Nature Inspired Computation And Machine Learning 13th Mexican International Conference On Artificial Intelligence Micai2014 Tuxtla Gutii 1 2 Rrez Part Ii Lecture Notes In Computer Science

Nature-Inspired Computing: Physics and Chemistry-Based Algorithms provides a comprehensive introduction to the methodologies and algorithms in nature-inspired computing, with an emphasis on applications to real-life engineering problems. The research interest for Nature-inspired Computing has grown considerably exploring different phenomena observed in nature and basic principles of physics, chemistry, and biology. The discipline has reached a mature stage and the field has been well-established. This endeavour is another attempt at investigation into various computational schemes inspired from nature, which are presented in this book with the development of a suitable framework and industrial applications. Designed for senior undergraduates, postgraduates, research students, and professionals, the book is written at a comprehensible level for students who have some basic knowledge of calculus and differential equations, and some exposure to optimization theory. Due to the focus on search and optimization, the book is also appropriate for electrical, control, civil, industrial and manufacturing engineering, business, and economics students, as well as those in computer and information sciences. With the mathematical and programming references and applications in each chapter, the book is self-contained, and can also serve as a reference for researchers and scientists in the fields of system science, natural computing, and optimization. World Congress on Nature and Biologically Inspired Computing (NaBIC) is organized to discuss the state-of-the-art as well as to address various issues with respect to Nurturing Intelligent Computing Towards Advancement of Machine Intelligence. This Volume contains the papers presented in the Seventh World Congress (NaBIC'15) held in Pietermaritzburg, South Africa during December 01-03, 2015. The 39 papers presented in this Volume were carefully reviewed and selected. The Volume would be a valuable reference to researchers, students and practitioners in the computational intelligence field.
Recently, nature has stimulated many successful techniques, algorithms, and computational applications allowing conventionally difficult problems to be solved through novel computing systems. Nature-Inspired Informatics for Intelligent Applications and Knowledge Discovery: Implications in Business, Science, and Engineering provides the latest findings in nature-inspired algorithms and their applications for breakthroughs in a wide range of disciplinary fields. This defining reference collection contains chapters written by leading researchers and well-known academicians within the field, offering readers a valuable and enriched accumulation of knowledge.
Computer scientist Moshe Sipper takes readers on a thrilling journey to the terra nova of computing to provide a compelling look at cutting-edge computers, robots, and machines now and in the decades ahead.
This book engages in an ongoing topic, such as the implementation of nature-inspired metaheuristic algorithms, with a main concentration on optimization problems in different fields of engineering optimization applications. The chapters of the book provide concise overviews of various nature-inspired metaheuristic algorithms, defining their profits in obtaining the optimal solutions of tiresome engineering design problems that cannot be efficiently resolved via conventional mathematical-based techniques. Thus, the chapters report on advanced studies on the applications of not only the traditional, but also the contemporary certain nature-inspired metaheuristic algorithms to specific engineering optimization problems with single and multi-objectives. Harmony search, artificial bee colony, teaching learning-based optimization,

electrostatic discharge, grasshopper, backtracking search, and interactive search are just some of the methods exhibited and consulted step by step in application contexts. The book is a perfect guide for graduate students, researchers, academicians, and professionals willing to use metaheuristic algorithms in engineering optimization applications.

The present book is primarily intended for undergraduate and postgraduate students of computer science and engineering, information technology, and electrical and electronics engineering. It bridges the gaps in knowledge of the seemingly difficult areas of machine learning and nature inspired computing. The text is written in a highly interactive manner, which satisfies the learning curiosity of any reader. Content of the text has been diligently organized to offer seamless learning experience. The text begins with introduction to machine learning, which is followed by explanation of different aspects of machine learning. Various supervised, unsupervised, reinforced and nature inspired learning techniques are included in the text book with numerous examples and case studies. Different aspects of new machine learning and nature inspired learning algorithms are explained in-depth. The well-explained algorithms and pseudo codes for each topic make this book useful for students. The book also throws light on areas like prediction and classification systems. Key Features • Day to day examples and pictorial representations for deeper understanding of the subject • Helps readers easily create programs/applications • Research oriented approach • More case studies and worked-out examples for each machine learning algorithm than any other book 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 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.

The two-volume set LNAI 8856 and LNAI 8857 constitutes the proceedings of the 13th Mexican International Conference on Artificial Intelligence, MICAI 2014, held in Tuxtla, Mexico, in November 2014. The total of 87 papers plus 1 invited talk presented in these proceedings were carefully reviewed and selected from 348 submissions. The first volume deals with advances in human-inspired computing and its applications. It contains 44 papers structured into seven sections: natural language processing, natural language processing applications, opinion mining, sentiment analysis, and social network applications, computer vision, image processing, logic, reasoning, and multi-agent systems, and intelligent tutoring systems. The second volume deals with advances in nature-inspired computation and machine learning and contains also 44 papers structured into eight sections: genetic and evolutionary algorithms, neural networks, machine learning, machine learning applications to audio and text, data mining, fuzzy logic, robotics, planning, and scheduling, and biomedical applications. The development of nature-inspired computational techniques has enhanced problem solving in dynamic and uncertain environments. By implementing effective computing strategies, this ensures adaptable, self-organizing, and decentralized behavioral

techniques. Recent Developments in Intelligent Nature-Inspired Computing is an authoritative reference source for the latest scholarly material on natural computation methods and applications in diverse fields. Highlighting multidisciplinary studies on swarm intelligence, global optimization, and group technology, this publication is an ideal reference source for professionals, researchers, scholars, and engineers interested in the latest developments in computer science methodologies.

This book contains research contributions from leading global scholars in nature-inspired computing. It includes comprehensive coverage of each respective topic, while also highlighting recent and future trends. The contributions provides readers with a snapshot of the state of the art in the field of nature-inspired computing and its application. This book has focus on the current researches while highlighting the empirical results along with theoretical concepts to provide a comprehensive reference for students, researchers, scholars, professionals and practitioners in the field of Advanced Artificial Intelligence, Nature-Inspired Algorithms and Soft Computing.

"This book provides applications of nature inspired computing for economic theory and practice, finance and stock-market, manufacturing systems, marketing, e-commerce, e-auctions, multi-agent systems and bottom-up simulations for social sciences and operations management"--Provided by publisher.

This book reviews the latest developments in nature-inspired computation, with a focus on the cross-disciplinary applications in data mining and machine learning. Data mining, machine learning and nature-inspired computation are current hot research topics due to their importance in both theory and practical applications. Adopting an application-focused approach, each chapter introduces a specific topic, with detailed descriptions of relevant algorithms, extensive literature reviews and implementation details. Covering topics such as nature-inspired algorithms, swarm intelligence, classification, clustering, feature selection, cybersecurity, learning algorithms over cloud, extreme learning machines, object categorization, particle swarm optimization, flower pollination and firefly algorithms, and neural networks, it also presents case studies and applications, including classifications of crisis-related tweets, extraction of named entities in the Tamil language, performance-based prediction of diseases, and healthcare services. This book is both a valuable a reference resource and a practical guide for students, researchers and professionals in computer science, data and management sciences, artificial intelligence and machine learning.

This book addresses the frontier advances in the theory and application of nature-inspired optimization techniques, including solving the quadratic assignment problem, prediction in nature-inspired dynamic optimization, the lion algorithm and its applications, optimizing the operation scheduling of microgrids, PID controllers for two-legged robots, optimizing crane operating times, planning electrical energy distribution systems, automatic design and evaluation of classification pipelines, and optimizing wind-energy power generation plants. The book also presents a variety of nature-inspired methods and illustrates methods of adapting these to said applications. Nature-inspired computation, developed by mimicking natural phenomena, makes a significant contribution toward the solution of non-convex optimization problems that normal mathematical optimizers fail to solve. As such, a wide range of nature-inspired computing approaches has been used in multidisciplinary engineering applications. Written by researchers and developers from a variety of fields, this book presents the

latest findings, novel techniques and pioneering applications.

The observation of nature has been the inspiration for many materials, laws, and theories, as well as computational methods. Nature-Inspired computing Design, Development, and Applications covers all the main areas of natural computing, from methods to computationally synthesized natural phenomena, to computing paradigms based on natural materials. This volume is comprised of ideas and research from nature to develop computational systems or materials to perform computation. Researchers, academic educators, and professionals will find a comprehensive view of all aspects of natural computing with emphasis on its main branches.

This book focuses on a wide range of optimization, learning, and control algorithms for interdependent complex networks and their role in smart cities operation, smart energy systems, and intelligent transportation networks. It paves the way for researchers working on optimization, learning, and control spread over the fields of computer science, operation research, electrical engineering, civil engineering, and system engineering. This book also covers optimization algorithms for large-scale problems from theoretical foundations to real-world applications, learning-based methods to enable intelligence in smart cities, and control techniques to deal with the optimal and robust operation of complex systems. It further introduces novel algorithms for data analytics in large-scale interdependent complex networks. • Specifies the importance of efficient theoretical optimization and learning methods in dealing with emerging problems in the context of interdependent networks • Provides a comprehensive investigation of advance data analytics and machine learning algorithms for large-scale complex networks • Presents basics and mathematical foundations needed to enable efficient decision making and intelligence in interdependent complex networks M. Hadi Amini is an Assistant Professor at the School of Computing and Information Sciences at Florida International University (FIU). He is also the founding director of Sustainability, Optimization, and Learning for InterDependent networks laboratory (solid lab). He received his Ph.D. and M.Sc. from Carnegie Mellon University in 2019 and 2015 respectively. He also holds a doctoral degree in Computer Science and Technology. Prior to that, he received M.Sc. from Tarbiat Modares University in 2013, and the B.Sc. from Sharif University of Technology in 2011.

This timely review book summarizes the state-of-the-art developments in nature-inspired optimization algorithms and their applications in engineering. Algorithms and topics include the overview and history of nature-inspired algorithms, discrete firefly algorithm, discrete cuckoo search, plant propagation algorithm, parameter-free bat algorithm, gravitational search, biogeography-based algorithm, differential evolution, particle swarm optimization and others. Applications include vehicle routing, swarming robots, discrete and combinatorial optimization, clustering of wireless sensor networks, cell formation, economic load dispatch, metamodeling, surrogated-assisted cooperative co-evolution, data fitting and reverse engineering as well as other case studies in engineering. This

book will be an ideal reference for researchers, lecturers, graduates and engineers who are interested in nature-inspired computation, artificial intelligence and computational intelligence. It can also serve as a reference for relevant courses in computer science, artificial intelligence and machine learning, natural computation, engineering optimization and data mining.

Brain and Nature-Inspired Learning, Computation and Recognition presents a systematic analysis of neural networks, natural computing, machine learning and compression, algorithms and applications inspired by the brain and biological mechanisms found in nature. Sections cover new developments and main applications, algorithms and simulations. Developments in brain and nature-inspired learning have promoted interest in image processing, clustering problems, change detection, control theory and other disciplines. The book discusses the main problems and applications pertaining to bio-inspired computation and recognition, introducing algorithm implementation, model simulation, and practical application of parameter setting. Readers will find solutions to problems in computation and recognition, particularly neural networks, natural computing, machine learning and compressed sensing. This volume offers a comprehensive and well-structured introduction to brain and nature-inspired learning, computation, and recognition. Presents an invaluable systematic introduction to brain and nature-inspired learning, computation and recognition Describes the biological mechanisms, mathematical analyses and scientific principles behind brain and nature-inspired learning, calculation and recognition Systematically analyzes neural networks, natural computing, machine learning and compression, algorithms and applications inspired by the brain and biological mechanisms found in nature Discusses the theory and application of algorithms and neural networks, natural computing, machine learning and compression perception

This book presents a cutting-edge research procedure in the Nature-Inspired Computing (NIC) domain and its connections with computational intelligence areas in real-world engineering applications. It introduces readers to a broad range of algorithms, such as genetic algorithms, particle swarm optimization, the firefly algorithm, flower pollination algorithm, collision-based optimization algorithm, bat algorithm, ant colony optimization, and multi-agent systems. In turn, it provides an overview of meta-heuristic algorithms, comparing the advantages and disadvantages of each. Moreover, the book provides a brief outline of the integration of nature-inspired computing techniques and various computational intelligence paradigms, and highlights nature-inspired computing techniques in a range of applications, including: evolutionary robotics, sports training planning, assessment of water distribution systems, flood simulation and forecasting, traffic control, gene expression analysis, antenna array design, and scheduling/dynamic resource management.

Bio-Inspired Computation and Applications in Image Processing summarizes the latest developments in bio-inspired computation in image processing, focusing on

nature-inspired algorithms that are linked with deep learning, such as ant colony optimization, particle swarm optimization, and bat and firefly algorithms that have recently emerged in the field. In addition to documenting state-of-the-art developments, this book also discusses future research trends in bio-inspired computation, helping researchers establish new research avenues to pursue. Reviews the latest developments in bio-inspired computation in image processing Focuses on the introduction and analysis of the key bio-inspired methods and techniques Combines theory with real-world applications in image processing Helps solve complex problems in image and signal processing Contains a diverse range of self-contained case studies in real-world 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

With the rapid growth of technology in society, communication networks have become a heavily researched topic. Implementing these advanced systems is a challenge, however, due to the abundance of optimization problems within these networks. The use of meta-heuristic algorithms and nature-inspired computing has become a prevalent technique among researchers for solving these complex problems within communication networks. Despite its popularity, this specific computing technique lacks the appropriate amount of research that is needed for professionals to grasp a definite understanding. Nature-Inspired Computing Applications in Advanced Communication Networks is a collection of innovative research on the methods and applications of natural computation techniques and algorithms within communication systems such as wireless sensor networks, vehicular adhoc networks, and internet of things. While highlighting topics including mobile sensor deployment, routing optimization, and sleep scheduling, this book is ideally designed for researchers, network professionals, computer scientists, mathematicians, developers, scholars, educators, and students seeking to enhance their understanding of nature-inspired computing and its solutions within various advanced communication networks.

This book follows on from Natural Computing in Computational Finance Volumes I, II and III. As in the previous volumes of this series, the book consists of a series of chapters each of which was selected following a rigorous, peer-reviewed, selection process. The chapters illustrate the application of a range of cutting-edge natural computing and agent-based methodologies in computational finance and economics. The applications explored include option model calibration, financial trend reversal detection, enhanced indexation, algorithmic trading, corporate payout determination and agent-based modeling of liquidity costs, and trade strategy adaptation. While describing cutting edge applications, the chapters are written so that they are accessible to a wide audience. Hence, they should be of interest to academics, students and practitioners in the fields of computational finance and economics. which was selected following a rigorous, peer-reviewed, selection process. The chapters illustrate the application of a range of cutting-edge natural computing and agent-based methodologies in computational finance and economics. The applications explored include option model calibration, financial trend reversal detection, enhanced indexation, algorithmic trading, corporate payout determination and agent-based modeling of liquidity costs, and trade strategy adaptation. While describing cutting edge applications, the chapters are written so that they are accessible to a wide audience. Hence, they should be of interest to academics, students and practitioners in the fields of computational finance and economics. The applications explored include option model calibration, financial trend reversal detection, enhanced indexation, algorithmic trading, corporate payout determination and agent-based modeling of liquidity costs, and trade strategy adaptation. While describing cutting edge applications, the chapters are written so that they are accessible to a wide audience. Hence, they should be of interest to academics, students and practitioners in the fields of computational finance and economics. written so that they are accessible to a wide audience. Hence, they should be of interest to academics, students and practitioners in the fields of computational finance and economics. The purpose of this book is to collect contributions that deal with the use of nature inspired metaheuristics for solving multi-objective combinatorial optimization problems. Such a collection intends to provide an overview of the state-of-the-art developments in this field, with the aim of motivating more researchers in operations research, engineering, and computer science, to do research in this area. As such, this book is expected to become a valuable reference for those wishing to do research on the use of nature inspired metaheuristics for solving multi-objective combinatorial optimization problems.

This volume comprises the select proceedings of the annual convention of the Computer Society of India. Divided into 10 topical volumes, the proceedings present papers on state-of-the-art research, surveys, and succinct reviews. The volumes cover diverse topics ranging from communications networks to big data analytics, and from system architecture to cyber security. This volume focuses on Nature Inspired Computing. The contents of this book will be useful to researchers and students alike.

The book presents recent advances in nature-inspired computing, giving a special emphasis to control systems applications. It reviews different techniques used for simulating physical, chemical, biological or social phenomena at the purpose of designing robust, predictive and adaptive control strategies. The book is a collection of several contributions, covering either more general approaches in control systems, or methodologies for control tuning and adaptive controllers, as well as exciting applications of nature-inspired techniques in robotics. On one side, the book is expected to motivate readers with a background in conventional control systems to try out these powerful techniques inspired by nature. On the other side, the book provides advanced readers with a deeper understanding of the field and a broad spectrum of different methods and techniques. All in all, the book is an outstanding, practice-oriented reference guide to nature-inspired computing addressing graduate students, researchers and practitioners in the field of control engineering.

This book discusses the current research and concepts in data science and how these can be addressed using different nature-inspired optimization techniques. Focusing on various data science problems, including classification, clustering, forecasting, and deep learning, it explores how researchers are using nature-inspired optimization techniques to find solutions to these problems in domains such as disease analysis and health care, object recognition, vehicular ad-hoc networking, high-dimensional data analysis, gene expression analysis, microgrids, and deep learning. As such it provides insights and inspiration for researchers to wanting to employ nature-inspired optimization techniques in their own endeavors.

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.

This book focuses primarily on the nature-inspired approach for designing smart applications. It includes several implementation paradigms such as design and path planning of wireless network, security mechanism and implementation for dynamic as well as static nodes, learning method of cloud computing, data exploration and management, data analysis and optimization, decision taking in conflicting environment, etc. The book fundamentally highlights the recent research advancements in the field of engineering and science.

The purpose of designing this book is to portray certain practical applications of nature-inspired computation in machine learning for the better understanding of the world around us. The focus is to portray and present recent developments in the areas where nature- inspired algorithms are specifically designed and applied to solve complex real-world problems in data analytics and pattern recognition, by means of domain-specific solutions. Various nature-inspired algorithms and their multidisciplinary applications (in mechanical engineering, electrical engineering, machine learning, image processing, data mining and wireless network domains are detailed, which will make this book a handy reference guide.

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

As technology continues to become more sophisticated, mimicking natural processes and phenomena also becomes more of a reality. Continued research in the field of natural computing enables an understanding of the world around us, in addition to opportunities for man-made computing to mirror the natural processes and systems that have existed for centuries. Nature-Inspired Computing: Concepts, Methodologies, Tools, and Applications takes an interdisciplinary approach to the topic of natural computing, including emerging technologies being developed for the purpose of simulating natural phenomena, applications across industries, and the future outlook of biologically and nature-inspired technologies. Emphasizing critical research in a comprehensive multi-volume set, this publication is designed for use by IT professionals, researchers, and graduate students studying intelligent computing.

This book presents nature inspired computing applications for the wireless sensor network (WSN). Although the use of WSN is increasing rapidly, it has a number of limitations in the context of battery issue, distraction, low communication speed, and security. This means there is a need for innovative intelligent algorithms to address these issues.The book is divided into three sections and also includes an introductory chapter providing an overview of WSN and its various applications and algorithms as well as the associated challenges. Section 1 describes bio-inspired optimization algorithms, such as genetic algorithms (GA), artificial neural networks (ANN) and artificial immune systems (AIS) in the contexts of fault analysis and diagnosis, and traffic management. Section 2 highlights swarm optimization techniques, such as African buffalo optimization (ABO), particle swarm optimization (PSO), and modified swarm intelligence technique for solving the problems of routing, network parameters optimization, and energy estimation. Lastly, Section 3 explores multi-objective optimization techniques using GA, PSO, ANN, teaching–learning-based optimization (TLBO), and combinations of the algorithms presented. As such, the

book provides efficient and optimal solutions for WSN problems based on nature-inspired algorithms.

This book discusses all the major nature-inspired algorithms with a focus on their application in the context of solving navigation and routing problems. It also reviews the approximation methods and recent nature-inspired approaches for practical navigation, and compares these methods with traditional algorithms to validate the approach for the case studies discussed. Further, it examines the design of alternative solutions using nature-inspired techniques, and explores the challenges of navigation and routing problems and nature-inspired metaheuristic approaches.

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