# International Journal Of Soft Computing

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.

This volume of Advances in Intelligent and Soft Computing contains accepted papers presented at SOCO 2012, held in the beautiful and historic city of Ostrava (Czech Republic), in September 2012. Soft computing represents a collection or set of computational techniques in machine learning, computer science and some engineering disciplines, which investigate, simulate, and analyze very complex issues and phenomena. After a through peer-review process, the SOCO 2012 International Program Committee selected 75 papers which are published in these conference proceedings, and represents an acceptance rate of 38%. In this relevant edition a special emphasis was put on the organization of special sessions. Three special sessions were organized related to relevant topics as: Soft computing models for Control Theory & Applications in Electrical Engineering, Soft computing models for biomedical signals and data processing and Advanced Soft Computing Methods in Computer Vision and Data Processing. The selection of papers was extremely rigorous in order to maintain the high quality of the conference and we would like to thank the members of the Program Committees for their hard work in the reviewing process. This is a crucial process to the creation of a high standard conference and the SOCO conference would not exist without their help.

"This book is a vital compendium of chapters on the latest research within the field of distributed computing, capturing trends in the design and development of Internet and distributed computing systems that leverage autonomic principles and techniques"--Provided by publisher.

Modern optimization approaches have attracted many research scientists, decision makers and practicing researchers in recent years as powerful intelligent computational techniques for solving several complex real-world problems. The Handbook of Research on Modern Optimization Algorithms and Applications in Engineering and Economics highlights the latest research innovations and applications of algorithms designed for optimization applications within the fields of engineering, IT, and economics. Focusing on a variety of methods and systems as well as practical examples, this book is a significant resource for graduate-level students, decision makers, and researchers in both public and private sectors who are seeking research-based methods for modeling uncertain real-world problems. .

Data mining analysis techniques have undergone significant developments in recent years. This has led to improved uses throughout numerous functions and applications. Intelligent Multidimensional Data Clustering and Analysis is an authoritative

reference source for the latest scholarly research on the advantages and challenges presented by the use of cluster analysis techniques. Highlighting theoretical foundations, computing paradigms, and real-world applications, this book is ideally designed for researchers, practitioners, upper-level students, and professionals interested in the latest developments in cluster analysis for large data sets.

This book offers a systematic introduction to the clustering algorithms for intuitionistic fuzzy values, the latest research results in intuitionistic fuzzy aggregation techniques, the extended results in interval-valued intuitionistic fuzzy environments, and their applications in multi-attribute decision making, such as supply chain management, military system performance evaluation, project management, venture capital, information system selection, building materials classification, and operational plan assessment, etc.

Image data has portrayed immense potential as a foundation of information for numerous applications. Recent trends in multimedia computing have witnessed a rapid growth in digital image collections, resulting in a need for increased image data management. Feature Dimension Reduction for Content-Based Image Identification is a pivotal reference source that explores the contemporary trends and techniques of content-based image recognition. Including research covering topics such as feature extraction, fusion techniques, and image segmentation, this book explores different theories to facilitate timely identification of image data and managing, archiving, maintaining, and extracting information. This book is ideally designed for engineers, IT specialists, researchers, academicians, and graduate-level students seeking interdisciplinary research on image processing and analysis.

This book is the proceedings of the 3rd World Conference on Soft Computing (WCSC), which was held in San Antonio, TX, USA, on December 16-18, 2013. It presents start-of-the-art theory and applications of soft computing together with an in-depth discussion of current and future challenges in the field, providing readers with a 360 degree view on soft computing. Topics range from fuzzy sets, to fuzzy logic, fuzzy mathematics, neuro-fuzzy systems, fuzzy control, decision making in fuzzy environments, image processing and many more. The book is dedicated to Lotfi A. Zadeh, a renowned specialist in signal analysis and control systems research who proposed the idea of fuzzy sets, in which an element may have a partial membership, in the early 1960s, followed by the idea of fuzzy logic, in which a statement can be true only to a certain degree, with degrees described by numbers in the interval [0,1]. The performance of fuzzy systems can often be improved with the help of optimization techniques, e.g. evolutionary computation, and by endowing the corresponding system with the ability to learn, e.g. by combining fuzzy systems with neural networks. The resulting “consortium” of fuzzy, evolutionary, and neural techniques is known as soft computing and is the main focus of this book.

In today’s modernized world, the field of healthcare has seen significant practical innovations with the implementation of computational intelligence approaches and soft computing methods. These two concepts present various solutions to complex scientific problems and imperfect data issues. This has made both very popular in the medical profession. There are still various areas to be studied and improved by these two schemes as healthcare practices continue to develop. Computational Intelligence

and Soft Computing Applications in Healthcare Management Science is an essential reference source that discusses the implementation of soft computing techniques and computational methods in the various components of healthcare, telemedicine, and public health. Featuring research on topics such as analytical modeling, neural networks, and fuzzy logic, this book is ideally designed for software engineers, information scientists, medical professionals, researchers, developers, educators, academicians, and students.

Search engines, with Google at the top, have become the most heavily used online service, with millions of searches performed every day and many remarkable capabilities. Soft Computing for Information Processing and Analysis includes reports from the front of soft computing in the internet industry and imparts knowledge and understanding of the significance of the field's accomplishments, new developments and future directions. This carefully edited book has evolved from presentations made by the participants of a meeting entitled "Fuzzy Logic and the Internet: Enhancing the Power of the Internet", organized by the Berkeley Initiative in Soft Computing (BISC), University of California, Berkeley. It addresses the important topics of modern search engines such as fuzzy query, decision analysis and support systems, including articles about topics such as Web Intelligence, World Knowledge and Fuzzy Logic (by Lotfi A. Zadeh), perception based information processing, or web intelligence.

"This book focuses on network management and traffic engineering for Internet and distributed computing technologies, as well as present emerging technology trends and advanced platforms"--Provided by publisher.

Data warehouse is one of the components of the overall business intelligence system. An enterprise has one data warehouse, and data marts source has their information from the data warehouse. The Data warehouse is a corporation of all data marts within the enterprise. Information is always accumulated in the dimensional model. In this paper, an intelligent data repository with soft computing is presented. It covers similarity metrics that are commonly used to improve the efficiency of data storages. It also covers multiple decision making methodologies to improve the efficiency of decision making.

The book offers a snapshot of the theories and applications of soft computing in the area of complex systems modeling and control. It presents the most important findings discussed during the 5th International Conference on Modelling, Identification and Control, held in Cairo, from August 31-September 2, 2013. The book consists of twenty-nine selected contributions, which have been thoroughly reviewed and extended before their inclusion in the volume. The different chapters, written by active researchers in the field, report on both current theories and important applications of soft-computing. Besides providing the readers with soft-computing fundamentals, and soft-computing based inductive methodologies/algorithms, the book also discusses key industrial soft-computing applications, as well as multidisciplinary solutions developed for a variety of purposes, like windup control, waste management, security issues, biomedical applications and many others. It is a perfect reference guide for graduate students, researchers and practitioners in the area of soft computing, systems modeling and control.

This book meets the present and future needs for the interaction between various science and technology/engineering areas on the one hand and different branches of soft computing on the other. Soft computing is the recent development about the computing methods which include fuzzy set theory/logic, evolutionary computation (EC), probabilistic reasoning, artificial neural networks, machine learning, expert systems, etc. Soft computing refers to a partnership of computational techniques in computer science, artificial intelligence, machine learning, and some other engineering disciplines, which attempt to study, model, and analyze complex problems from different interdisciplinary problems. This, as opposed to traditional computing, deals with approximate models and gives solutions to complex real-life problems. Unlike hard computing, soft computing is tolerant of imprecision, uncertainty, partial truth, and approximations. Interdisciplinary sciences include various challenging problems of science and engineering. Recent developments in soft computing are the bridge to handle different interdisciplinary science and engineering problems. In recent years, the correspondingly increased dialog between these disciplines has led to this new book. This is done, firstly, by encouraging the ways that soft computing may be applied in traditional areas, as well as point towards new and innovative areas of applications and secondly, by encouraging other scientific disciplines to engage in a dialog with the above computation algorithms outlining their problems to both access new methods as well as to suggest innovative developments within itself.

The book presents innovative scientific research works by academics, research scholars and students, presented at the 2017 International Conference on Energy, Materials and Information Technology at Amity University Jharkhand, India. It includes contributions on system solutions based on soft computing techniques, and covers innovative soft computing techniques and tools with advanced applications. A major focus of the book is on presenting interdisciplinary problems and how they can be solved using information technology, together with innovative connections to other disciplines. It also includes papers on cloud computing and WSN-related real-time research.

"This book explores emerging technologies and best practices designed to effectively address concerns inherent in properly optimizing advanced systems, demonstrating applications in areas such as bio-engineering, space exploration, industrial informatics, information security, and nuclear and renewable energies"--Provided by publisher.

This book comprises a selection of papers on theoretical advances and applications of fuzzy logic and soft computing from the IFSA 2007 World Congress, held in Cancun, Mexico, June 2007. These papers constitute an important contribution to the theory and applications of fuzzy logic and soft computing methodologies.

A critical part of ensuring that systems are advancing alongside technology without complications is problem solving. Practical applications of problem-solving theories can model conflict and cooperation and aid in creating solutions to real-

world problems. Soft-Computing-Based Nonlinear Control Systems Design is a critical scholarly publication that examines the practical applications of control theory and its applications in problem solving to fields including economics, environmental management, and financial modelling. Featuring a wide range of topics, such as fuzzy logic, nature-inspired algorithms, and cloud computing, this book is geared toward academicians, researchers, and students seeking relevant research on control theory and its practical applications.

The growing commercial market of Microwave/ Millimeter wave industry over the past decade has led to the explosion of interests and opportunities for the design and development of microwave components.The design of most microwave components requires the use of commercially available electromagnetic (EM) simulation tools for their analysis. In the design process, the simulations are carried out by varying the design parameters until the desired response is obtained. The optimization of design parameters by manual searching is a cumbersome and time consuming process. Soft computing methods such as Genetic Algorithm (GA), Artificial Neural Network (ANN) and Fuzzy Logic (FL) have been widely used by EM researchers for microwave design since last decade. The aim of these methods is to tolerate imprecision, uncertainty, and approximation to achieve robust and low cost solution in a small time frame. Modeling and optimization are essential parts and powerful tools for the microwave/millimeter wave design. This book deals with the development and use of soft computing methods for tackling challenging design problems in the microwave/millimeter wave domain. The aim in the development of these methods is to obtain the design in small time frame while improving the accuracy of the design for a wide range of applications. To achieve this goal, a few diverse design problems of microwave field, representing varied challenges in the design, such as different microstrip antennas, microwave filters, a microstrip-via and also some critical high power components such as nonlinear tapers and RF-windows are considered as case-study design problems. Different design methodologies are developed for these applications. The presents soft computing methods, their review for microwave/millimeter wave design problems and specific case-study problems to infuse better insight and understanding of the subject.

This book aims at addressing the challenges of contemporary manufacturing in Industry 4.0 environment and future manufacturing (aka Industry 5.0), by implementing soft computing as one of the major sub-fields of artificial intelligence. It contributes to development and application of the soft computing systems, including links to hardware, software and enterprise systems, in resolving modern manufacturing issues in complex, highly dynamic and globalized industrial circumstances. It embraces heterogeneous complementary aspects, such as control, monitoring and modeling of different manufacturing tasks, including intelligent robotic systems and processes, addressed by various machine learning and fuzzy techniques; modeling and parametric optimization of advanced conventional and non-conventional,

eco-friendly manufacturing processes by using machine learning and evolutionary computing techniques; cybersecurity framework for Internet of Things-based systems addressing trustworthiness and resilience in machine-to-machine and human-machine collaboration; static and dynamic digital twins integration and synchronization in a smart factory environment; STEP-NC technology for a smart machine vision system, and integration of Open CNC with Service-Oriented Architecture for STEP-NC monitoring system in a smart manufacturing. Areas of interest include but are not limited to applications of soft computing to address the following: dynamic process/system modeling and simulation, dynamic process/system parametric optimization, dynamic planning and scheduling, smart, predictive maintenance, intelligent and autonomous systems, improved machine cognition, effective digital twins integration, human-machine collaboration, robots, and cobots.

This book offers an in-depth and comprehensive introduction to the priority methods of intuitionistic preference relations, the consistency and consensus improving procedures for intuitionistic preference relations, the approaches to group decision making based on intuitionistic preference relations, the approaches and models for interactive decision making with intuitionistic fuzzy information, and the extended results in interval-valued intuitionistic fuzzy environments.

Although computational intelligence and soft computing are both well-known fields, using computational intelligence and soft computing in conjunction is an emerging concept. This combination can effectively be used in practical areas of various fields of research. Applied Computational Intelligence and Soft Computing in Engineering is an essential reference work featuring the latest scholarly research on the concepts, paradigms, and algorithms of computational intelligence and its constituent methodologies such as evolutionary computation, neural networks, and fuzzy logic. Including coverage on a broad range of topics and perspectives such as cloud computing, sampling in optimization, and swarm intelligence, this publication is ideally designed for engineers, academicians, technology developers, researchers, and students seeking current research on the benefits of applying computation intelligence techniques to engineering and technology.

Multimedia represents information in novel and varied formats. One of the most prevalent examples of continuous media is video. Extracting underlying data from these videos can be an arduous task. From video indexing, surveillance, and mining, complex computational applications are required to process this data. Intelligent Analysis of Multimedia Information is a pivotal reference source for the latest scholarly research on the implementation of innovative techniques to a broad spectrum of multimedia applications by presenting emerging methods in continuous media processing and manipulation. This book offers a fresh perspective for students and researchers of information technology, media professionals, and programmers.

This book is an introduction to some new fields in soft computing with its principal components of fuzzy logic, ANN and EA. The approach in this book is to provide an understanding of the soft computing field and to work through soft computing using examples. It also aims to integrate pseudo-code operational summaries and Matlab codes, to present computer simulation, to include real world applications and to highlight the distinctive work of human consciousness in machine.

Soft Computing Based Medical Image Analysis presents the foremost techniques of soft computing in medical image analysis and processing. It includes image enhancement, segmentation, classification-based soft computing, and their application in diagnostic imaging, as well as an extensive background for the development of intelligent systems based on soft computing used in medical image analysis and processing. The book introduces the theory and concepts of digital image analysis and processing based on soft computing with real-world medical imaging applications. Comparative studies for soft computing based medical imaging techniques and traditional approaches in medicine are addressed, providing flexible and sophisticated application-oriented solutions. Covers numerous soft computing approaches, including fuzzy logic, neural networks, evolutionary computing, rough sets and Swarm intelligence Presents transverse research in soft computing formation from various engineering and industrial sectors in the medical domain Highlights challenges and the future scope for soft computing based medical analysis and processing techniques

The evolution of soft computing applications has offered a multitude of methodologies and techniques that are useful in facilitating new ways to address practical and real scenarios in a variety of fields. In particular, these concepts have created significant developments in the engineering field. Soft Computing Techniques and Applications in Mechanical Engineering is a pivotal reference source for the latest research findings on a comprehensive range of soft computing techniques applied in various fields of mechanical engineering. Featuring extensive coverage on relevant areas such as thermodynamics, fuzzy computing, and computational intelligence, this publication is an ideal resource for students, engineers, research scientists, and academicians involved in soft computing techniques and applications in mechanical engineering areas.

"This book presents the most innovative systematic and practical facets of fuzzy computing technologies to students, scholars, and academicians, as well as practitioners, engineers, and professionals"--

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.

The Proceedings of SocProS 2014 serves as an academic bonanza for scientists and researchers working in the field of Soft Computing. This book contains theoretical as well as practical aspects using fuzzy logic, neural networks, evolutionary algorithms, swarm intelligence algorithms, etc., with many applications under the umbrella of ‘Soft Computing’. The book is beneficial for young as well as experienced researchers dealing across complex and intricate real world problems for which finding a solution by traditional methods is a difficult task. The different application areas covered in the Proceedings are: Image Processing, Cryptanalysis, Industrial Optimization, Supply Chain Management, Newly Proposed Nature Inspired Algorithms, Signal Processing, Problems related to Medical and Healthcare, Networking Optimization Problems, etc.

Conventional computational methods, and even the latest soft computing paradigms, often fall short in their ability to offer solutions to many real-world problems due to uncertainty, imprecision, and circumstantial data. Hybrid intelligent computing is a paradigm that addresses these issues to a considerable extent. The Handbook of Research on Advanced Hybrid Intelligent Techniques and Applications highlights the latest research on various issues relating to the hybridization of artificial intelligence, practical applications, and best methods for implementation. Focusing on key interdisciplinary computational intelligence research dealing with soft computing techniques, pattern mining, data analysis, and computer vision, this book is relevant to the research needs of academics, IT specialists, and graduate-level students.