Roger Lee (Ed.)

Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing 2011

Studies in Computational Intelligence, Volume 368

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

Vol. 346. Weisi Lin, Dacheng Tao, Janusz Kacprzyk, Zhu Li, Ebroul Izquierdo, and Haohong Wang (Eds.)
Multimedia Analysis, Processing and Communications, 2011
ISBN 978-3-642-19550-1

Vol. 347. Sven Helmer, Alexandra Poulovassilis, and Fatos Xhafa
Reasoning in Event-Based Distributed Systems, 2011
ISBN 978-3-642-19723-9

Vol. 348. Beniamino Murgante, Giuseppe Borruso, and Alessandra Lapucci (Eds.)
Geocomputation, Sustainability and Environmental Planning, 2011
ISBN 978-3-642-19732-1

Vol. 349. Vitor R. Carvalho
Modeling Intention in Email, 2011
ISBN 978-3-642-19955-4

Vol. 350. Thanasis Daradoumis, Santi Caballé, Angel A. Juan, and Fatos Xhafa (Eds.)
Technology-Enhanced Systems and Tools for Collaborative Learning Scaffolding, 2011
ISBN 978-3-642-19813-7

Vol. 351. Ngoc Thanh Nguyen, Bogdan Trawiński, and Jason J. Jung (Eds.)
New Challenges for Intelligent Information and Database Systems, 2011
ISBN 978-3-642-19952-3

Vol. 352. Nik Bessis and Fatos Xhafa (Eds.)
Next Generation Data Technologies for Collective Computational Intelligence, 2011
ISBN 978-3-642-20343-5

Vol. 353. Igor Aizenberg
Complex-Valued Neural Networks with Multi-Valued Neurons, 2011
ISBN 978-3-642-20352-7

Vol. 354. Ljupco Kocarev and Shiguo Lian (Eds.)
Chaos-Based Cryptography, 2011
ISBN 978-3-642-20541-5

Vol. 355. Yan Meng and Yaochu Jin (Eds.)
Bio-Inspired Self-Organizing Robotic Systems, 2011
ISBN 978-3-642-20759-4

Vol. 356. Slawomir Koziel and Xin-She Yang (Eds.)
Computational Optimization, Methods and Algorithms, 2011
ISBN 978-3-642-20858-4

Vol. 357. Nadia Nedjah, Leandro Santos Coelho, Viviana Cocco Mariani, and Luiza de Macedo Mourelle (Eds.)
Innovative Computing Methods and their Applications to Engineering Problems, 2011
ISBN 978-3-642-20957-4

Vol. 358. Norbert Jankowski, Włodzisław Duch, and Krzysztof Grąbczewski (Eds.)
Meta-Learning in Computational Intelligence, 2011
ISBN 978-3-642-20979-6

Vol. 359. Xin-She Yang, and Slawomir Koziel (Eds.)
Computational Optimization and Applications in Engineering and Industry, 2011
ISBN 978-3-642-20985-7

Vol. 360. Mikhail Moshkov and Beata Zielosko
Combinatorial Machine Learning, 2011
ISBN 978-3-642-20994-9

Vol. 361. Vincenzo Pallotta, Alessandro Soro, and Eloisa Vargiu (Eds.)
Advances in Distributed Agent-Based Retrieval Tools, 2011
ISBN 978-3-642-21383-0

Vol. 362. Pascal Bouvry, Horacio González-Vélez, and Joanna Kolodziej (Eds.)
Intelligent Decision Systems in Large-Scale Distributed Environments, 2011
ISBN 978-3-642-21270-3

Vol. 363. Kishan G. Mehrotra, Chilukuri Mohan, Jae C. Oh, Pramod K. Varshney, and Moonis Ali (Eds.)
Developing Concepts in Applied Intelligence, 2011
ISBN 978-3-642-21331-1

Vol. 364. Roger Lee (Ed.)
Computer and Information Science, 2011
ISBN 978-3-642-21377-9

Vol. 365. Roger Lee (Ed.)
Computers, Networks, Systems, and Industrial Engineering 2011, 2011
ISBN 978-3-642-21374-8

Vol. 366. Mario Köppen, Gerald Schaefer, and Ajith Abraham (Eds.)
Intelligent Computational Optimization in Engineering, 2011
ISBN 978-3-642-21704-3

Vol. 367. Gabriel Luque and Enrique Alba
Parallel Genetic Algorithms, 2011
ISBN 978-3-642-22083-8

Vol. 368. Roger Lee (Ed.)
Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing 2011, 2011
ISBN 978-3-642-22287-0

Roger Lee (Ed.)

Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing 2011

Springer

Editor

Prof. Dr. Roger Lee
Central Michigan University
Software Engineering & Information Technology Institute
Mt. Pleasant, MI 48859
U.S.A.
E-mail: lee1ry@cmich.edu

ISBN 978-3-642-22287-0 e-ISBN 978-3-642-22288-7

DOI 10.1007/978-3-642-22288-7

Studies in Computational Intelligence ISSN 1860-949X

Library of Congress Control Number: 2011930872

Typeset & *Cover Design:* Scientific Publishing Services Pvt. Ltd., Chennai, India.

Printed on acid-free paper

9 8 7 6 5 4 3 2 1

springer.com

Preface

The purpose of the 12th International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD 2011) held on July 6–8 2011 Sydney, Australia was to bring together researchers and scientists, businessmen and entrepreneurs, teachers and students to discuss the numerous fields of computer science, and to share ideas and information in a meaningful way. Our conference officers selected the best 14 papers from those papers accepted for presentation at the conference in order to publish them in this volume. The papers were chosen based on review scores submitted by members of the program committee, and underwent further rounds of rigorous review.

In Chapter 1, Loretta Davidson et al. In this paper, we analyze the Environment II module of this data set using variable clustering to produce meaningful clusters related to questionnaire sections and provide information to reduce the number of demographic variables considered in further analysis. Case level clustering was attempted, but did not produce adequate results.

In Chapter 2, Xianjing Wang et al. This paper presents an approach of polar coordinate-based handwritten recognition system involving Support Vector Machines (SVM) classification methodology to achieve high recognition performance. We provide comparison and evaluation for zoning feature extraction methods applied in Polar system. The recognition results we proposed were trained and tested by using SVM with a set of 650 handwritten character images. All the input images are segmented (isolated) handwritten characters. Compared with Cartesian based handwritten recognition system, the recognition rate is more stable and improved up to 86.63%.

In Chapter 3, Hong Zhou et al. This paper provides the mathematical analysis of the statistical delay bounds of different levels of Constant Bit Rate (CBR) traffic under First Come First Served with static priority (P-FCFS) scheduling. The mathematical results are supported by the simulation studies. The statistical delay bounds are also compared with the deterministic delay bounds of several popular rate-based scheduling algorithms. It is observed that the deterministic bounds of the scheduling algorithms are much larger than the statistical bounds and are overly conservative in the design and analysis of efficient QoS support in wireless access systems.

In Chapter 4, Ming Zhang. A new learning algorithm for SS-HONN is also developed from this study. A time series data simulation and analysis system, SS-HONN Simulator, is built based on the SS-HONN models too. Test results show that every error of SS-HONN models are from 2.1767% to 4.3114%, and the

average error of Polynomial Higher Order Neural Network (PHONN), Trigonometric Higher Order Neural Network (THONN), and Sigmoid polynomial Higher Order Neural Network (SPHONN) models are from 2.8128% to 4.9076%. It means that SS-HONN models are 0.1131% to 0.6586% better than PHONN, THONN, and SPHONN models.

In Chapter 5, Tsuyoshi Miyazaki et al. In this paper, we examine a method in which distinctive mouth shapes are processed using a computer. When lip-reading skill holders do lip-reading, they stare at the changes in mouth shape of a speaker. In recent years, some researches into lip-reading using information technology has been pursued. There are some researches based on the changes in mouth shape. The researchers analyze all data of the mouth shapes during an utterance, whereas lip-reading skill holders look at distinctive mouth shapes. We found that there was a high possibility for lip-reading by using the distinctive mouth shapes. To build the technique into a lip-reading system, we propose an expression method of the distinctive mouth shapes which can be processed using a computer. In this way, we acquire knowledge about the relation between Japanese phones and mouth shapes. We also propose a method to express order of the distinctive mouth shapes which are formed by a speaker.

In Chapter 6, Pinaki Sarkar et al. Resource constraint sensors of a *Wireless Sensor Network (WSN)* cannot afford the use of costly encryption techniques like *public key* while dealing with *sensitive data*. So *symmetric key encryption* techniques are preferred where it is essential to have the same cryptographic key between communicating parties. To this end, keys are preloaded into the nodes before deployment and are to be established once they get deployed in the *target area*. This entire process is called key predistribution. In this paper we propose one such scheme using *unique factorization of polynomials over Finite Fields*. To the best of our knowledge such an elegant use of Algebra is being done for the first time in WSN literature. The best part of the scheme is large number of node support with very small and uniform *key ring* per node. However the resiliency is not good. For this reason we use a special technique based on Reed Muller codes proposed recently by Sarkar, Saha and Chowdhury in 2010. The *combined scheme* has good resiliency with huge node support using very less keys per node.

In Chapter 7, Humayra Binte Ali et al. In this paper we proposed two different subspace projection methods that are the extensions of basis subspace projection methods and applied them successfully for facial expression recognition. Our first proposal is an improved principal component analysis for facial expression recognition in frontal images by using an extension of eigenspaces and we term this as WR-PCA (region based and weighted principal component analysis). Secondly we proposed locally salient Independent component analysis(LS-ICA) method for facial expression analysis. These two methods are extensively discussed in the rest of the paper. Experiments with Cohn-kanade database show that these techniques achieves an accuracy rate of 93% when using LS-ICA and 91.81% when WR-PCA and 83.05% when using normal PCA. Our main contribution here is that by performing WR-PCA, which is an extension of typical PCA and first investigated by us, we achieve a nearly similar result as LS-ICA which is a very well established technique to identify partial distortion.

In Chapter 8, Belal Chowdhury et al. The paper outlines a Health Portal model for designing a real-time health prevention system. An application of the architecture is described in the area of web Health Portal.

In Chapter 9, Mark Wallis et al. This paper presents a model of policy configuration that harnesses the power of the Internet community by presenting average-sets of policy configuration. These policy "profiles" allow users to select a default set of policy values that line up with the average case, as presented by the application population. Policies can be promoted at an application level or at a group level. An XML approach is presented for representing the policy profiles. The approach allows for easy profile comparison and merging. A storage mechanism is also presented that describes how these policies should be made persistent in a distributed data storage system.

In Chapter 10, Md. Rafiqul Islam et al. In this paper we present an effective and efficient spam classification technique using clustering approach to categorize the features. In our clustering technique we use VAT (Visual Assessment and clustering Tendency) approach into our training model to categorize the extracted features and then pass the information into classification engine. We have used WEKA (www.cs.waikato.ac.nz/ml/weka/) interface to classify the data using different classification algorithms, including tree-based classifiers, nearest neighbor algorithms,statistical algorithms and AdaBoosts. Our empirical performance shows that we can achieve detection rate over 97%.

In Chapter 11, Tursun Abdurahmonov et al. This paper describes the use of Elliptic Curve Cryptography (ECC) over Prime Field (__) for encryption and digital signature of smart cards. The concepts of ECC over prime field (__) are described, followed by the experimental design of the smart card simulation. Finally, the results are compared against RSA algorithms.

In Chapter 12, Md. Golam Rabbani et al. The paper depicts a converged architecture of WiMAX and WiFi, and then proposes an adaptive resource distribution model for the access points. The resource distribution model ultimately allocates more time slots to those connections that need more instantaneous resources to meet QoS requirements. A dynamic splitting technique is also presented that divides the total transmission period into downlink and uplink transmission by taking the minimum data rate requirements of the connections into account. This ultimately improves the utilization of the available resources, and the QoS of the connections. Simulation results show that the proposed schemes significantly outperform the other existing resource sharing schemes, in terms of maintaining QoS of different traffic classes in an integrated WiMAX/WiFi architecture.

In Chapter 13, Yuchuan Wu et al. This paper presents a human daily activity classification approach based on the sensory data collected from a single tri-axial accelerometer worn on waist belt. The classification algorithm was realized to distinguish 6 different activities including standing, jumping, sitting-down, walking, running and falling through three major steps: wavelet transformation, Principle Component Analysis (PCA)-based dimensionality reduction and followed by implementing a radial basis function (RBF) kernel Support Vector Machine (SVM) classifier.

In Chapter 14, Subhasis Mukherjee et al. In this paper, we propose a reinforcement learning based approach that uses a dynamic state-action mapping using back propagation of reward and Q-learning along with spline fit (QLSF) for the final choice of high level functions in order to save the goal. The novelty of our approach is that the agent learns while playing and can take independent decision which overcomes the limitations of rule-base system due to fixed and limited predefined decision rules. The spline fit method used with the nose camera was also able to find out the location and the ball distance more accurately compare to the IR sensors. The noise source and near and far sensor dilemma problem with IR sensor was neutralized using the proposed spline fit method. Performance of the proposed method has been verified against the bench mark data set made with Upenn'03 code logic and a base line experiment with IR sensors. It was found that the efficiency of our QLSF approach in goalkeeping was better than the rule based approach in conjunction with the IR sensors. The QLSF develops a semi-supervised learning process over the rule-base system's input-output mapping process, given in the Upenn'03 code.

It is our sincere hope that this volume provides stimulation and inspiration, and that it will be used as a foundation for works yet to come.

July 2011

Morshed U. Chowdhury
Siddheswar Ray Monash

Contents

List of Contributors

Tursun Abdurahmonov
Multimedia University, Malaysia
tursun.abdurahmono07@mmu.edu.my

Iftekhar Ahmad
Edith Cowan University, Australia
i.ahmad@ecu.edu.au

Humayra Binte Ali
Flinders University
ali0041@flinders.edu.au

Ronghua Chen
Deakin University, Australia

Belal Chowdhury
La Trobe University, Australia

Morshed U. Chowdhury
Deakin University, Australia
morshed.chowdhury@deakin.edu.au

Loretta Davidson
Central Michigan University, USA
david1lj@cmich.edu

Clare D'Souza
La Trobe University, Australia

Iqbal Gondal
Monash University, Australia
iqbal.gondal@monash.edu

Michael Hannaford
University of Newcastle, Australia

Md Rafiul Hassan
Department of Information and
Computer Science, KFUPM,
Dhahran, KSA
mrhassan@kfupm.edu.sa

Frans Henskens
University of Newcastle, Australia

Gongzhu Hu
Central Michigan University, USA
hu1g@cmich.edu

Shamsul Huda
University of Ballarat, Australia
s.huda@ballarat.edu.au

Helmi Mohamed Hussain
Multimedia University, Malaysia
helmi.hussain@mmu.edu.my

Naohiro Ishii
Aichi Institute of Technology, Japan
ishii@aitech.ac.jp

Md Rafiqul Islam
Deakin University, Australia
rislam@deakin.edu.au

Joarder Kamruzzaman
Monash University, Australia
joarder.kamruzzaman@monash.edu

Richard Leibbrandt
Flinders University, Australia

Trent Lewis
Flinders University, Australia

Tsuyoshi Miyazaki
Kanagawa Institute of Technology, Japan
miyazaki@ic.kanagawa-it.ac.jp

Subhasis Mukherjee
University of Ballarat, Australia
smukherjee@academic.mit.edu.au

Toyoshiro Nakashima
Sugiyama Jogakuen University, Japan
nakasima@sugiyama-u.ac.jp

David M W Powers
Flinders University, Australia

Md. Golam Rabbani
Monash University, Australia
golam.rabbani@monash.edu

Atul Sajjanhar
Deakin University, Australia
atul.sajjanhar@deakin.edu.au

Pinaki Sarkar
Jadavpur University, India
pinakisark@gmail.com

Mary F.H. She
Deakin University, Australia

Nasreen Sultana
Frankston Hospital, Australia

Mark Wallis
University of Newcastle, Australia
mark.wallis@uon.edu.au

Xianjing Wang
Deakin University, Australia
xianjing.wang@deakin.edu.au

Yuchuan Wu
Deakin University, Australia

John Yearwood
University of Ballarat, Australia
j.yearwood@ballarat.edu.au

Eng-Thiam Yeoh
Multimedia University, Malaysia
etyeoh@mmu.edu.my

Ming Zhang
Christopher Newport University, USA
mzhang@cnu.edu

Zhongwei Zhang
University of Southern Queensland, Australia
zhongwei@usq.edu.au

Hong Zhou
University of Southern Queensland, Australia
hong.zhou@usq.edu.au