TOWARDS HYBRID AND ADAPTIVE COMPUTING A PERSPECTIVE STUDIES IN COMPUTATIONAL INTELLIGENCE READ ONLY

Luis Chase

Towards Hybrid And Adaptive Computing A Perspective Studies In Computational Intelligence Introduction

Towards Hybrid and Adaptive Computing

Soft Computing today is a very vast field whose extent is beyond measure. This book offers a well structured presentation of the basic concepts of Artificial Neural Networks, Fuzzy Inference Systems and Evolutionary Algorithms.

Computational Intelligence

Hybrid Intelligent Systems has become an important research topic in computer science and a key application field in science and engineering. This book offers a gentle introduction to the engineering aspects of hybrid intelligent systems, also emphasizing the interrelation with the main intelligent technologies such as genetic algorithms – evolutionary computation, neural networks, fuzzy systems, evolvable hardware, DNA computing, artificial immune systems. A unitary whole of theory and application, the book provides readers with the fundamentals, background information, and practical methods for building a hybrid intelligent system. It treats a panoply of applications, including many in industry, educational systems, forecasting, financial engineering, and bioinformatics. This volume is useful to newcomers in the field because it quickly familiarizes them with engineering elements of developing hybrid intelligent systems and a wide range of real applications, including non-industrial applications. Researchers, developers and technically oriented managers can use the book for developing both new hybrid intelligent systems approaches and new applications requiring the hybridization of the typical tools and concepts to computational intelligence.

Hybrid Computational Intelligence

Hybrid Computational Intelligence: Challenges and Utilities is a comprehensive resource that begins with the basics and main components of computational intelligence. It brings together many different aspects of the current research on HCI technologies, such as neural networks, support vector machines, fuzzy logic and evolutionary computation, while also covering a wide range of applications and implementation issues, from pattern recognition and system modeling, to intelligent control problems and biomedical applications. The book also explores the most widely used applications of hybrid computation as well as the history of their development. Each individual methodology provides hybrid systems with complementary reasoning and searching methods which allow the use of domain knowledge and empirical data to solve complex problems.

New Frontiers in Computational Intelligence and Its Applications

Computational Intelligence is a broad and active research area that is growing rapidly due to the many successful applications of these new techniques in very diverse problems. Many industries have benefited from adopting this technology. The increased number of patents and diverse range of products developed using computational intelligence methods is evidence of this fact. The goal of this book is to provide highlights of the current research in computational intelligence area. The book consists of research papers in the fields of neural networks, fuzzy logic, evolutionary computing, hybrid evolutionary computing-fuzzy logic systems, hybrid neural networks-evolutionary computing and fuzzy logic systems, image processing and vision, advances in robotics, control and manufacturing, and rough sets.

Handbook On Computational Intelligence (In 2 Volumes)

With the Internet, the proliferation of Big Data, and autonomous systems, mankind has entered into an era of 'digital obesity'. In this century, computational intelligence, such as thinking machines, have been brought forth to process complex human problems in a wide scope of areas — from social sciences, economics and biology, medicine and social networks, to cyber security.The Handbook of Computational Intelligence (in two volumes) prompts readers to look at these problems from a non-traditional angle. It takes a step by step approach, supported by case studies, to explore the issues that have arisen in the process. The Handbook covers many classic paradigms, as well as recent achievements and future promising developments to solve some of these very complex problems. Volume one explores the subjects of fuzzy logic and systems, artificial neural networks, and learning systems. Volume two delves into evolutionary computation, hybrid systems, as well as the applications of computational intelligence in decision making, the process industry, robotics, and autonomous systems.This work is a 'one-stop-shop' for beginners, as well as an inspirational source for more advanced researchers. It is a useful resource for lecturers and learners alike.

Hybrid Intelligent Systems

Hybrid Intelligent Systems summarizes the strengths and weaknesses of five intelligent technologies: fuzzy logic, genetic algorithms, case-based reasoning, neural networks and expert systems, reviewing the status and significance of research into their integration. Engineering and scientific examples and case studies are used to illustrate principles and application development techniques. The reader will gain a clear idea of the current status of hybrid intelligent systems and discover how to choose and develop appropriate applications. The book is based on a thorough literature search of recent publications on research and development in hybrid intelligent systems; the resulting 50-page reference section of the book is invaluable. The book starts with a summary of the five major intelligent technologies and of the issues in and current status of research into them. Each subsequent chapter presents a detailed discussion of a different combination of intelligent technologies, along with examples and case studies. Four chapters contain detailed case studies of working hybrid systems. The book enables the reader to: Describe the important concepts, strengths and limitations of each technology; Recognize and analyze potential problems with the application of hybrid systems; Choose appropriate hybrid intelligent solutions; Understand how applications are designed with any of the approaches covered; Choose appropriate commercial development shells or tools. An invaluable reference source for those who wish to apply intelligent systems techniques to their own problems.

Computational Intelligence

Computational Intelligence: An Introduction, Second Edition offers an in-depth exploration into the adaptive mechanisms that enable intelligent behaviour in complex and changing environments. The main focus of this text is centred on the computational modelling of biological and natural intelligent systems, encompassing swarm intelligence, fuzzy systems, artificial neutral networks, artificial immune systems and evolutionary computation. Engelbrecht provides readers with a wide knowledge of Computational Intelligence (CI) paradigms and algorithms; inviting readers to implement and problem solve real-world, complex problems within the CI development framework. This implementation framework will enable readers to tackle new problems without any difficulty through a single Java class as part of the CI library. Key features of this

second edition include: A tutorial, hands-on based presentation of the material. State-of-the-art coverage of the most recent developments in computational intelligence with more elaborate discussions on intelligence and artificial intelligence (AI). New discussion of Darwinian evolution versus Lamarckian evolution, also including swarm robotics, hybrid systems and artificial immune systems. A section on how to perform empirical studies; topics including statistical analysis of stochastic algorithms, and an open source library of CI algorithms. Tables, illustrations, graphs, examples, assignments, Java code implementing the algorithms, and a complete CI implementation and experimental framework. Computational Intelligence: An Introduction, Second Edition is essential reading for third and fourth year undergraduate and postgraduate students studying CI. The first edition has been prescribed by a number of overseas universities and is thus a valuable teaching tool. In addition, it will also be a useful resource for researchers in Computational Intelligence and Artificial Intelligence, as well as engineers, statisticians, operational researchers, and bioinformaticians with an interest in applying AI or CI to solve problems in their domains. Check out http://www.ci.cs.up.ac.za for examples, assignments and Java code implementing the algorithms.

Intelligent Control

Intelligent Control considers non-traditional modelling and control approaches to nonlinear systems. Fuzzy logic, neural networks and evolutionary computing techniques are the main tools used. The book presents a modular switching fuzzy logic controller where a PD-type fuzzy controller is executed first followed by a PI-type fuzzy controller thus improving the performance of the controller compared with a PID-type fuzzy controller. The advantage of the switching-type fuzzy controller is that it uses one rule-base thus minimises the rule-base during execution. A single rule-base is developed by merging the membership functions for change of error of the PD-type controller and sum of error of the PI-type controller. Membership functions are then optimized using evolutionary algorithms. Since the two fuzzy controllers were executed in series, necessary further tuning of the differential and integral scaling factors of the controller is then performed. Neural-network-based tuning for the scaling parameters of the fuzzy controller is then described and finally an evolutionary algorithm is applied to the neurally-tuned-fuzzy controller in which the sigmoidal function shape of the neural network is determined. The important issue of stability is addressed and the text demonstrates empirically that the developed controller was stable within the operating range. The text concludes with ideas for future research to show the reader the potential for further study in this area. Intelligent Control will be of interest to researchers from engineering and computer science backgrounds working in the intelligent and adaptive control.

Do Smart Adaptive Systems Exist?

Do Smart Adaptive Systems Exist? is intended as a reference and a guide summarising and focusing on best practices when using intelligent techniques and building systems requiring a degree of adaptation and intelligence. It is therefore not intended as a collection of the most recent research results, but as a practical guide for experts from other areas and industrial users interested in building solutions to their problems using intelligent techniques. One of the main issues covered is an attempt to answer the question of how to select and/or combine suitable intelligent techniques from a large pool of potential solutions. Another attractive feature of the book is that it brings together experts from neural network, fuzzy, machine learning, evolutionary and hybrid systems communities who will provide their views on how these different intelligent technologies have contributed and will contribute to creation of smart adaptive systems of the future.

Handbook of Research on Artificial Intelligence Techniques and Algorithms

For decades, optimization methods such as Fuzzy Logic, Artificial Neural Networks, Firefly, Simulated annealing, and Tabu search, have been capable of handling and tackling a wide range of real-world application problems in society and nature. Analysts have turned to these problem-solving techniques in the event during natural disasters and chaotic systems research. The Handbook of Research on Artificial Intelligence Techniques and Algorithms highlights the cutting edge developments in this promising research

area. This premier reference work applies Meta-heuristics Optimization (MO) Techniques to real world problems in a variety of fields including business, logistics, computer science, engineering, and government. This work is particularly relevant to researchers, scientists, decision-makers, managers, and practitioners.

Bio-Inspired Technologies for the Hardware of Adaptive Systems

Evolvable Hardware (EHW) has emerged as a sub-domain of artificial evolution represented by a design methodology (consortium of methods) involving the application of Evolutionary Algorithms (EA) to the synthesis of digital and analogue electronic circuits and systems. Nevertheless, the most benefit for the society and indeed most revolutionizing application of EA is its hardware implementation leading to the EHW. These new EA based methodologies led to a new type of machines that is evolved to attain a desired behaviour, which means they have a behavioural computational intelligence. EHW is a special case of the adaptive hardware, namely being strongly related to the Adaptive Systems (AS) and the Adaptive Hardware (AH). The book presents a careful selection of the field that very well reflects the breadth of this high technology and its terminology and applications in context of the AS/AH. The harmonious symbiosis of the engineering approach and the accurate scientific methodology features the aspects of highly relevant and practical design principles governing the development of EHW and its connections with AS/AH. This book is both attractive and useful for everybody interested in the design and analysis of EHW in context of AS/AH and implementation of real time adaptive hardware hybrid intelligent systems.

Handbook of Research on Soft Computing and Nature-Inspired Algorithms

Soft computing and nature-inspired computing both play a significant role in developing a better understanding to machine learning. When studied together, they can offer new perspectives on the learning process of machines. The Handbook of Research on Soft Computing and Nature-Inspired Algorithms is an essential source for the latest scholarly research on applications of nature-inspired computing and soft computational systems. Featuring comprehensive coverage on a range of topics and perspectives such as swarm intelligence, speech recognition, and electromagnetic problem solving, this publication is ideally designed for students, researchers, scholars, professionals, and practitioners seeking current research on the advanced workings of intelligence in computing systems.

Advances in Computational Intelligence

Computational Intelligence (CI) is a recently emerging area in fundamental and applied research, exploiting a number of advanced information processing technologies that mainly embody neural networks, fuzzy logic and evolutionary computation. With a major concern to exploiting the tolerance for imperfection, uncertainty, and partial truth to achieve tractability, robustness and low solution cost, it becomes evident that composing methods of CI should be working concurrently rather than separately. It is this conviction that research on the synergism of CI paradigms has experienced significant growth in the last decade with some areas nearing maturity while many others remaining unresolved. This book systematically summarizes the latest findings and sheds light on the respective fields that might lead to future breakthroughs. Contents: A Quest for Granular Computing and Logic Processing (W Pedrycz); Abstraction and Linguistic Analysis of Conventional Numerical Dynamic Systems (F-Y Wang); Slicing: A Distributed Learning Approach (S A Eschrich & L O Hall); Marginal Learning Algorithms in Statistical Machine Learning (Q Tao & J Wang); Constraint Handling in Genetic Algorithm for Optimization (G G Yen); Hybrid PSO-EA Algorithm for Training Feedforward and Recurrent Neural Networks for Challenging Problems (X Cai et al.); Modular Wavelet-Fuzzy Networks (Y Lin & F-Y Wang); Ant Colony Algorithms: The State-of-the-Art (J Zhang et al.); Motif Discoveries in DNA and Protein Sequences Using Self-Organizing Neural Networks (D Liu & X Xiong); Computational Complexities of Combinatorial Problems with Applications to Reverse Engineering of Biological Networks (P Berman et al.); Advances in Fingerprint Recognition Algorithms with Application (J Tian et al.); Adaptation and Predictive Control Observed in Neuromuscular Control Systems (J He); Robust Adaptive Approximation Based Backstepping via Localized Adaptive Bounding (Y Zhao & J A

Farrell); Dynamically Connected Fuzzy Single Input Rule Modules and Application to Underactuated Systems (J Yi et al.). Readership: Researchers, graduate and senior level undergraduate students in electrical & electronic engineering, computer engineering, neural networks, fuzzy logic and artificial intelligence.

Computer and Information Science 2012

The series \"Studies in Computational Intelligence\" (SCI) publishes new developments and advances in the various areas of computational intelligence – quickly and with a high quality. The intent is to cover the theory, applications, and design methods of computational intelligence, as embedded in the fields of engineering, computer science, physics and life science, as well as the methodologies behind them. The series contains monographs, lecture notes and edited volumes in computational intelligence spanning the areas of neural networks, connectionist systems, genetic algorithms, evolutionary computation, artificial intelligence, cellular automata, self-organizing systems, soft computing, fuzzy systems, and hybrid intelligent systems. Critical to both contributors and readers are the short publication time and world-wide distribution - this permits a rapid and broad dissemination of research results. The purpose of the 11th IEEE/ACIS International Conference on Computer and Information Science (ICIS 2012) was held on May 30-1June1, 2012 in Shanghai, China is to bring together scientist, engineers, computer users, students to share their experiences and exchange new ideas, and research results about all aspects (theory, applications and tools) of computer and information science, and to discuss the practical challenges encountered along the way and the solutions adopted to solve them The conference organizers selected the best 20 papers from those papers accepted for presentation at the conference in order to publish them in this volume. The papers were chosen based on review scores submitted by members of the program committee, and underwent further rigorous rounds of review.

Hybrid Information Systems

Hybrid intelligent systems are becoming a very important problem-solving methodology affecting researchers and practitioners in areas ranging from science and technology to business and commerce. This volume focuses on the hybridization of different soft computing technologies and their interactions with hard computing techniques, other intelligent computing frameworks, and agents. Topics covered include: genetic-neurocomputing, neuro-fuzzy systems, genetic-fuzzy systems, genetic-fuzzy neurocomputing, hybrid optimization techniques, interaction with intelligent agents, fusion of soft computing and hard computing techniques, other intelligent systems and hybrid systems applications. The different contributions were presented at the first international workshop on hybrid intelligent systems (HIS1) in Adelaide, Australia.

Parallel and Distributed Computational Intelligence

Offering a global snapshot of parallel and distributed computational intelligence today, this volume covers ongoing issues as well as recent exploratory work. Topics discussed include GPUs, Clusters, Grids, volunteer computing, p2p networks and more.

Adaptive Computing in Design and Manufacture VI

The Adaptive Computing in Design and Manufacture conference series has become a well-established, largely application-oriented meeting recognised by several UK Engineering Institutions and the International Society of Genetic and Evolutionary Computing. The main theme of the series relates to the integration of evolutionary and adaptive computing technologies with design and manufacturing processes whilst also taking into account complementary advanced computing technologies. Evolutionary and adaptive computing techniques continue to increase their penetration of industrial and commercial practice as awareness of their powerful search, exploration and optimisation capabilities becomes ever more prevalent, and increasing desk-top computational capability renders stochastic population-based search a far more viable proposition. There has been a significant increase in the development and integration of commercial software tools utilising

adaptive computing technologies and the emergence of related commercial research and consultancy organisations supporting the introduction of best practice in terms of industrial utilisation. The book is comprised of selected papers that cover a diverse set of industrial application areas including engineering design and design environments and manufacturing process design, scheduling and control. Various aspects of search, exploration and optimisation are investigated in the context of integration with industrial processes including multi-objective and constraint satisfaction, development and utilization of meta-models, algorithm and strategy development and human-centric evolutionary approaches. The role of agent-based and neural net technologies in terms of supporting search processes and providing an alternative simulation environment is also explored. This collection of papers will be of particular interest to both industrial researchers and practitioners in addition to the academic research communities across engineering, operational research and computer science.

Hybrid Information Systems

Hybrid intelligent systems are becoming a very important problem-solving methodology affecting researchers and practitioners in areas ranging from science and technology to business and commerce. This volume focuses on the hybridization of different soft computing technologies and their interactions with hard computing techniques, other intelligent computing frameworks, and agents. Topics covered include: genetic-neurocomputing, neuro-fuzzy systems, genetic-fuzzy systems, genetic-fuzzy neurocomputing, hybrid optimization techniques, interaction with intelligent agents, fusion of soft computing and hard computing techniques, other intelligent systems and hybrid systems applications. The different contributions were presented at the first international workshop on hybrid intelligent systems (HIS1) in Adelaide, Australia.

Innovations in Intelligent Systems

Innovations in Intelligent Systems is a rare collection of the latest developments in intelligent paradigms such as knowledge-based systems, computational intelligence and hybrid combinations as well as practical applications in engineering, science, business and commerce. The book covers central topics such as intelligent multi-agent systems, data mining, case-based reasoning, and rough sets. Essential techniques to the development of intelligent machines are investigated such as pattern recognition and classification, machine learning, natural language processing, grammar, evolutionary schemes, fuzzy-neural procedures, and intelligent vision. The book also includes useful applications ranging from medical diagnosis and technical/medical language translation, to power demand forecasting and manufacturing plants. Due to its depth and breadth of the coverage and the usefulness of the techniques and applications, this book is a valuable reference for experts and students alike.

Soft Computing and Intelligent Systems

The field of soft computing is emerging from the cutting edge research over the last ten years devoted to fuzzy engineering and genetic algorithms. The subject is being called soft computing and computational intelligence. With acceptance of the research fundamentals in these important areas, the field is expanding into direct applications through engineering and systems science.This book cover the fundamentals of this emerging filed, as well as direct applications and case studies. There is a need for practicing engineers, computer scientists, and system scientists to directly apply \"fuzzy\" engineering into a wide array of devices and systems.

Intelligent Systems: From Theory to Practice

In the modern science and technology there are some research directions and ch- lenges which are at the forefront of world wide research activities because of their relevance. This relevance may be related to different aspects. First, from a point of view of researchers it can be implied by just an analytic or algorithmic difficulty in the solution of problems within an area. From a broader perspective, this re- vance can be related

to how important problems and challenges in a particular area are to society, corporate or national competitiveness, etc. Needless to say that the latter, more global challenges are probably more decisive a driving force for s- ence seen from a global perspective. One of such “meta-challenges” in the present world is that of intelligent s- tems. For a long time it has been obvious that the complexity of our world and the speed of changes we face in virtually all processes that have impact on our life imply a need to automate many tasks and processes that have been so far limited to human beings because they require some sort of intelligence.

Advances In Computational Intelligence: Theory And Applications

Computational Intelligence (CI) is a recently emerging area in fundamental and applied research, exploiting a number of advanced information processing technologies that mainly embody neural networks, fuzzy logic and evolutionary computation. With a major concern to exploiting the tolerance for imperfection, uncertainty, and partial truth to achieve tractability, robustness and low solution cost, it becomes evident that composing methods of CI should be working concurrently rather than separately. It is this conviction that research on the synergism of CI paradigms has experienced significant growth in the last decade with some areas nearing maturity while many others remaining unresolved. This book systematically summarizes the latest findings and sheds light on the respective fields that might lead to future breakthroughs.

Evolutionary and Adaptive Computing in Engineering Design

Following an introduction to the various techniques and examples of their routine application, this potential is explored through the introduction of various strategies that support searches across a far broader set of possible design solutions within time and budget constraints. Generic problem areas investigated include: - design decomposition; - whole-system design; - multi-objective and constraint satisfaction; - human-computer interaction; - computational expense. Appropriate strategies that help overcome problems often encountered when integrating computer-based techniques with complex, real-world design environments are described. A straightforward approach coupled with examples supports a rapid understanding of the manner in which such strategies can best be designed to handle the complexities of a particular problem.

Hybrid Intelligent Systems

This book highlights the recent research on hybrid intelligent systems and their various practical applications. It presents 58 selected papers from the 20th International Conference on Hybrid Intelligent Systems (HIS 2020) and 20 papers from the 12th World Congress on Nature and Biologically Inspired Computing (NaBIC 2020), which was held online, from December 14 to 16, 2020. A premier conference in the field of artificial intelligence, HIS - NaBIC 2020 brought together researchers, engineers and practitioners whose work involves intelligent systems, network security and their applications in industry. Including contributions by authors from 25 countries, the book offers a valuable reference guide for all researchers, students and practitioners in the fields of science and engineering.

The State of the Art in Computational Intelligence

Computational Intelligence is a very dynamic domain of modern information society which integrates fields such as neural networks, fuzzy systems, evolutionary computation and intelligent systems in general. The book presents papers from the Euro-International Symposium on Computational Intelligence held in Kosice (Slovak Republic) in August 2000. It contains theoretical studies along with a chapter on applications and case studies. One of the main results of the symposium is that the combination of various techniques into hybrid intelligent systems will be very important for the development of intelligent information systems in the 21st century. The book also contains interesting forewords written by L.A. Zadeh, D.E. Goldberg, and K. Fukushima.

Hybrid Intelligent Systems

This book includes recent research on Hybrid Intelligent Systems. It presents 35 selected papers from the 17th edition of the International Conference on Hybrid Intelligent Systems (HIS), which was held in Delhi, India from December 14 to 16, 2017. Reflecting the awareness in the respective academic communities that combined approaches are essential to solving the remaining tough problems in computational intelligence, the HIS is a premier conference focused on the hybridization of intelligent systems. The book offers a valuable reference guide for all researchers, students and practitioners in the fields of Computer Science and Engineering.

Evolutionary Computation

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.

Parallel Architectures and Bioinspired Algorithms

This monograph presents examples of best practices when combining bioinspired algorithms with parallel architectures. The book includes recent work by leading researchers in the field and offers a map with the main paths already explored and new ways towards the future. Parallel Architectures and Bioinspired Algorithms will be of value to both specialists in Bioinspired Algorithms, Parallel and Distributed Computing, as well as computer science students trying to understand the present and the future of Parallel Architectures and Bioinspired Algorithms.

Adaptive Computing in Design and Manufacture V

The Adaptive Computing in Design and Manufacture Conference series is now in its tenth year and has become a well-established, application-oriented meeting recognised by several UK Engineering Institutions and the International Society of Genetic and Evolutionary Computing. The main theme of the conference again relates to the integration of evolutionary and adaptive computing technologies with design and manufacturing processes whilst also taking into account complementary advanced computing technologies. Evolutionary and adaptive computing techniques continue to increase their penetration of industrial and commercial practice as their powerful search, exploration and optimisation capabilities become ever more apparent. The last two years have seen a very significant increase in the development of commercial software tools utilising adaptive computing technologies and the emergence of related commercial research and consultancy organisations supporting the introduction of best practice in terms of industrial utilisation. Adaptive Computing in Design and Manufacture V is comprised of selected papers that cover a diverse set of industrial application areas including: engineering design and design environments, manufacturing process design, scheduling and control, electronic circuit design, fault detection. Various aspects of search and optimisation such as multi-objective and constrained optimisation are also investigated in the context of integration with industrial processes. In addition to evolutionary computing techniques, both neural-net and agent-based technologies play a role in a number of contributions. This collection of papers will be of particular interest to both industrial researchers and practitioners in addition to the academic research

communities of engineering, operational research and computer science.

Artificial Immune Systems: A New Computational Intelligence Approach

Artificial Immune Systems (AIS) are adaptive systems inspired by the biological immune system and applied to problem solving. This book provides an accessible introduction that will be suitable for anyone who is beginning to study or work in this area. It gives a clear definition of an AIS, sets out the foundations of the topic (including basic algorithms), and analyses how the immune system relates to other biological systems and processes. No prior knowledge of immunology is needed - all the essential background information is covered in the introductory chapters. Key features of the book include: - A discussion of AIS in the context of Computational Intelligence; - Case studies in Autonomous Navigation, Computer Network Security, Job-Shop Scheduling and Data Analysis =B7 An extensive survey of applications; - A framework to help the reader design and understand AIS; - A web site with additional resources including pseudocodes for immune algorithms, and links to related sites. Written primarily for final year undergraduate and postgraduate students studying Artificial Intelligence, Evolutionary and Biologically Inspired Computing, this book will also be of interest to industrial and academic researchers working in related areas.

New Directions on Hybrid Intelligent Systems Based on Neural Networks, Fuzzy Logic, and Optimization Algorithms

This book is devoted to the hybridization of intelligent systems which is a promising research field of modern computational intelligence concerned with the development of the next generation of intelligent systems. This Volume contains the papers presented in the Fifteenth International conference on Hybrid Intelligent Systems (HIS 2015) held in Seoul, South Korea during November 16-18, 2015. The 26 papers presented in this Volume were carefully reviewed and selected from 90 paper submissions. The Volume will be a valuable reference to researchers, students and practitioners in the computational intelligence field.

Hybrid Intelligent Systems

This book covers the latest technological advances in neuro-computational intelligence in biological processes where the primary focus is on biologically inspired neuro-computational techniques. The theoretical and practical aspects of biomedical neural computing, brain-inspired computing, bio-computational models, artificial intelligence (AI) and machine learning (ML) approaches in biomedical data analytics are covered along with their qualitative and quantitative features. The contents cover numerous computational applications, methodologies and emerging challenges in the field of bio-soft computing and bio-signal processing. The authors have taken meticulous care in describing the fundamental concepts, identifying the research gap and highlighting the problems with the strategical computational approaches to address the ongoing challenges in bio-inspired models and algorithms. Given the range of topics covered, this book can be a valuable resource for students, researchers as well as practitioners interested in the rapidly evolving field of neurocomputing and biomedical data analytics.

Bio-inspired Neurocomputing

The present book includes a set of selected extended papers from the third International Joint Conference on Computational Intelligence (IJCCI 2011), held in Paris, France, from 24 to 26 October 2011. The conference was composed of three co-located conferences: The International Conference on Fuzzy Computation (ICFC), the International Conference on Evolutionary Computation (ICEC), and the International Conference on Neural Computation (ICNC). Recent progresses in scientific developments and applications in these three areas are reported in this book. IJCCI received 283 submissions, from 59 countries, in all continents. This book includes the revised and extended versions of a strict selection of the best papers presented at the conference.

Computational Intelligence

This book highlights recent research on Hybrid Intelligent Systems and their various practical applications. It presents 56 selected papers from the 18th International Conference on Hybrid Intelligent Systems (HIS 2018), which was held at the Instituto Superior de Engenharia do Porto (ISEP), Porto, Portugal from December 13 to 15, 2018. A premier conference in the field of Artificial Intelligence, HIS 2018 brought together researchers, engineers and practitioners whose work involves intelligent systems and their applications in industry. Including contributions by authors from over 30 countries, the book offers a valuable reference guide for all researchers, students and practitioners in the fields of Computer Science and Engineering.

Hybrid Intelligent Systems

\"This book is a collection of the latest developments, models, and applications within the transdisciplinary fields related to metaheuristic computing, providing readers with insight into a wide range of topics such as genetic algorithms, differential evolution, and ant colony optimization\"--Provided by publisher.

Modeling, Analysis, and Applications in Metaheuristic Computing: Advancements and Trends

Developments in the areas of biology and bioinformatics are continuously evolving and creating a plethora of data that needs to be analyzed and decrypted. Since it can be difficult to decipher the multitudes of data within these areas, new computational techniques and tools are being employed to assist researchers in their findings. The Handbook of Research on Computational Intelligence Applications in Bioinformatics examines emergent research in handling real-world problems through the application of various computation technologies and techniques. Featuring theoretical concepts and best practices in the areas of computational intelligence, artificial intelligence, big data, and bio-inspired computing, this publication is a critical reference source for graduate students, professionals, academics, and researchers.

Handbook of Research on Computational Intelligence Applications in Bioinformatics

This book is the result of a special session on constraint-handling techniques used in evolutionary algorithms within the Congress on Evolutionary Computation (CEC) in 2007. It presents recent research in constraint-handling in evolutionary optimization.

Constraint-Handling in Evolutionary Optimization

The field of biologically inspired computation has coexisted with mainstream computing since the 1930s, and the pioneers in this area include Warren McCulloch, Walter Pitts, Robert Rosen, Otto Schmitt, Alan Turing, John von Neumann and Norbert Wiener. Ideas arising out of studies of biology have permeated algorithmics, automata theory, artificial intelligence, graphics, information systems and software design. Within this context, the biomolecular, cellular and tissue levels of biological organisation have had a considerable inspirational impact on the development of computational ideas. Such innovations include neural computing, systolic arrays, genetic and immune algorithms, cellular automata, artificial tissues, DNA computing and protein memories. With the rapid growth in biological knowledge there remains a vast source of ideas yet to be tapped. This includes developments associated with biomolecular, genomic, enzymic, metabolic, signalling and developmental systems and the various impacts on distributed, adaptive, hybrid and emergent computation. This multidisciplinary book brings together a collection of chapters by biologists, computer scientists, engineers and mathematicians who were drawn together to examine the ways in which the interdisciplinary displacement of concepts and ideas could develop new insights into emerging computing paradigms. Funded by the UK Engineering and Physical Sciences Research Council (EPSRC), the CytoCom

Network formally met on five occasions to examine and discuss common issues in biology and computing that could be exploited to develop emerging models of computation.

Computation in Cells and Tissues

Using the same strategy for the needs of image processing and pattern recognition, scientists and researchers have turned to computational intelligence for better research throughputs and end results applied towards engineering, science, business and financial applications. Handbook of Research on Computational Intelligence for Engineering, Science, and Business discusses the computation intelligence approaches, initiatives and applications in the engineering, science and business fields. This reference aims to highlight computational intelligence as no longer limited to computing-related disciplines and can be applied to any effort which handles complex and meaningful information.

Handbook of Research on Computational Intelligence for Engineering, Science, and Business