

International Journal Of Computational Intelligence And Applications

Recent years have seen numerous applications across a variety of fields using various techniques of Computational Intelligence. This book, one of a series on the foundations of Computational Intelligence, is focused on learning and approximation.

""This book provides vital research on theory analysis, improvements, and applications of fireworks algorithm. While highlighting topics such as convergence rate, parameter applications, and global optimization analysis, this publication explores up-to-date progress on the specific techniques of this algorithm"--Provided by publisher"--

In recent years, there has been a growing interest in the need for designing intelligent systems to address complex decision systems. One of the most challenging issues for the intelligent system is to effectively handle real-world uncertainties that cannot be eliminated. These uncertainties include various types of information that are incomplete, imprecise, fragmentary, not fully reliable, vague, contradictory, deficient, and overloading. The uncertainties result in a lack

of the full and precise knowledge of the decision system, including the determining and selection of evaluation criteria, alternatives, weights, assignment scores, and the final integrated decision result. Computational intelligent techniques (including fuzzy logic, neural networks, and genetic algorithms etc.), which are complimentary to the existing traditional techniques, have shown great potential to solve these demanding, real-world decision problems that exist in uncertain and unpredictable environments. These technologies have formed the foundation for intelligent systems.

The International Conference on “Computational Intelligence in Data Mining” (ICCIDM), after three successful versions, has reached to its fourth version with a lot of aspiration. The best selected conference papers are reviewed and compiled to form this volume. The proceedings discusses the latest solutions, scientific results and methods in solving intriguing problems in the fields of data mining, computational intelligence, big data analytics, and soft computing. The volume presents a sneak preview into the strengths and weakness of trending applications and research findings in the field of computational intelligence and data mining along with related field.

Foundations of Computational Intelligence Volume 5: Function Approximation and Classification Approximation theory is that area of analysis which is concerned with the ability to approximate functions by simpler and more easily calculated functions. It is an

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area which, like many other fields of analysis, has its primary roots in the mat- matics. The need for function approximation and classification arises in many branches of applied mathematics, computer science and data mining in particular. This edited volume comprises of 14 chapters, including several overview Ch- ters, which provides an up-to-date and state-of-the art research covering the theory and algorithms of function approximation and classification. Besides research ar- cles and expository papers on theory and algorithms of function approximation and classification, papers on numerical experiments and real world applications were also encouraged. The Volume is divided into 2 parts: Part-I: Function Approximation and Classification – Theoretical Foundations Part-II: Function Approximation and Classification – Success Stories and Real World Applications Part I on Function Approximation and Classification – Theoretical Foundations contains six chapters that describe several approaches Feature Selection, the use Decomposition of Correlation Integral, Some Issues on Extensions of Information and Dynamic Information System and a Probabilistic Approach to the Evaluation and Combination of Preferences Chapter 1 “Feature Selection for Partial Least Square Based Dimension Red- tion” by Li and Zeng investigate a systematic feature reduction framework by combing dimension reduction with feature selection. To evaluate the proposed framework authors used four typical data sets.

Hybrid Computational Intelligence: Challenges and Utilities is a comprehensive

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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.

Studies on robotics applications have grown substantially in recent years, with swarm robotics being a relatively new area of research. Inspired by studies in swarm intelligence and robotics, swarm robotics facilitates interactions between robots as well as their interactions with the environment. The Handbook of Research on Design, Control, and Modeling of Swarm Robotics is a collection of the most important research achievements in swarm robotics thus far, covering the growing areas of design, control, and modeling of swarm robotics. This handbook serves as an essential resource for researchers, engineers, graduates, and senior undergraduates with interests in swarm robotics and its applications.

These four volumes (CCIS 297, 298, 299, 300) constitute the proceedings of the 14th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, IPMU 2012, held in Catania, Italy, in July 2012. The 258 revised

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full papers presented together with six invited talks were carefully reviewed and selected from numerous submissions. The papers are organized in topical sections on fuzzy machine learning and on-line modeling; computing with words and decision making; soft computing in computer vision; rough sets and complex data analysis: theory and applications; intelligent databases and information system; information fusion systems; philosophical and methodological aspects of soft computing; basic issues in rough sets; 40th anniversary of the measures of fuzziness; SPS11 uncertainty in profiling systems and applications; handling uncertainty with copulas; formal methods to deal with uncertainty of many-valued events; linguistic summarization and description of data; fuzzy implications: theory and applications; sensing and data mining for teaching and learning; theory and applications of intuitionistic fuzzy sets; approximate aspects of data mining and database analytics; fuzzy numbers and their applications; information processing and management of uncertainty in knowledge-based systems; aggregation functions; imprecise probabilities; probabilistic graphical models with imprecision: theory and applications; belief function theory: basics and/or applications; fuzzy uncertainty in economics and business; new trends in De Finetti's approach; fuzzy measures and integrals; multicriteria decision making; uncertainty in privacy and security; uncertainty in the spirit of Pietro Benvenuti; coopetition; game theory; probabilistic approach.

Computational intelligence is a component of Encyclopedia of Technology, Information, and Systems Management Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. Computational intelligence is a rapidly growing research field including a wide variety of problem-solving techniques inspired by nature. Traditionally computational intelligence consists of three major

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research areas: Neural Networks, Fuzzy Systems, and Evolutionary Computation. Neural networks are mathematical models inspired by brains. Neural networks have massively parallel network structures with many neurons and weighted connections. Whereas each neuron has a simple input-output relation, a neural network with many neurons can realize a highly non-linear complicated mapping. Connection weights between neurons can be adjusted in an automated manner by a learning algorithm to realize a non-linear mapping required in a particular application task. Fuzzy systems are mathematical models proposed to handle inherent fuzziness in natural language. For example, it is very difficult to mathematically define the meaning of “cold” in everyday conversations such as “It is cold today” and “Can I have cold water”. The meaning of “cold” may be different in a different situation. Even in the same situation, a different person may have a different meaning. Fuzzy systems offer a mathematical mechanism to handle inherent fuzziness in natural language. As a result, fuzzy systems have been successfully applied to real-world problems by extracting linguistic knowledge from human experts in the form of fuzzy IF-THEN rules. Evolutionary computation includes various population-based search algorithms inspired by evolution in nature. Those algorithms usually have the following three mechanisms: fitness evaluation to measure the quality of each solution, selection to choose good solutions from the current population, and variation operators to generate offspring from parents. Evolutionary computation has high applicability to a wide range of optimization problems with different characteristics since it does not need any explicit mathematical formulations of objective functions. For example, simulation-based fitness evaluation is often used in evolutionary design. Subjective fitness evaluation by a human user is also often used in evolutionary art and music. These volumes are aimed at the following five

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major target audiences: University and College students Educators, Professional practitioners, Research personnel and Policy analysts, managers, and decision makers.

In recent years computational intelligence has been extended by adding many other subdisciplines and this new field requires a series of challenging problems that will give it a sense of direction in order to ensure that research efforts are not wasted. This book written by top experts in computational intelligence provides such clear directions and a much-needed focus on the most important and challenging research issues.

Soft computing techniques are innovative tools that use nature-inspired algorithms to run predictive analysis of industries from business to software measurement. These tools have gained momentum in recent years for their practicality and flexibility. The Handbook of Research on Fuzzy and Rough Set Theory in Organizational Decision Making collects both empirical and applied research in the field of fuzzy set theory, and bridges the gap between the application of soft computational approaches and the organizational decision making process. This publication is a pivotal reference for business professionals, IT specialists, software engineers, and advanced students of business and information technology.

Industrial engineering is a branch of engineering dealing with the optimization of complex processes or systems. It is concerned with the development, improvement, implementation and evaluation of production and service systems. Computational Intelligence Systems find a wide application area in industrial engineering: neural networks in forecasting, fuzzy sets in capital budgeting, ant colony optimization in scheduling, Simulated Annealing in optimization, etc. This book will include most of the application areas of industrial engineering through these computational intelligence systems. In the literature, there is no book including many real and

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practical applications of Computational Intelligence Systems from the point of view of Industrial Engineering. Every chapter will include explanatory and didactic applications. It is aimed that the book will be a main source for MSc and PhD students.

Recently, cryptology problems, such as designing good cryptographic systems and analyzing them, have been challenging researchers. Many algorithms that take advantage of approaches based on computational intelligence techniques, such as genetic algorithms, genetic programming, and so on, have been proposed to solve these issues. Implementing Computational Intelligence Techniques for Security Systems Design is an essential research book that explores the application of computational intelligence and other advanced techniques in information security, which will contribute to a better understanding of the factors that influence successful security systems design. Featuring a range of topics such as encryption, self-healing systems, and cyber fraud, this book is ideal for security analysts, IT specialists, computer engineers, software developers, technologists, academicians, researchers, practitioners, and students.

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