligence Systems, held in 12 - 13 November, 2007, Salamanca, Spain.

The field of natural computing has been the focus of a substantial research effort in recent decades. One particular strand of this research concerns the development of computational algorithms using metaphorical inspiration from systems and phenomena that occur in the natural world. These naturally inspired computing algorithms have proven to be successful problem-solvers across domains as diverse as management science, bioinformatics, finance, marketing, engineering, architecture and design. This book is a comprehensive introduction to natural computing algorithms, suitable for academic and industrial

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researchers and for undergraduate and graduate courses on natural computing in computer science, engineering and management science.

This book provides a handbook of algorithmic recipes from the fields of Metaheuristics, Biologically Inspired Computation and Computational Intelligence that have been described in a complete, consistent, and centralized manner. These standardized descriptions were carefully designed to be accessible, usable, and understandable. Most of the algorithms described in this book were originally inspired by biological and natural systems, such as the adaptive capabilities of genetic evolution and the acquired immune system, and the foraging behaviors of birds, bees, ants and bacteria. An encyclopedic algorithm reference, this book is intended for research scientists, engineers, students, and interested amateurs. Each algorithm description provides a working code example in the Ruby Programming Language.

In any deterministic solution, the convergence is not at all guaranteed, whereas, the stochastic and random search algorithms are 1 shot optimization and it can hit the nearly optimized solution, with guarantee. Therefore the AI dependent evolutionary algorithms (GA, PSO, DE, BFOA) are prescribed for this type of optimization problems. Some selected evolutionary algorithms are presented for digital filter design. If the statistical characteristic of the input data varies with respect to time or the required knowledge about input data is not satisfactory, adaptive filters are needed. Adaptive filters (FIR and IIR) have attractive increasing attention due to

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their widespread use in many different applications such as system identification, noise cancellation, channel equalization, linear prediction, control, and modeling. In the present book, in order to achieve a global minimum solution to the fitness function related to filter transfer function, biologically inspired algorithm is used.

Adaptation to classical Bacterial Foraging Optimization is employed to design stable and optimum digital filter design for signal processing and image processing applications.

A clear and lucid bottom-up approach to the basic principles of evolutionary algorithms. Evolutionary algorithms (EAs) are a type of artificial intelligence. EAs are motivated by optimization processes that we observe in nature, such as natural selection, species migration, bird swarms, human culture, and ant colonies. This book discusses the theory, history, mathematics, and programming of evolutionary optimization algorithms. Featured algorithms include genetic algorithms, genetic programming, ant colony optimization, particle swarm optimization, differential evolution, biogeography-based optimization, and many others. Evolutionary Optimization Algorithms: Provides a straightforward, bottom-up approach that assists the reader in obtaining a clear—but theoretically rigorous—understanding of evolutionary algorithms, with an emphasis on implementation. Gives a careful treatment of recently developed EAs—including opposition-based learning, artificial fish swarms, bacterial foraging, and many others—and discusses their similarities and differences from more well-established EAs. Includes chapter-end problems plus a

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solutions manual available online for instructors Offers simple examples that provide the reader with an intuitive understanding of the theory Features source code for the examples available on the author's website Provides advanced mathematical techniques for analyzing EAs, including Markov modeling and dynamic system modeling Evolutionary Optimization Algorithms: Biologically Inspired and Population-Based Approaches to Computer Intelligence is an ideal text for advanced undergraduate students, graduate students, and professionals involved in engineering and computer science.

This is part 1 of the 3-volume set CCIS 1252 until CCIS 1254 that constitutes the refereed proceedings of the 6th International Conference on Artificial Intelligence and Security, ICAIS 2020, which was held in Hohhot, China, in July 2020. The conference was formerly called "International Conference on Cloud Computing and Security" with the acronym ICCCS. The total of 178 full papers and 8 short papers presented in this 3-volume proceedings was carefully reviewed and selected from 1064 submissions. The papers were organized in topical sections as follows: Part I: artificial intelligence; Part II: artificial intelligence; Internet of things; information security; Part III: information security; big data and cloud computing; information processing.

Modern metaheuristic algorithms such as bee algorithms and harmony 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

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in optimization, including genetic algorithms, bee algorithms, particle swarm optimization, simulated annealing, ant colony optimization, harmony search, and firefly algorithms. We also briefly introduce the photosynthetic algorithm, the enzyme algorithm, and Tabu search. 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 some of the algorithms such as the harmony search and firefly algorithms are at the forefront of current research, this book can also serve as a reference book for researchers.

The natural social behavior of large groups of animals, such as flocks of birds, schools of fish, or colonies of ants has fascinated scientists for hundreds of years, if not longer, due to the intricate nature of their interactions and their ability to move and work together seemingly effortlessly. *Innovations and Developments of Swarm Intelligence Applications* explores the emerging realm of swarm intelligence, which finds its basis in the natural social behavior of animals. The study and application of this swarm behavior has led scientists to a new world of research as ways are found to apply this behavior to independent intelligent agents, creating complex solutions for real world applications. *Worldwide contributions* have been seamlessly combined in this comprehensive reference, providing a wealth of new information for researchers, academicians, students, and engineers.

This two-volume set of LNCS 12463 and LNCS 12464 constitutes - in conjunction with the volume LNAI 12465 -

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the refereed proceedings of the 16th International Conference on Intelligent Computing, ICIC 2020, held in Bari, Italy, in October 2020. The 162 full papers of the three proceedings volumes were carefully reviewed and selected from 457 submissions. The ICIC theme unifies the picture of contemporary intelligent computing techniques as an integral concept that highlights the trends in advanced computational intelligence and bridges theoretical research with applications. The theme for this conference is "Advanced Intelligent Computing Methodologies and Applications." Papers related to this theme are especially solicited, addressing theories, methodologies, and applications in science and technology.

Introduction to Nature-Inspired Optimization brings together many of the innovative mathematical methods for non-linear optimization that have their origins in the way various species behave in order to optimize their chances of survival. The book describes each method, examines their strengths and weaknesses, and where appropriate, provides the MATLAB code to give practical insight into the detailed structure of these methods and how they work. Nature-inspired algorithms emulate processes that are found in the natural world, spurring interest for optimization. Lindfield/Penny provide concise coverage to all the major algorithms, including genetic algorithms, artificial bee colony algorithms, ant colony optimization and the cuckoo search algorithm, among others. This book provides a quick reference to practicing engineers, researchers and graduate students who work in the field of optimization. Applies concepts in nature and biology to develop new algorithms for nonlinear optimization Offers working MATLAB® programs for the

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major algorithms described, applying them to a range of problems Provides useful comparative studies of the algorithms, highlighting their strengths and weaknesses Discusses the current state-of-the-field and indicates possible areas of future development

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.

his two-volume set LNCS 12689-12690 constitutes the refereed proceedings of the 12th International Conference on Advances in Swarm Intelligence, ICSI 2021, held in Qingdao, China, in July 2021. The 104 full papers presented in this volume were carefully reviewed and selected from 177 submissions. They cover topics such as: Swarm Intelligence and Nature-Inspired Computing; Swarm-based Computing Algorithms for Optimization; Particle Swarm Optimization; Ant Colony Optimization; Differential Evolution; Genetic Algorithm and Evolutionary Computation; Fireworks Algorithms; Brain Storm Optimization Algorithm; Bacterial Foraging Optimization Algorithm; DNA Computing Methods; Multi-Objective Optimization; Swarm Robotics and Multi-Agent System; UAV Cooperation and Control; Machine Learning;

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Data Mining; and Other Applications.

This book constitutes the proceedings of the 11th International Conference on Advances in Swarm Intelligence, ICSI 2020, held in July 2020 in Belgrade, Serbia. Due to the COVID-19 pandemic the conference was held virtually. The 63 papers included in this volume were carefully reviewed and selected from 127 submissions. The papers are organized in 12 cohesive topical sections as follows: Swarm intelligence and nature-inspired computing; swarm-based computing algorithms for optimization; particle swarm optimization; ant colony optimization; brain storm optimization algorithm; bacterial foraging optimization; genetic algorithm and evolutionary computation; multi-objective optimization; machine learning; data mining; multi-agent system and robotic swarm, and other applications.

The design of a layout for a process plant is highly related with the concept of inherent safety, as both the likelihood of accidents and the extent of their consequences can be mitigated by the proper placement of equipment units. Inherent safety indices, such as the Hazard Identification and Ranking System and the Safety Weighted Hazard Index, aim at assessing risk based on expert opinion, process reactivity and properties for a wide variety of processes. In this study, we address the problem of defining proper layout designs by using a safety assessment approach based on these two indices. The information provided by the indices along with parameters that characterize the chemical process are included in the mathematical formulation of an optimization problem, which aims at finding adequate trade-offs between capital costs and safety. The optimization problem is then solved by a Bacterial Foraging Optimization Algorithm. The meta-heuristic locates each process unit in a two-dimensional plane along with the piping connections between equipment, considering damage radii, safety devices and other

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secondary barriers minimizing the total costs of the layout. Using a case study, a comparison is conducted among the layouts that are obtained using each one of the two indices as well as with previous results obtained using the Fire and Explosion Index. The model allows variability in initialization and proves its applicability; it aims to be of substantial support in the complex decision-making process of a layout design. Nature-inspired algorithms have a great popularity in the current scientific community, being the focused scope of many research contributions in the literature year by year. The rationale behind the acquired momentum by this broad family of methods lies on their outstanding performance evinced in hundreds of research fields and problem instances. This book gravitates on the development of nature-inspired methods and their application to stochastic, dynamic and robust optimization. Topics covered by this book include the design and development of evolutionary algorithms, bio-inspired metaheuristics, or memetic methods, with empirical, innovative findings when used in different subfields of mathematical optimization, such as stochastic, dynamic, multimodal and robust optimization, as well as noisy optimization and dynamic and constraint satisfaction problems.

This book presents the proceedings of the 8th International Workshop on Soft Computing Applications, SOFA 2018, held on 13–15 September 2018 in Arad, Romania. The workshop was organized by Aurel Vlaicu University of Arad, in conjunction with the Institute of Computer Science, Iasi Branch of the Romanian Academy, IEEE Romanian Section, Romanian Society of Control Engineering and Technical Informatics – Arad Section, General Association of Engineers in Romania – Arad Section and BTM Resources Arad. The papers included in these proceedings, published post-conference, cover the research including Knowledge-Based

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Technologies for Web Applications, Cloud Computing, Security Algorithms and Computer Networks, Business Process Management, Computational Intelligence in Education and Modelling and Applications in Textiles and many other areas related to the Soft Computing. The book is directed to professors, researchers, and graduate students in area of soft computing techniques and applications.

Nature-Inspired Optimization Algorithms provides a systematic 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 well-chosen 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, as well as multi-objective optimization. This book can serve as an introductory book for graduates, doctoral students and lecturers in computer science, engineering and natural sciences. It can also serve a source of inspiration for new applications. Researchers and engineers as well as experienced experts will also find it a handy reference. Discusses and summarizes the latest developments in nature-inspired algorithms with comprehensive, timely literature

Provides a theoretical understanding as well as practical implementation hints

Provides a step-by-step introduction to each algorithm

The use of optimization algorithms has seen an emergence in various professional fields due to its ability to process data and information in an efficient and productive manner. Combining computational intelligence with these algorithms has created a trending

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subject of research on how much more beneficial intelligent-inspired algorithms can be within companies and organizations. As modern theories and applications are continually being developed in this area, professionals are in need of current research on how intelligent algorithms are advancing in the real world. The Handbook of Research on Advancements of Swarm Intelligence Algorithms for Solving Real-World Problems is a pivotal reference source that provides vital research on the development of swarm intelligence algorithms and their implementation into current issues. While highlighting topics such as multi-agent systems, bio-inspired computing, and evolutionary programming, this publication explores various concepts and theories of swarm intelligence and outlines future directions of development. This book is ideally designed for IT specialists, researchers, academicians, engineers, developers, practitioners, and students seeking current research on the real-world applications of intelligent algorithms.

Advancements in the nature-inspired swarm intelligence algorithms continue to be useful in solving complicated problems in nonlinear, non-differentiable, and un-continuous functions as well as being applied to solve real-world applications. Recent Algorithms and Applications in Swarm Intelligence Research highlights the current research on swarm intelligence algorithms and its applications. Including research and survey and application papers, this book serves as a platform for students and scholars interested in achieving their studies on swarm intelligence algorithms and their

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applications.

Global optimization is a branch of applied mathematics and numerical analysis that deals with the task of finding the absolutely best set of admissible conditions to satisfy certain criteria / objective function(s), formulated in mathematical terms. Global optimization includes nonlinear, stochastic and combinatorial programming, multiobjective programming, control, games, geometry, approximation, algorithms for parallel architectures and so on. Due to its wide usage and applications, it has gained the attention of researchers and practitioners from a plethora of scientific domains. Typical practical examples of global optimization applications include: Traveling salesman problem and electrical circuit design (minimize the path length); safety engineering (building and mechanical structures); mathematical problems (Kepler conjecture); Protein structure prediction (minimize the energy function) etc. Global Optimization algorithms may be categorized into several types: Deterministic (example: branch and bound methods), Stochastic optimization (example: simulated annealing). Heuristics and meta-heuristics (example: evolutionary algorithms) etc. Recently there has been a growing interest in combining global and local search strategies to solve more complicated optimization problems. This edited volume comprises 17 chapters, including several overview Chapters, which provides an up-to-date and state-of-the art research covering the theory and algorithms of global optimization. Besides research articles and expository papers on theory and algorithms of global optimization, papers on numerical experiments

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and on real world applications were also encouraged.

The book is divided into 2 main parts.

This book includes introduction of several algorithms which are exclusively for graph based problems, namely combinatorial optimization problems, path formation problems, etc. Each chapter includes the introduction of the basic traditional nature inspired algorithm and discussion of the modified version for discrete algorithms including problems pertaining to discussed algorithms.

Swarm intelligence algorithms are a form of nature-based optimization algorithms. Their main inspiration is the cooperative behavior of animals within specific communities. This can be described as simple behaviors of individuals along with the mechanisms for sharing knowledge between them, resulting in the complex behavior of the entire community. Examples of such behavior can be found in ant colonies, bee swarms, schools of fish or bird flocks. Swarm intelligence algorithms are used to solve difficult optimization problems for which there are no exact solving methods or the use of such methods is impossible, e.g. due to unacceptable computational time. This set comprises two volumes: *Swarm Intelligence Algorithms: A Tutorial* and *Swarm Intelligence Algorithms: Modifications and Applications*. The first volume thoroughly presents the basics of 24 algorithms selected from the entire family of swarm intelligence algorithms. It contains a detailed explanation of how each algorithm works, along with relevant program codes in Matlab and the C++ programming language, as well as numerical examples illustrating step-by-step how individual algorithms work.

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The second volume describes selected modifications of these algorithms and presents their practical applications. This book presents 24 swarm algorithms together with their modifications and practical applications. Each chapter is devoted to one algorithm. It contains a short description along with a pseudo-code showing the various stages of its operation. In addition, each chapter contains a description of selected modifications of the algorithm and shows how it can be used to solve a selected practical problem.

Escherichia coli, commonly referred to as *E. coli*, has been the organism of choice for molecular genetics for decades. Its machinery and mobile behavior is one of the most fascinating topics for cell scientists. Scientists and engineers, not trained in microbiology, and who would like to learn more about living machines, can see it as a unique example. This cross-disciplinary monograph covers more than thirty years of research and is accessible to graduate students and scientists alike.

The two-volume set of LNCS 10941 and 10942 constitutes the proceedings of the 9th International Conference on Advances in Swarm Intelligence, ICSI 2018, held in Shanghai, China, in June 2018. The total of 113 papers presented in these volumes was carefully reviewed and selected from 197 submissions. The papers were organized in topical sections as follows: theories and models of swarm intelligence; ant colony optimization; particle swarm optimization; artificial bee colony algorithms; genetic algorithms; differential evolution; fireworks algorithms; bacterial foraging optimization; artificial immune system; hydrologic cycle

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optimization; other swarm-based optimization algorithms; hybrid optimization algorithms; multi-objective optimization; large-scale global optimization; multi-agent systems; swarm robotics; fuzzy logic approaches; planning and routing problems; recommendation in social media; prediction, classification; finding patterns; image enhancement; deep learning.

This book features selected high-quality research papers presented at the International Conference on Machine Intelligence and Signal Processing (MISP 2019), held at the Indian Institute of Technology, Allahabad, India, on September 7–10, 2019. The book covers the latest advances in the fields of machine learning, big data analytics, signal processing, computational learning theory, and their real-time applications. The topics covered include support vector machines (SVM) and variants like least-squares SVM (LS-SVM) and twin SVM (TWSVM), extreme learning machine (ELM), artificial neural network (ANN), and other areas in machine learning. Further, it discusses the real-time challenges involved in processing big data and adapting the algorithms dynamically to improve the computational efficiency. Lastly, it describes recent developments in processing signals, for instance, signals generated from IoT devices, smart systems, speech, and videos and addresses biomedical signal processing: electrocardiogram (ECG) and electroencephalogram (EEG).

The two-volume set of LNCS 11655 and 11656 constitutes the proceedings of the 10th International Conference on Advances in Swarm Intelligence, ICSI 2019, held in Chiang

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Mai, Thailand, in June 2019. The total of 82 papers presented in these volumes was carefully reviewed and selected from 179 submissions. The papers were organized in topical sections as follows: Part I: Novel methods and algorithms for optimization; particle swarm optimization; ant colony optimization; fireworks algorithms and brain storm optimization; swarm intelligence algorithms and improvements; genetic algorithm and differential evolution; swarm robotics. Part II: Multi-agent system; multi-objective optimization; neural networks; machine learning; identification and recognition; social computing and knowledge graph; service quality and energy management.

Precise prediction of risk for dyslexia among children's in earlier stages is a significant long-term aim in the field of cognitive computing. Producing such accurate results for detection of dyslexia from a dataset which consist of low-quality dataset and the presence of vague information is the toughest challenge among researchers.

The 2016 International Conference on Artificial Intelligence Science and Technology (AIST2016) was held in Shanghai, China, from 15th to 17th July, 2016. AIST2016 aims to bring together researchers, engineers, and students to the areas of Artificial Intelligence Science and Technology. AIST2016 features unique mixed topics of artificial intelligence and application, computer and software, communication and network, information and security, data mining, and optimization. This volume consists of 101 peer-reviewed articles by local and foreign eminent scholars which cover the frontiers and state-of-art development in AI Technology. Social insects--ants, bees, termites, and wasps--can be viewed as powerful problem-solving systems with sophisticated collective intelligence. Composed of simple interacting agents, this intelligence lies in the networks of interactions among individuals and between individuals and

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the environment. A fascinating subject, social insects are also a powerful metaphor for artificial intelligence, and the problems they solve--finding food, dividing labor among nestmates, building nests, responding to external challenges--have important counterparts in engineering and computer science. This book provides a detailed look at models of social insect behavior and how to apply these models in the design of complex systems. The book shows how these models replace an emphasis on control, preprogramming, and centralization with designs featuring autonomy, emergence, and distributed functioning. These designs are proving immensely flexible and robust, able to adapt quickly to changing environments and to continue functioning even when individual elements fail. In particular, these designs are an exciting approach to the tremendous growth of complexity in software and information. Swarm Intelligence draws on up-to-date research from biology, neuroscience, artificial intelligence, robotics, operations research, and computer graphics, and each chapter is organized around a particular biological example, which is then used to develop an algorithm, a multiagent system, or a group of robots. The book will be an invaluable resource for a broad range of disciplines.

From nature, we observe swarming behavior in the form of ant colonies, bird flocking, animal herding, honey bees, swarming of bacteria, and many more. It is only in recent years that researchers have taken notice of such natural swarming systems as culmination of some form of innate collective intelligence, albeit swarm intelligence (SI) - a metaphor that inspires a myriad of computational problem-solving techniques. In computational intelligence, swarm-like algorithms have been successfully applied to solve many real-world problems in engineering and sciences. This handbook volume serves as a useful foundational as well as

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consolidatory state-of-art collection of articles in the field from various researchers around the globe. It has a rich collection of contributions pertaining to the theoretical and empirical study of single and multi-objective variants of swarm intelligence based algorithms like particle swarm optimization (PSO), ant colony optimization (ACO), bacterial foraging optimization algorithm (BFOA), honey bee social foraging algorithms, and harmony search (HS). With chapters describing various applications of SI techniques in real-world engineering problems, this handbook can be a valuable resource for researchers and practitioners, giving an in-depth flavor of what SI is capable of achieving.

Biomimicry uses our scientific understanding of biological systems to exploit ideas from nature in order to construct some technology. In this book, we focus on how to use biomimicry of the functional operation of the “hardware and software” of biological systems for the development of optimization algorithms and feedback control systems that extend our capabilities to implement sophisticated levels of automation. The primary focus is not on the modeling, emulation, or analysis of some biological system. The focus is on using “bio-inspiration” to inject new ideas, techniques, and perspective into the engineering of complex automation systems. There are many biological processes that, at some level of abstraction, can be represented as optimization processes, many of which have as a basic purpose automatic control, decision making, or automation. For instance, at the level of everyday experience, we can view the actions of a human operator of some process (e. g. , the driver of a car) as being a series of the best choices he or she makes in trying to achieve some goal (staying on the road); emulation of this decision-making process amounts to modeling a type of biological optimization and decision-making process, and implementation of the

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resulting algorithm results in “human mimicry” for automation. There are clearer examples of - ological optimization processes that are used for control and automation when you consider nonhuman biological or behavioral processes, or the (internal) - ology of the human and not the resulting external behavioral characteristics (like driving a car). For instance, there are homeostasis processes where, for instance, temperature is regulated in the human body.

This comprehensive reference text discusses evolutionary optimization techniques, to find optimal solutions for single and multi-objective problems. The text presents each evolutionary optimization algorithm along with its history and other working equations. It also discusses variants and hybrids of optimization techniques. The text presents step-by-step solution to a problem and includes software’s like MATLAB and Python for solving optimization problems. It covers important optimization algorithms including single objective optimization, multi objective optimization, Heuristic optimization techniques, shuffled frog leaping algorithm, bacteria foraging algorithm and firefly algorithm. Aimed at senior undergraduate and graduate students in the field of electrical engineering, electronics engineering, mechanical engineering, and computer science and engineering, this text: Provides step-by-step solution for each evolutionary optimization algorithm. Provides flowcharts and graphics for better understanding of optimization techniques. Discusses popular optimization techniques include particle swarm optimization and genetic algorithm. Presents every optimization technique along with the history and working equations. Includes latest software like Python and MATLAB. The third international conference on INformation Systems Design and Intelligent Applications (INDIA – 2016) held in Visakhapatnam, India during January 8-9, 2016. The book

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covers all aspects of information system design, computer science and technology, general sciences, and educational research. Upon a double blind review process, a number of high quality papers are selected and collected in the book, which is composed of three different volumes, and covers a variety of topics, including natural language processing, artificial intelligence, security and privacy, communications, wireless and sensor networks, microelectronics, circuit and systems, machine learning, soft computing, mobile computing and applications, cloud computing, software engineering, graphics and image processing, rural engineering, e-commerce, e-governance, business computing, molecular computing, nano-computing, chemical computing, intelligent computing for GIS and remote sensing, bio-informatics and bio-computing. These fields are not only limited to computer researchers but also include mathematics, chemistry, biology, bio-chemistry, engineering, statistics, and all others in which computer techniques may assist.

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