

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/27313612>

Soft Computing in Industrial Applications

Article · January 2007

Source: OAI

CITATIONS

4

READS

25

5 authors, including:



[Ashraf Saad](#)

Armstrong State University

41 PUBLICATIONS 270 CITATIONS

[SEE PROFILE](#)



[Prem NIDHI Keshav](#)

Siddaganga Institute of Technology

74 PUBLICATIONS 409 CITATIONS

[SEE PROFILE](#)



[Muhammad Sarfraz](#)

Kuwait University

215 PUBLICATIONS 1,846 CITATIONS

[SEE PROFILE](#)



[Rajkumar Roy](#)

Cranfield University

251 PUBLICATIONS 3,428 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Score board of competitiveness of European transport manufacturing industries [View project](#)

All content following this page was uploaded by [Rajkumar Roy](#) on 09 February 2015.

The user has requested enhancement of the downloaded file. All in-text references [underlined in blue](#) are added to the original document and are linked to publications on ResearchGate, letting you access and read them immediately.

The series "Advances in Soft Computing" contains publications on various areas within so-called soft computing which include fuzzy sets, rough sets, neural networks, evolutionary computations, probabilistic and evidential reasoning, multi-valued logic, and related fields. The publications within "Advances in Soft Computing" are primarily textbooks and proceedings of important conferences, symposia and congresses. They cover significant recent developments in the field, both of a foundational and applicable character. An important characteristic feature of the series is the short publication time and world-wide distribution. This permits a rapid and broad dissemination of research results.

Saad · Avineri · Dahal · Sarfraz · Roy (Eds.)
Soft Computing in Industrial Applications

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



Soft Computing in Industrial Applications

Soft Computing admits approximate reasoning, imprecision, 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 11th 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 wider reading for science and engineering postgraduate students.

ISSN 1615-3871

ISBN 978-3-540-70704-2



9 783540 707042

Available
online

springerlink.com

springer.com

Ashraf Saad
Erel Avineri
Keshav Dahal
Muhammad Sarfraz
Rajkumar Roy
Editors

Soft Computing in Industrial Applications

Recent and Emerging Methods
and Techniques

 Springer

Advances in Soft Computing

Editor-in-Chief

Prof. Janusz Kacprzyk
Systems Research Institute
Polish Academy of Sciences
ul. Newelska 6
01-447 Warsaw
Poland
E-mail: kacprzyk@ibspan.waw.pl

Further volumes of this series can be found on our homepage: springer.com

Marek Kurzynski, Edward Puchala,
Michał Wozniak, Andrzej Zolnierak (Eds.)
Computer Recognition Systems, 2005
ISBN 978-3-540-25054-8

Abraham Ajith, Yasuhiko Dote,
Takeshi Furuhashi, Mario Köppen,
Azuma Ohuchi, Yukio Ohsawa (Eds.)
*Soft Computing as Transdisciplinary Science
and Technology*, 2005
ISBN 978-3-540-25055-5

Barbara Dunin-Keplicz, Andrzej
Jankowski, Andrzej Skowron,
Marcin Szczuka (Eds.)
*Monitoring, Security, and Rescue
Techniques in Multiagent Systems*, 2005
ISBN 978-3-540-23245-2

Frank Hoffmann, Mario Köppen,
Frank Klawonn, Rajkumar Roy (Eds.)
*Soft Computing Methodologies and
Applications*, 2005
ISBN 978-3-540-25726-4

Mieczysław A. Kłopotek, Sławomir T.
Wierzchon, Krzysztof Trojanowski
(Eds.)
*Intelligent Information Processing and
Web Mining*, 2005
ISBN 978-3-540-25056-2

Abraham Ajith, Bernard de Bactis,
Mario Köppen, Bertram Nickolay (Eds.)
*Applied Soft Computing Technologies: The
Challenge of Complexity*, 2006
ISBN 978-3-540-31649-7

Mieczysław A. Kłopotek, Sławomir T.
Wierzchon, Krzysztof Trojanowski
(Eds.)
*Intelligent Information Processing and
Web Mining*, 2006
ISBN 978-3-540-33520-7

Ashutosh Tiwari, Joshua Knowles,
Erel Avineri, Keshav Dahal,
Rajkumar Roy (Eds.)
Applications and Soft Computing, 2006
ISBN 978-3-540-29123-7

Bernd Reusch, (Ed.)
*Computational Intelligence, Theory and
Applications*, 2006
ISBN 978-3-540-34780-4

Miguel López-Díaz, María ç. Gil,
Przemysław Grzegorzewski, Olgierd
Hryniewicz, Jonathan Lawry
*Soft Methodology and Random Information
Systems*, 2006
ISBN 978-3-540-34776-7

Ashraf Saad, Erel Avineri, Keshav Dahal,
Muhammad Sarfraz, Rajkumar Roy (Eds.)
Soft Computing in Industrial Applications,
2007
ISBN 978-3-540-70704-2

Ashraf Saad, Erel Avineri, Keshav Dahal,
Muhammad Sarfraz, Rajkumar Roy (Eds.)

Soft Computing in Industrial Applications

Recent and Emerging Methods and Techniques

Editors

Dr. Ashraf Saad
Department of Computer Science
Armstrong Atlantic State University
11935 Abercorn Street
Savannah, Georgia 31419-1997
USA
E-mail: ashraf@cs.armstrong.edu

Dr. Erel Avineri
Centre for Transport & Society
Faculty of the Built Environment
University of the West of England
Frenchay Campus
Coldharbour Lane
Bristol BS16 1QY
UK
E-mail: Erel.Avineri@uwe.ac.uk

Dr. Keshav Dahal
MOSAIC Research Group
University of Bradford
Department of Computing
Bradford BD7 1DP
UK
E-mail: K.P.Dahal@Bradford.ac.uk

Dr. Muhammad Sarfraz
Information & Computer Science Department
King Fahd University of Petroleum & Minerals
KFUPM #1510
Dhahran 31261
Saudi Arabia
E-mail: sarfraz@ccse.kfupm.edu.sa,
sarfraz@kfupm.edu.sa

Prof. Rajkumar Roy
Decision Engineering Centre
Manufacturing Department
Cranfield University
Bedford MK43 0AL
UK
E-mail: r.roy@cranfield.ac.uk

Library of Congress Control Number: 2007923718

ISSN print edition: 1615-3871

ISSN electronic edition: 1860-0794

ISBN-10 3-540-70704-2 Springer Berlin Heidelberg New York

ISBN-13 978-3-540-70704-2 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilm or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable for prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media
springer.com

© Springer-Verlag Berlin Heidelberg 2007
Printed in Germany

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Typesetting: by the authors and SPS using a Springer L^AT_EX macro package

Printed on acid-free paper SPIN: 11585275 89/SPS 5 4 3 2 1 0

Preface

On behalf of all members of the International Technical Program Committee of the 11th Online World Conference on Soft Computing in Industrial Applications (WSC11), we would like to extend our sincere welcome to you. The conference continues a tradition started over a decade ago by the World Federation of Soft Computing (WFSC) to bring together researchers interested in advancing state of the art in the field. Continuous technological improvements since then continue to make this online forum a viable gathering format for a world class conference.

The program committee received a total of 63 submissions, of which 61 papers qualified for peer review by the International Program Committee. Each paper was then reviewed by at least three referees, culminating in the acceptance of 30 papers for publication. Authors of all accepted papers were then notified to prepare and submit their final manuscripts and conference presentations. This resulted in a total of 28 final submissions by 73 authors that comprise the six sessions of the conference program. Based on the reviewers' reports, the authors provided revised versions of the papers – all of them are featured in this book. Also featured is an invited paper based on a keynote presentation. The authors of several outstanding papers have been invited to submit significantly revised and extended versions of their papers to the Applied Soft Computing Journal.

We extend our sincere thanks to all authors and to all members of the International Program Committee for their clear and unwavering commitment to the success of WSC11. Reflecting the worldwide nature of WSC11, authors, members of the program committee and the conference organizers are from over 20 countries and five continents. We also extend our thanks to our keynote speaker, Dr. Pieter Mosterman of the MathWorks for his contributed talk.

November 29, 2006

Ashraf Saad
General Chair of WSC11
Savannah, Georgia, USA

Erel Avineri
Program Chair of WSC11
Bristol, UK

Message from the WSC11 General Chair and Program Chair

It is our pleasure to officially announce the start of the conference. The official WSC11 web site has been relocated since August to the following URL: <http://www.cs.armstrong.edu/wsc11/>. Please make the necessary changes to any web pages that you maintain with reference to the conference. That will increase the chances of search engines pointing to the correct WSC11 web site.

An opening note has been posted to the conference web site along with the final pdf version of all accepted papers. With regard to the presentation of papers and the keynote, we will be able to support (for the first time in WSC's history) real-time presentations via audio conferencing. This is made possible through a kind three-week trial offer (for the duration of the conference) of Elluminate (<http://www.Elluminate.com>), a Java-based (<http://java.sun.com/products/javawebstart/>) webinar environment. In return, we will provide feedback about the use of this web-based conferencing tool in support of our worldwide conference. In order to get an idea of the use of this tool, please visit the following URL: <https://sas.illuminate.com/m.jnlp?sid=1125&password=M.161974A26FAAF95DB6C50F2C6CFF05> where an image version of the opening note is currently posted for testing purposes.

Therefore, we request from each correspondence author to email us back by Friday, September 22, with his/her availability to make a 25-30 minutes presentation during the upcoming two weeks (Sep 25-Oct 6). Please provide us with 2-3 possible times, and indicate your local time zone as it relate to GMT (e.g., EST in the US is GMT-5, while Brazil should be GMT-4). A presenter will need a Java-enabled computer, with a reasonable high quality connection to the Internet, and which is also equipped with a speaker and a microphone (or a headset). We will schedule all presentations and upload into Elluminate the presentation slides that have been submitted in August. A final schedule of presentations will be posted and emailed to all by Monday, September 25. All interested participants will then be able to connect to a presentation at the scheduled time, up to a maximum of 30 seats per session. We will expect session chairs to attend as many of the presentations of their sessions as possible.

It is indeed an exciting development for us to be able to support a synchronous mode of interaction for WSC11 given our global community. We also hope to witness a strong level of participation in the sessions by researchers from all four corners of the globe.

September 18, 2006

Ashraf Saad
General Chair of WSC11
Savannah, Georgia, USA

Erel Avineri
Program Chair of WSC11
Bristol, UK

WSC11 Organization and International Program Committee

General Chair

Ashraf Saad, Armstrong Atlantic State University**, USA

** Formerly with the Georgia Institute of Technology

Program Chair

Erel Avineri, University of the West of England, Bristol, UK

Advisory Board

Hisao Ishibuchi, Osaka Prefecture University, Japan

Rajkumar Roy, Cranfield University, UK

Ajith Abraham, Chung-Ang University, Korea

Mario Köppen, Fraunhofer IPK, Berlin, Germany

International Co-chairs

Lakhmi Jain, University of South Australia, Australia

Serge Popov, Kharkiv University of Radio Electronics, Ukraine

Muhammad Sarfraz, King Fahd University of Petroleum and Minerals, Saudi Arabia

Ashitosh Tiwari, Cranfield University, UK

Publicity Chair

Keshav Dahal, University of Bradford, UK

International Technical Program Committee

Janos Abonyi, University of Veszprem Folyamatmérnöki Tanszék, Hungary

Bart Baesens, Catholic University of Leuven, Belgium

Valeriu Beiu, United Arab Emirates University, UAE

Sugato Bagchi, IBM Research, USA

Soumya Banerjee, BITS Mesra, India

Christian Blum, Universitat Politècnica de Catalunya, Spain

Ulrich Bodenhofer, Software Competence Center, Austria

Andrea Bonarini, Politecnico de Milano, Italy

Oscar Castillo, Instituto Tecnológico de Tijuana, Mexico
 Siam Charoenseang, King Mongkut's University of Technology, Thailand
 Leandro Coelho, Pontifical Catholic University of Parana, Brazil
 Carlos A. Coelho, CINVESTAV, Mexico
 Oscar Cordon, University of Granada, Spain
 Gaspar Cunha, University of Minho, Portugal
 Suash Deb, National Institute of Science & Technology, India
 Guy De Tré, Ghent University, Belgium
 Mauro Dell'Orco, University of Bari, Italy
 Giuseppe Di Fatta, University of Konstanz, Germany
 Katrin Franke, Fraunhofer IPK, Germany
 Aureli Soria Frisch, Universitat Pompeu Fabra, Spain
 Xiao-Zhi Gao, Helsinki University of Technology, Finland
 Takeshi Furuhashi, Nagoya University, Japan
 Crina Grosan, Babes-Bolyai University, Romania
 Roderich Gross, Université Libre de Bruxelles, Belgium
 Hani Hagra, University of Essex, UK
 Ioannis Hatzilygeroudis, University of Patras, Greece
 Ayanna Howard, Georgia Institute of Technology, USA
 Yaochu Jin, Honda Research Institute Europe, Germany
 Uri Kartoun, Ben Gurion University of the Negev, Israel
 Okyay Kaynak, Bogazici University, Turkey
 Frank Klawonn, University of Applied Sciences, Germany
 Joshua Knowles, University of Manchester, UK
 Andreas König, Technische Universität Kaiserslautern, Germany
 Renato Krohling, University of Dortmund, Germany
 Reza Langari, Texas A&M, USA
 Luis Magdalena, Universidad Politécnica de Madrid, Spain
 Max Manfrin, Université Libre de Bruxelles, Belgium
 Christophe Marsala, Université P. et M. Curie, France
 Patricia Melin, Instituto Tecnológico de Tijuana, Mexico
 Sanaz Mostaghim, ETH-Zurich, Switzerland
 Mehmet K Muezzinoglu, University of Louisville, USA
 Lakshmi Narasimhan, The University of Newcastle, Australia
 Detlef D Nauck, British Telecom, UK
 Nadia Nedjah, State University of Rio de Janeiro, Brazil
 Andreas Nuernberger, Universität Magdeburg, Germany
 Jae C. Oh, Syracuse University, USA
 Sankar K. Pal, Indian Statistical Institute, India
 Vasile Palade, Oxford University, UK
 Gerardo Rossel, Universidad Abierta Interamericana, Argentina
 Yos Sunitiyoso, University of the West of England, Bristol, UK
 Vicenc Torra, AI Research Institute, CSIC, Spain
 Edward Tunstel, Jet Propulsion Lab/NASA, USA
 Marley Vellasco, Pontifical Catholic University of Rio de Janeiro, Brazil
 Christian Woehler, DaimlerChrysler AG, Germany
 Berend Jan van der Zwaag, University of Twente, The Netherlands

Contents

Invited Keynote

Hybrid Dynamic Systems in an Industry Design Application <i>Pieter J. Mosterman, Elisabeth M. O'Brien</i>	1
---	---

Part I: Soft Computing in Computer Graphics, Imaging and Vision

Object Recognition Using Particle Swarm Optimization on Fourier Descriptors <i>Muhammad Sarfraz, Ali Taleb Ali Al-Awami</i>	19
Gestix: A Doctor-Computer Sterile Gesture Interface for Dynamic Environments <i>Juan Wachs, Helman Stern, Yael Edan, Michael Gillam, Craig Feied, Mark Smith, Jon Handler</i>	30
Differential Evolution for the Registration of Remotely Sensed Images <i>I. De Falco, A. Della Cioppa, D. Maisto, E. Tarantino</i>	40
Geodesic Distance Based Fuzzy Clustering <i>Balazs Feil, Janos Abonyi</i>	50

Part II: Control Systems

Stability Analysis of the Simplest Takagi-Sugeno Fuzzy Control System Using Popov Criterion <i>Xiaojun Ban, X.Z. Gao, Xianlin Huang, Hang Yin</i>	63
---	----

Identification of an Experimental Process by B-Spline Neural Network Using Improved Differential Evolution Training	
<i>Leandro dos Santos Coelho, Fabio A. Guerra</i>	72
Applying Particle Swarm Optimization to Adaptive Controller	
<i>Leandro dos Santos Coelho, Fabio A. Guerra</i>	82
B-Spline Neural Network Using an Artificial Immune Network Applied to Identification of a Ball-and-Tube Prototype	
<i>Leandro dos Santos Coelho, Rodrigo Assunção</i>	92

Part III: Pattern Recognition

Pattern Recognition for Industrial Security Using the Fuzzy Sugeno Integral and Modular Neural Networks	
<i>Patricia Melin, Alejandra Mancilla, Miguel Lopez, Daniel Solano, Miguel Soto, Oscar Castillo</i>	105
Application of a GA/Bayesian Filter-Wrapper Feature Selection Method to Classification of Clinical Depression from Speech Data	
<i>Juan Torres, Ashraf Saad, Elliot Moore</i>	115
Comparison of PSO-Based Optimized Feature Computation for Automated Configuration of Multi-sensor Systems	
<i>Kuncup Iswandy, Andreas Koenig</i>	122
<u>Evaluation of Objective Features for Classification of Clinical Depression in Speech by Genetic Programming</u>	
<i>Juan Torres, Ashraf Saad, Elliot Moore</i>	132
A Computationally Efficient SUPANOVA: Spline Kernel Based Machine Learning Tool	
<i>Boleslaw K. Szymanski, Lijuan Zhu, Long Han, Mark Embrechts, Alexander Ross, Karsten Sternickel</i>	144

Part IV: Classification

Multiobjective Genetic Programming Feature Extraction with Optimized Dimensionality	
<i>Yang Zhang, Peter I Rockett</i>	159
A Cooperative Learning Model for the Fuzzy ARTMAP-Dynamic Decay Adjustment Network with the Genetic Algorithm	
<i>Shing Chiang Tan, M.V.C. Rao, Chee Peng Lim</i>	169

A Modified Fuzzy Min-Max Neural Network and Its Application to Fault Classification

Anas M. Quteishat, Chee Peng Lim 179

AFC-ECG: An Adaptive Fuzzy ECG Classifier

Wai Kei Lei, Bing Nan Li, Ming Chui Dong, Mang I Vai 189

A Self-organizing Fuzzy Neural Networks

Haisheng Lin, X.Z. Gao, Xianlin Huang, Zhuoyue Song 200

Part V: Soft Computing for Modeling, Optimization and Information Processing

A Particle Swarm Approach to Quadratic Assignment Problems

Hongbo Liu, Ajith Abraham, Jianying Zhang 213

Population-Based Incremental Learning for Multiobjective Optimisation

Sujin Bureerat, Krit Sriworamas 223

Combining of Differential Evolution and Implicit Filtering Algorithm Applied to Electromagnetic Design Optimization

Leandro dos Santos Coelho, Viviana Cocco Mariani 233

A Layered Matrix Cascade Genetic Algorithm and Particle Swarm Optimization Approach to Thermal Power Generation Scheduling

Siew Chin Neoh, Norhashimah Morad, Chee Peng Lim, Zalina Abdul Aziz 241

Differential Evolution for Binary Encoding

Tao Gong, Andrew L. Tuson 251

Part VI: Soft Computing in Civil Engineering and Other Applications

Prioritization of Pavement Stretches Using Fuzzy MCDM Approach – A Case Study

A.K. Sandra, V.R. Vinayaka Rao, K.S. Raju, A.K. Sarkar 265

A Memetic Algorithm for Water Distribution Network Design

R. Baños, C. Gil, J.I. Agulleiro, J. Reca 279

Neural Network Models for Air Quality Prediction: A Comparative Study

S.V. Barai, A.K. Dikshit, Sameer Sharma 290

Recessive Trait Cross over Approach of GAs Population Inheritance for Evolutionary Optimization
Amr Madkour, Alamgir Hossain, Keshav Dahal 306

Automated Prediction of Solar Flares Using Neural Networks and Sunspots Associations
T. Colak, R. Qahwaji 316

Keyword Index 325

Author Index 327