Complex Adaptive Systems 2012

Procedia Computer Science Volume 12

Washington DC, USA
14-16 November 2012

Editors:

Cihan H. Dagli

ISBN: 978-1-62748-819-8
ISSN: 1877-0509

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact Elsevier B.V.
at the address below.

Elsevier B.V.
Radarweg 29
Amsterdam 1043 NX
The Netherlands

Phone: +31 20 485 3911
Fax: +31 20 485 2457

http://www.elsevierpublishingsolutions.com/contact.asp

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Preface 9

Preface to Part I Complex System 11
Nil Ergin

Computational System Architecture Development Using a Holistic Modeling Approach 13
Renzhong Wang, Cihan H. Dagli

Understanding System of Systems Development Using an Agent- Based Wave Model 21
Paulette Acheson, Louis Pape, Cihan Dagli, Nil Kilicay-Ergin, John Columbi, Khaled Haris

Enabling Systems and the Adaptability of Complex Systems-of-Systems 31
Charles O. Adler, Cihan H. Dagli

RQ-Tech, A Strategic-Level Approach for Conceptualizing Enterprise Architectures 37
Christine A. Hoyland

Understanding the Dynamics of System-of-Systems in Complex Regional Conflicts 43
Barbara Rapaport, Vernon Ireland

Addressing Wicked Problems in a Range of Project Types 49
Vernon Ireland, Barbara Rapaport, Amina Omarova

An Alternative Approach to Identifying and Appraising Adaptive Loops in Complex Organizations 56
Amina Omarova, Vernon Ireland, Alex Gorod

Optimal System's Complexity, An Architecture Perspective 63
Babak Heydari, Kia Dalili

Effect of Unfolding on the Spectral Statistics of Adjacency Matrices of Complex Networks 69
Sherif M. Abuelenin, Adel Y. Abul-Magd

UML Profile and Extensions for Complex Approval Systems with Complementary Levels of Abstraction 75
Aditya Akundi, Francisco Zapata, Eric Smith

Moon Plants as Model System for Life Support to Enable Human Exploration 81
Robert N. Bowman, Arwen I. Davé, Christopher P. McKay

Preface to Part II Computational Intelligence and Machine Learning 88
Rosemary D. Paradis, David Enke

Approximate Policy Iteration for Markov Control Revisited 90
Abhijit Gosavi

Hybrid Sampling Strategy-based Multiobjective Evolutionary Algorithm 96
Wenqiang Zhang, Lin Lin, Mitsuo Gen, Chen-Fu Chien

A New Ensemble Learning Method for Temporal Pattern Identification 102
Wenjing Zhang, Xin Feng

A Hybrid EA for Reactive Flexible Job-shop Scheduling 110
Lin Lin, Mitsuo Gen, Yan Liang, Katsuhisa Ohno

A Post-Pareto Approach for Multi-Objective Decision Making Using a Non-Uniform Weight Generator Method 116
Victor M. Carrillo, Heidi Taboada

Modified Genetic Algorithm for Flexible Job-Shop Scheduling Problems 122
Wannaporn Teekeng, Arit Thammano

Evaluation of Feedback among Multiple Scheduler Profiles in Fuzzy Genetic Scheduling 129
Gürsel A. Süer, Arkopaul Sarkar, Aslican Arinsoy, Philip Appiah Kubi, Kevin Plis, Melih Altun

A General Iterative Procedure of the Non-Numerical Ranking Preferences Method for Multiple Objective Decision Making 135
Victor M. Carrillo, Heidi Taboada

An Evolutionary Game Theory Approach for Intelligent Patrolling 140
Oswaldo Aguirre, Heidi Taboada

Effect of Potential Model Pruning on Different-Sized Boards in Monte-Carlo GO 146
Makoto Oshima, Koji Yamada, Satoshi Endo

The GA-ACO Method Applied to Engineering Design 152
David Hibler

Analysis of Viewer EEG Data to Determine Categorization of Short Video Clip 158
Paul A. Nussbaum, Alfred Herrera, Rounak Joshi, Rosalyn Hargraves

Industrial Robotic System with Adaptive Control 164
Marko Švaco, Bojan Šekoranja, Bojan Jerbic

Design of a Highly Maneuverable Mobile Robot 170
R. Shah, S. Ozcelik, R. Challoo
Towards A Differential Privacy and Utility Preserving Machine Learning Classifier 176
Kato Mivule, Claude Turner, Soo-Yeon Ji
Note and Timbre Classification by Local Features of Spectrogram 182
Erhan Guven, A. Murat Ozbayoglu
Cognitive Category Learning 188
Rosemary D. Paradis, Jinhong K. Guo, John Olden-Stahl, Jack Moulton
Can Deep Neural Networks Discover Meaningful Pattern Features? 194
Iveta Mrazova, Marek Kukacka
Utilizing Depth Based Sensors and Customizable Software Frameworks for Experiential Application 200
Brian Moriarty, Elizabeth Lennon, Frank Dicola, Kyle Buzby, Morisa Manzella, Emily Hromada
A Formal Semantics for Ciset and Ciset Relation Operators 206
Premchand S. Nair
Preface to Part III Adaptive Big Data Analytics 211
Mika Sato-Ilic
Fitting the Problem to the Paradigm: Algorithm Characteristics Required for Effective Use of MapReduce 212
Fred Highland, John Stephenson
Modeling Temporal Pattern and Event Detection using Hidden Markov Model with Application to a Sludge Bulking Data 218
Naveen K. Bansal, Xin Feng, Wenjing Zhang, Wutao Wei, Yuanhao Zhao
Analysis of Web Survey Data based on Similarity of Fuzzy Clusters 224
Ryunosuke Chiba, Mika Sato-Ilic
On Fuzzy Clustering based Correlation 230
Mika Sato-Ilic
Transfer Function Model for Pollutant Breakthrough in Geomedia 236
S. H. Anderson, Horng-Jer Shieh, R. L. Peyton
Influence of Scale on Chemical Dispersivity in Geomedia 242
S. H. Anderson, Brian Haeffner, R. L. Peyton
Subspace Hierarchical Clustering for Three-way Three-mode Data using Quadratic Regularization 248
Kensuke Tanioka, Hiroshi Yadohisa
Design of Hadoop-based Framework for Analytics of Large Synchrophasor Datasets 254
Matthew Edwards, Aseem Rambani, Yifeng Zhu, Mohamad Musavi
A New Hybrid Approach For Forecasting Interest Rates 259
David Enke, Nijat Mehdiyev
A Fuzzy Inference Model for Predicting Irregular Human Behaviour During Stressful Missions 265
Sina Khanmohammadi, Cihan Hayreddin Dagli, Farnaz Zamani Esfahlani
Housing Starts Forecast of Retail Sales through the 2007-2009 Recession 271
Anthony Joseph, Maurice Larrain
Adaptive Machine Learning Approaches to Seasonal Prediction of Tropical Cyclones 276
Michael B. Richman, Lance M. Leslie
Estimation of the Burned Area in Forest Fires Using Computational Intelligence Techniques 282
A. Murat Özbayoglu, Recep Bozer
Assessing Atmospheric Variability using Kernel Principal Component Analysis 288
Andrew E. Mercer, Michael B. Richman
Assessing Metacognitive Skills Using Adaptive Neural Networks 294
Justin Anderson, Kouider Mokhtari, Arun Kulkarni
Preface to Part IV Energy, Smart Grid Design and Infrastructure 300
Ricardo Pineda
A Smart Grid Robust Optimization Framework 301
Muhittin Yilmaz, Naren Reddy Dhansri
Parallel Dual Tabu Search for Capacitor Placement in Smart Grids 307
Yoshihiro Ogita, Hiroyuki Mori
Autonomic Computing Drives Innovation of Energy Smart Grids 314
Melvin Greer, Manuel Rodriguez-Martinez
Performance Evaluation of Different Optimization Algorithms for Power Demand Forecasting Applications in a Smart Grid Environment 320
Ashraf Ul Haque, Paras Mandal, Julian Meng, Ricardo L. Pineda
An Integer Programming Power Optimization in Storage Systems 326
Muhittin Yilmaz, Pratyush Valluri, Sasikanth Pagadrai

Forecasting Power Output of Solar Photovoltaic System Using Wavelet Transform and Artificial Intelligence Techniques 332
Paras Mandal, Surya Teja Swarroop Madhira, Ashraf Ul Haque, Julian Meng, Ricardo L. Pineda
Optimizing the Transmission Line Cost of a Fault Tolerance Network to Promote Green Power Usage 338
Wen-Li Wang, Robert Weissbach, Mei-Huei Tang
Using the Monkey Algorithm for Hybrid Power Systems Optimization 344
Carlos M. Ituarte-Villarreal, Nicolas Lopez, Jose F. Espiritu
Evolutionary Agent Based Microstorage Management for a Hybrid Power System 350
Nicolas Lopez, Carlos Ituarte, Jose F. Espiritu
Traffic Simulation System based on Fuzzy Logic 356
Mohammad A. Taha, Laheeb Ibrahim
A Hybrid Intelligent System for Designing a Contract Model for Weather Derivatives 361
Hajime Fujita, Hiroyuki Mori
Fuzzy Architecture Assessment for Critical Infrastructure Resilience 367
George Muller
Preface to Part V Distributed Networks 373
Gursel Serpen
Simulating Heterogeneous and Larger-Scale Wireless Sensor Networks with TOSSIM TinyOS Emulator 374
Jiakai Li, Gursel Serpen
Assessing Time Complexity of Applications for TinyOS-Mica Wireless Sensor Networks in TOSSIM Emulator 380
Gursel Serpen, Jiakai Li
An Overview and Assessment of Wireless Technologies and Co- existence of ZigBee, Bluetooth and Wi-Fi Devices 386
R. Challoo, A. Oladeinde, N. Yilmazer, S. Ozcelik, L. Challoo
Predicting the Type of Nanostructure Using Data Mining Techniques and Multinomial Logistic Regression 392
Mahmoud Shehadeh, Nader Ebrahimi, Abel Ochigbo
Security Through Behavioral Biometrics and Artificial Intelligence 398
Benjamin Purgason, David Hibler
An Approximation Algorithm for Computing a Tipping Set in Super Modular Games for Interdependent Security 404
B. Cremeans, S. Lakshmivarahan, S. K. Dhall
Detection of Groups in Non-Structured Data 412
Rosemary D. Paradis, Daniel Davenport, David Menaker, Sarah M. Taylor
Preface to Part VI Biologically Inspired Paradigms 418
Walker H. Land Jr.
Simulating Voltage-Gated Na and K Ion Channel Kinetics Using Hodgkin- Huxley Mode 420
Iren Valova, Natacha Gueorguieva, George Georgiev
QRS Complex Detector Implementing Orthonormal Functions 426
George Georgiev, Iren Valova, Natacha Gueorguieva, Leo Lei
Promoter Analysis with Wavelets and Support Vector Machines 432
Makihiko Sato
PNN/GRNN Ensemble Processor Design for Early Screening of Breast Cancer 438
Walker H. Land Jr., Xinpei Ma, Erin Barnes, Xingye Qiao, John Heine, Timothy Masters, Jin Woo Park
Classifying Lung Cancer Recurrence Time Using Novel Ensemble Method with Gene Network based Input Models 444
William Ford, Jin Woo Park, Aaron S. Campbell, Youping Deng, Yan Li, Walker H. Land Jr.
GRNN Ensemble Classifier for Lung Cancer Prognosis Using Only Demographic and TNM features 450
J. David Schaffer, Jin Woo Park, Erin Barnes, Qiyi Lu, Xingye Qiao, Youping Deng, Yan Li, Walker H. Land Jr.
Promoting Search Diversity in Ant Colony Optimization with Stubborn Ants 456
Ashraf M. Abdelbar, Donald C. Wunsch II
Swarm Theory Applied To Air Traffic Flow Management 463
Sergio Torres
Subject Index 471
Author Index 476