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Soft Computing in Industrial Applications

Saad · Avineri · Dahal  
Sarfraz · Roy (Eds.)



Soft Computing admits approximate reasoning, imprecisions, uncertainty and partial truth in order to mimic aspects of the remarkable human capability of making decisions in real life and ambiguous environments. "Soft Computing in Industrial Applications" contains a collection of papers that were presented at the 10th On-line World Conference on Soft Computing in Industrial Applications, held in September–October 2006. This carefully edited book provides a comprehensive overview of the recent advances in the industrial applications of soft computing and covers a wide range of application areas, including data analysis and data mining, computer graphics, intelligent control systems, pattern recognition, classifiers, as well as modeling optimization. The book is aimed at researchers and practitioners who are engaged in developing and applying intelligent systems principles to solving real-world problems. It is also suitable as reader material for science and engineering postgraduate students.

Soft Computing in Industrial Applications

ISBN 978-3-642-07704-2



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# Soft Computing in Industrial Applications

Recent and Emerging Methods  
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# Soft Computing With Industrial Applications Volume 17

**N Colangelo**



## **Soft Computing With Industrial Applications Volume 17:**

*Soft Computing in Industrial Applications* Yukinori Suzuki, Seppo J. Ovaska, Takeshi Furuhashi, Rajkumar Roy, Yasuhiko Dote, 2012-12-06 This book contains recent theoretical innovations and a comprehensive collection of industrial applications in the emerging field of Soft Computing. Soft computing is a new form of artificial intelligence and it consists of four core methodologies: Fuzzy Computing, Neuro Computing, Evolutionary Computation, and Probabilistic Computing. These individual techniques are clearly complementary or synergistic rather than competitive. Therefore, it is a common practice to combine two or three methodologies when solving complex problems. Also, the systematic fusion of soft computing and hard computing is a highly potential alternative to be considered. Soft computing methodologies are suitable for various real world applications because the available information and system knowledge are often imprecise, uncertain, or partially even incorrect. To handle such demanding conditions and obtain the required robustness with pure hard computing would typically be either very difficult or expensive. This book is a unique collection of technical articles providing a thorough overview of the state of the art theory and industrial applications. The core articles on evolutionary computation, fuzzy computing, and neuro computing are of particular interest to researchers and practicing engineers. [Soft Computing in Industrial Applications](#)

Václav Snášel, Pavel Krömer, Mario Köppen, Gerald Schaefer, 2013-11-20 This volume of *Advances in Intelligent Systems and Computing* contains accepted papers presented at WSC17, the 17th Online World Conference on Soft Computing in Industrial Applications, held from December 2012 to January 2013 on the Internet. WSC17 continues a successful series of scientific events started over a decade ago by the World Federation of Soft Computing. It brought together researchers from over the world interested in the ever advancing state of the art in the field. Continuous technological improvements make this online forum a viable gathering format for a world class conference. The aim of WSC17 was to disseminate excellent research results and contribute to building a global network of scientists interested in both theoretical foundations and practical applications of soft computing. The 2012 edition of the Online World Conference on Soft Computing in Industrial Applications consisted of a general track and a special session on Continuous Features Discretization for Anomaly Intrusion Detectors. Generation and a special session on Emerging Theories and Applications in Transportation Science. A total of 33 high quality research papers were accepted after a rigorous review process and are provided in this book. *Real Life Applications of Soft Computing*

Anupam Shukla, Ritu Tiwari, Rahul Kala, 2010-05-21 Rapid advancements in the application of soft computing tools and techniques have proven valuable in the development of highly scalable systems and resulted in brilliant applications including those in biometric identification, interactive voice response systems, and data mining. Although many resources on the subject adequately cover the theoretical aspects, *Soft Computing in Textile Sciences*

Les M. Sztandera, Christopher Pastore, 2013-03-20 Textiles and computing have long been associated. High volume and low profit margins of textile products have driven the industry to invest in high technology, particularly in the area of data interpretation and analysis. Thus, it is

virtually inevitable that soft computing has found a home in the textile industry Contained in this volume are six chapters discussing various aspects of soft computing in the field of textiles and apparel

**Stochastic Global Optimization and Its Applications with Fuzzy Adaptive Simulated Annealing** Hime Aguiar e Oliveira Junior, Lester Ingber, Antonio Petraglia, Mariane Rembold Petraglia, Maria Augusta Soares Machado, 2012-01-26 Stochastic global optimization is a very important subject that has applications in virtually all areas of science and technology Therefore there is nothing more opportune than writing a book about a successful and mature algorithm that turned out to be a good tool in solving difficult problems Here we present some techniques for solving several problems by means of Fuzzy Adaptive Simulated Annealing Fuzzy ASA a fuzzy controlled version of ASA and by ASA itself ASA is a sophisticated global optimization algorithm that is based upon ideas of the simulated annealing paradigm coded in the C programming language and developed to statistically find the best global fit of a nonlinear constrained non convex cost function over a multi dimensional space By presenting detailed examples of its application we want to stimulate the reader s intuition and make the use of Fuzzy ASA or regular ASA easier for everyone wishing to use these tools to solve problems We kept formal mathematical requirements to a minimum and focused on continuous problems although ASA is able to handle discrete optimization tasks as well This book can be used by researchers and practitioners in engineering and industry in courses on optimization for advanced undergraduate and graduate levels and also for self study

**Intelligent Systems and Soft Computing** Behnam Azvine, Nader Azarmi, Detlef D. Nauck, 2006-12-30 Artificial intelligence has traditionally focused on solving human centered problems like natural language processing or common sense reasoning On the other hand for a while now soft computing has been applied successfully in areas like pattern recognition clustering or automatic control The papers in this book explore the possibility of bringing these two areas together This book is unique in the way it concentrates on building intelligent software systems by combining methods from diverse disciplines such as fuzzy set theory neuroscience agent technology knowledge discovery and symbolic artificial intelligence The first part of the book focuses on foundational aspects and future directions the second part provides the reader with an overview of recently developed software tools for building flexible intelligent systems the final section studies developed applications in various fields

**Computational Intelligence in Automotive Applications** Danil Prokhorov, 2008-05-28 What is computational intelligence CI Traditionally CI is understood as a collection of methods from the elds of neural networks NN fuzzy logic and evolutionary computation Various de nitions and opinions exist but what belongs to CI is still being debated see e g 1 3 More recently there has been a proposal to de ne the CI not in terms of the tools but in terms of challenging problems to be solved 4 With this edited volume I have made an attempt to give a representative sample of contemporary CI activities in automotive applications to illustrate the state of the art While CI research and achievements in some specialized elds described see e g 5 6 this is the rst volume of its kind dedicated to automotive technology As if re ecting the general lack of consensus on what constitutes the eld of CI this volume

1 illustrates automotive applications of not only neural and fuzzy computations which are considered to be the standard CI topics but also others such as decision trees graphical models Support Vector Machines SVM multi agent systems etc This book is neither an introductory text nor a comprehensive overview of all CI research in this area Hopefully as a broad and representative sample of CI activities in automotive applications it will be worth reading for both professionals and students When the details appear insufficient the reader is encouraged to consult other relevant sources provided by the chapter authors

**Affective Computing and Intelligent Interaction** Jianhua Tao, Tieniu Tan, 2005-10-27 This book constitutes the refereed proceedings of the First International Conference on Affective Computing and Intelligent Interaction ACII 2005 held in Beijing China in October 2005 as an associated event of ICCV 2005 the International Conference on Computer Vision The 45 revised full papers and 81 revised poster papers presented were carefully reviewed and selected from 198 submissions They cover a wide range of topics such as facial expression recognition face animation emotional speech synthesis intelligent agent and virtual reality The papers are organized in topical sections on affective face and gesture processing affective speech processing evaluation of affective expressivity affective database annotation and tools psychology and cognition of affect and affective interaction and systems and applications

**Multisensor Fusion** Anthony K. Hyder, E. Shahbazian, E. Waltz, 2002-07-31 Proceedings of the NATO Advanced Study Institute on Multisensor Data Fusion held in Pitlochry Perthshire Scotland June 25 July 7 2000

Data Analysis and Applications 3 Andreas Makridakis, Alex Karagrigoriou, Christos H. Skiadas, 2020-06-16 Data analysis as an area of importance has grown exponentially especially during the past couple of decades This can be attributed to a rapidly growing computer industry and the wide applicability of computational techniques in conjunction with new advances of analytic tools This being the case the need for literature that addresses this is self evident New publications are appearing covering the need for information from all fields of science and engineering thanks to the universal relevance of data analysis and statistics packages This book is a collective work by a number of leading scientists analysts engineers mathematicians and statisticians who have been working at the forefront of data analysis The chapters included in this volume represent a cross section of current concerns and research interests in these scientific areas The material is divided into two parts Computational Data Analysis and Classification Data Analysis with methods for both providing the reader with both theoretical and applied information on data analysis methods models and techniques and appropriate applications

Empirical Foundations of Information and Software Science V Pranas Zunde, D. Hocking, 2012-12-06 This is the proceedings of the Sixth Symposium on Empirical Foundations of Information and Software Sciences EFISS which was held in Atlanta Georgia on October 19 21 1988 The purpose of the symposia is to explore subjects and methods of scientific inquiry which are of common interest to information and software sciences and to identify directions of research that would benefit from the mutual interaction of these two disciplines The main theme of the sixth symposium was modeling in information and software engineering with emphasis on methods and tools of modeling The

symposium covered topics such as models of individual and organizational users of information systems methods of selecting appropriate types of models for a given type of users and a given type of tasks deriving models from records of system usage modeling system evolution constructing user and task models for adaptive systems and models of system architectures This symposium was sponsored by the School of Information and Computer Science of the Georgia Institute of Technology and by the U S Army Institute for Research in Management Information Communications and Computer Sciences AIRMICS 17le Editors vii CONTENTS 1 I KEYNOTE ADDRESS Handbook of Automotive Power Electronics and Motor Drives Ali Emadi,2017-12-19 Initially the only electric loads encountered in an automobile were for lighting and the starter motor Today demands on performance safety emissions comfort convenience entertainment and communications have seen the working in of seemingly innumerable advanced electronic devices Consequently vehicle electric systems require larger capacities and more complex configurations to deal with these demands Covering applications in conventional hybrid electric and electric vehicles the Handbook of Automotive Power Electronics and Motor Drives provides a comprehensive reference for automotive electrical systems This authoritative handbook features contributions from an outstanding international panel of experts from industry and academia highlighting existing and emerging technologies Divided into five parts the Handbook of Automotive Power Electronics and Motor Drives offers an overview of automotive power systems discusses semiconductor devices sensors and other components explains different power electronic converters examines electric machines and associated drives and details various advanced electrical loads as well as battery technology for automobile applications As we seek to answer the call for safer more efficient and lower emission vehicles from regulators and consumer insistence on better performance comfort and entertainment the technologies outlined in this book are vital for engineering advanced vehicles that will satisfy these criteria *Production Scheduling* Rodrigo Righi,2012-01-11 Generally speaking scheduling is the procedure of mapping a set of tasks or jobs studied objects to a set of target resources efficiently More specifically as a part of a larger planning and scheduling process production scheduling is essential for the proper functioning of a manufacturing enterprise This book presents ten chapters divided into five sections Section 1 discusses rescheduling strategies policies and methods for production scheduling Section 2 presents two chapters about flow shop scheduling Section 3 describes heuristic and metaheuristic methods for treating the scheduling problem in an efficient manner In addition two test cases are presented in Section 4 The first uses simulation while the second shows a real implementation of a production scheduling system Finally Section 5 presents some modeling strategies for building production scheduling systems This book will be of interest to those working in the decision making branches of production in various operational research areas as well as computational methods design People from a diverse background ranging from academia and research to those working in industry can take advantage of this volume Cloud Computing and Big Data C. Catlett,W. Gentzsch,L. Grandinetti,2013-10-22 Cloud computing offers many advantages to researchers and engineers who need access

to high performance computing facilities for solving particular compute intensive and or large scale problems but whose overall high performance computing HPC needs do not justify the acquisition and operation of dedicated HPC facilities There are however a number of fundamental problems which must be addressed such as the limitations imposed by accessibility security and communication speed before these advantages can be exploited to the full This book presents 14 contributions selected from the International Research Workshop on Advanced High Performance Computing Systems held in Cetraro Italy in June 2012 The papers are arranged in three chapters Chapter 1 includes five papers on cloud infrastructures while Chapter 2 discusses cloud applications The third chapter in the book deals with big data which is nothing new large scientific organizations have been collecting large amounts of data for decades but what is new is that the focus has now broadened to include sectors such as business analytics financial analyses Internet service providers oil and gas medicine automotive and a host of others This book will be of interest to all those whose work involves them with aspects of cloud computing and big data applications

Cognitive Sensors and IoT Fadi Al-Turjman, 2017-09-22 This book presents the Cognitive Information Centric Sensor Network CICSN framework for the IoT This framework is built on top of cognitive nodes capable of knowledge representation learning and reasoning along with an information centric approach for data delivery It also discusses the most appropriate deployment strategy for these cognitive nodes under realistic assumptions that cares about the Quality of Information QoI In addition it uses a QoI aware data delivery strategy with Analytic Hierarchy Process AHP as the reasoning technique to identify data delivery paths that dynamically adapt to changing network conditions and user requirements

Computational Intelligence in Economics and Finance Paul P. Wang, 2013-03-09 Due to the ability to handle specific characteristics of economics and finance forecasting problems like e g non linear relationships behavioral changes or knowledge based domain segmentation we have recently witnessed a phenomenal growth of the application of computational intelligence methodologies in this field In this volume Chen and Wang collected not just works on traditional computational intelligence approaches like fuzzy logic neural networks and genetic algorithms but also examples for more recent technologies like e g rough sets support vector machines wavelets or ant algorithms After an introductory chapter with a structural description of all the methodologies the subsequent parts describe novel applications of these to typical economics and finance problems like business forecasting currency crisis discrimination foreign exchange markets or stock markets behavior

**Applied Mathematics and Computational Intelligence** Anna M. Gil-Lafuente, José M. Merigó, Bal Kishan Dass, Rajkumar Verma, 2018-03-06 This book gathers selected papers presented at the conference of the Forum for Interdisciplinary Mathematics FIM held at Palau Macaya Barcelona on 18 to 20 November 2015 The event was co organized by the University of Barcelona Spain the Spanish Royal Academy of Economic and Financial Sciences Spain and the Forum for Interdisciplinary Mathematics India This instalment of the conference was presented with the title Applied Mathematics and Computational Intelligence and particularly focused on the use of Mathematics and Computational Intelligence

techniques in a diverse range of scientific disciplines as well as their applications in real world problems The book presents thirty peer reviewed research papers organised into four topical sections on Mathematical Foundations Computational Intelligence and Optimization Techniques Modelling and Simulation Techniques and Applications in Business and Engineering This book will be of great interest to anyone working in the area of applied mathematics and computational intelligence and will be especially useful for scientists and graduate students pursuing research in these fields

**Applied Soft Computing and Embedded System Applications in Solar Energy** Rupendra Kumar Pachauri, Jitendra Kumar Pandey, Abhishek Sharmu, Om Nautiyal, Mangey Ram, 2021-05-26 Applied Soft Computing and Embedded System Applications in Solar Energy deals with energy systems and soft computing methods from a wide range of approaches and application perspectives The authors examine how embedded system applications can deal with the smart monitoring and controlling of stand alone and grid connected solar photovoltaic PV systems for increased efficiency Growth in the area of artificial intelligence with embedded system applications has led to a new era in computing impacting almost all fields of science and engineering Soft computing methods implemented to energy related problems regularly face data driven issues such as problems of optimization classification clustering or prediction The authors offer real time implementation of soft computing and embedded system in the area of solar energy to address the issues with microgrid and smart grid projects both renewable and non renewable generations energy management and power regulation They also discuss and examine alternative solutions for energy capacity assessment energy efficiency systems design as well as other specific smart grid energy system applications The book is intended for students professionals and researchers in electrical and computer engineering fields working on renewable energy resources microgrids and smart grid projects Examines the integration of hardware with stand alone PV panels and real time monitoring of factors affecting the efficiency of the PV panels Offers real time implementation of soft computing and embedded system in the area of solar energy Discusses how soft computing plays a huge role in the prediction of efficiency of stand alone and grid connected solar PV systems Discusses how embedded system applications with smart monitoring can control and enhance the efficiency of stand alone and grid connected solar PV systems Explores swarm intelligence techniques for solar PV parameter estimation Dr Rupendra Kumar Pachauri is Assistant Professor Selection Grade in the Department of Electrical and Electronics Engineering University of Petroleum and Energy Studies UPES Dehradun India Dr Jitendra Kumar Pandey is Professor Head of R D in the University of Petroleum and Energy Studies UPES Dehradun India Mr Abhishek Sharma is working as a research scientist in the research and development department UPES India Dr Om Prakash Nautiyal is working as a scientist in Uttarakhand Science Education Research Centre USERC Department of Information and Science Technology Govt of Uttarakhand Dehradun India Prof Mangey Ram is working as a Research Professor at Graphic Era Deemed to be University Dehradun India

**Control Systems** Vsevolod Kuntsevich, Vyacheslav Gubarev, Yuriy Kondratenko, 2022-09-01 In recent years a considerable amount of effort has been



devoted both in industry and academia towards the development of advanced methods of control theory with focus on its practical implementation in various fields of human activity such as space control robotics control applications in marine systems control processes in agriculture and food production Control Systems Theory and Applications consists of selected best papers which were presented at XXIV International conference on automatic control Automatics 2017 September 13 15 2017 Kyiv Ukraine organized by Ukrainian Association on Automatic Control National member organization of IFAC International Federation on Automatic Control and National University of Life and Environmental Sciences of Ukraine More than 120 presentations were discussed at the conference with participation of the scientists from the numerous countries The book is divided into two main parts a first on Theory of Automatic Control 5 chapters and the second on Control Systems Applications 8 chapters The selected chapters provide an overview of challenges in the area of control systems design modeling engineering and implementation and the approaches and techniques that relevant research groups within this area are employing to try to resolve these This book on advanced methods of control theory and successful cases in the practical implementation is ideal for personnel in modern technological processes automation and SCADA systems robotics space and marine industries as well as academic staff and master research students in computerized control systems automatized and computer integrated systems electrical and mechanical engineering

**Artificial Intelligence-Based Energy Management Systems for Smart Microgrids** Baseem Khan, Sanjeevikumar Padmanaban, Hassan Haes Alhelou, Om Prakash Mahela, S. Rajkumar, 2022-06-07 Modeling and optimization of energy management systems for micro and mini grids play an important role in the fields of energy generation dispatch system operation protection coordination power quality issues and peak demand conflict with grid security This comprehensive reference text provides an in depth insight into these topics This text discusses the use of meta heuristic and artificial intelligence algorithms for developing energy management systems with energy use prediction for mini and microgrid systems It covers important concepts including modeling of microgrid and energy management systems optimal protection coordination based microgrid energy management optimal energy dispatch with energy management systems and peak demand management with energy management systems Key Features Presents a comprehensive discussion of mini and microgrid concepts Discusses AC and DC microgrid modeling in detail Covers optimization of mini and microgrid systems using AI and meta heuristic techniques Provides MATLAB based simulations on a mini and microgrid Comprehensively discussing concepts of microgrids with the help of software based simulations this text will be useful as a reference text for graduate students and professionals in the fields of electrical engineering electronics and communication engineering renewable energy and clean technology

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