

Advances in Experimental Medicine and Biology 696

Hamid R. Arabnia
Quoc-Nam Tran *Editors*

Software Tools and Algorithms for Biological Systems

 Springer

Advances in Experimental Medicine and Biology

Volume 696

Editorial Board:

NATHAN BACK, *State University of New York at Buffalo*

IRUN R. COHEN, *The Weizmann Institute of Science*

ABEL LAJTHA, *N.S. Kline Institute for Psychiatric Research*

JOHN D. LAMBRIS, *University of Pennsylvania*

RODOLFO PAOLETTI, *University of Milan*

For further volumes:

<http://www.springer.com/series/5584>

Hamid R. Arabnia • Quoc-Nam Tran
Editors

Software Tools and Algorithms for Biological Systems

Editors

Hamid R. Arabnia
Department of Computer Science
415 Boyd Graduate Studies
Research Centre
University of Georgia
Athens, GA, USA
hra@cs.uga.edu

Quoc-Nam Tran
Department of Computer Science
Lamar University
Beaumont, TX 77710, USA
qntran@buchberger.cs.lamar.edu

ISSN 0065-2598

ISBN 978-1-4419-7045-9

e-ISBN 978-1-4419-7046-6

DOI 10.1007/978-1-4419-7046-6

Springer New York Dordrecht Heidelberg London

Library of Congress Control Number: 2011921718

© Springer Science+Business Media, LLC 2011

All rights reserved. This work may not be translated or copied in whole or in part without the written permission of the publisher (Springer Science+Business Media, LLC, 233 Spring Street, New York, NY 10013, USA), except for brief excerpts in connection with reviews or scholarly analysis. Use in connection with any form of information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed is forbidden.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Contents

Part I Computational Methods for Microarray, Gene Expression Analysis, and Gene Regulatory Networks

1	A Technical Platform for Generating Reproducible Expression Data from <i>Streptomyces coelicolor</i> Batch Cultivations	3
	F. Battke, A. Herbig, A. Wentzel, Ø.M. Jakobsen, M. Bonin, D.A. Hodgson, W. Wohlleben, T.E. Ellingsen, the STREAM Consortium, and K. Nieselt	
2	MiRNA Recognition with the <i>yasMiR</i> System: The Quest for Further Improvements	17
	Daniel Pasailă, Andrei Sucilă, Irina Mohorianu, Ștefan Panțiru, and Liviu Ciortuz	
3	Top Scoring Pair Decision Tree for Gene Expression Data Analysis	27
	Marcin Czajkowski and Marek Krętowski	
4	Predictive Minimum Description Length Principle Approach to Inferring Gene Regulatory Networks	37
	Vijender Chaitankar, Chaoyang Zhang, Preetam Ghosh, Ping Gong, Edward J. Perkins, and Youping Deng	
5	Parsimonious Selection of Useful Genes in Microarray Gene Expression Data	45
	Félix F. González-Navarro and Lluís A. Belanche-Muñoz	
6	Hierarchical Signature Clustering for Time Series Microarray Data	57
	Lars Koenig and Eunseog Youn	

7	Microarray Database Mining and Cell Differentiation Defects in Schizophrenia	67
	Aurelian Radu, Gabriela Hristescu, Pavel Katsel, Vahram Haroutunian, and Kenneth L. Davis	
8	miRNA Prediction Using Computational Approach	75
	A.K. Mishra and D.K. Lobiyal	
9	Improving the Accuracy of Gene Expression Profile Classification with Lorenz Curves and Gini Ratios	83
	Quoc-Nam Tran	
10	Feature Selection in Gene Expression Data Using Principal Component Analysis and Rough Set Theory	91
	Debahuti Mishra, Rajashree Dash, Amiya Kumar Rath, and Milu Acharya	
11	Dramatically Reduced Precision in Microarray Analysis Retains Quantitative Properties and Provides Additional Benefits	101
	William C. Ray	
12	Algebraic Model Checking for Boolean Gene Regulatory Networks	113
	Quoc-Nam Tran	
13	Comparative Advantages of Novel Algorithms Using MSR Threshold and MSR Difference Threshold for Biclustering Gene Expression Data	123
	Shyama Das and Sumam Mary Idicula	
14	Performance Comparison of SLFN Training Algorithms for DNA Microarray Classification	135
	Hieu Trung Huynh, Jung-Ja Kim, and Yonggwan Won	
15	Clustering Microarray Data to Determine Normalization Method	145
	Marie Vendettuoli, Erin Doyle, and Heike Hofmann	
Part II Bioinformatics Databases, Data Mining, and Pattern Discovery Techniques		
16	Estimation, Modeling, and Simulation of Patterned Growth in Extreme Environments	157
	B. Strader, K.E. Schubert, M. Quintana, E. Gomez, J. Curnutt, and P. Boston	

17	Performance of Univariate Forecasting on Seasonal Diseases: The Case of Tuberculosis	171
	Adhistya Erna Permanasari, Dayang Rohaya Awang Rambli, and P. Dhanapal Durai Dominic	
18	Predicting Individual Affect of Health Interventions to Reduce HPV Prevalence	181
	Courtney D. Corley, Rada Mihalcea, Armin R. Mikler, and Antonio P. Sanfilippo	
19	Decision Tree and Ensemble Learning Algorithms with Their Applications in Bioinformatics	191
	Dongsheng Che, Qi Liu, Khaled Rasheed, and Xiuping Tao	
20	Pattern Recognition of Surface EMG Biological Signals by Means of Hilbert Spectrum and Fuzzy Clustering	201
	Ruben-Dario Pinzon-Morales, Katherine-Andrea Baquero-Duarte, Alvaro-Angel Orozco-Gutierrez, and Victor-Hugo Grisales-Palacio	
21	Rotation of Random Forests for Genomic and Proteomic Classification Problems	211
	Gregor Stiglic, Juan J. Rodriguez, and Peter Kokol	
22	Improved Prediction of MHC Class I Binders/ Non-Binders Peptides Through Artificial Neural Network Using Variable Learning Rate: SARS Corona Virus, a Case Study	223
	Sudhir Singh Soam, Bharat Bhasker, and Bhartendu Nath Mishra	
Part III Protein Classification and Structure Prediction, and Computational Structural Biology		
23	Fast Three-Dimensional Noise Reduction for Real-Time Electron Tomography	233
	José Antonio Martínez and José Jesús Fernández	
24	Prediction of Chemical-Protein Binding Activity Using Contrast Graph Patterns	243
	Andrzej Dominik, Zbigniew Walczak, and Jacek Wojciechowski	
25	Topological Constraint in High-Density Cells' Tracking of Image Sequences	255
	Chunming Tang, Ling Ma, and Dongbin Xu	

26	STRIKE: A Protein–Protein Interaction Classification Approach	263
	Nazar Zaki, Wassim El-Hajj, Hesham M. Kamel, and Fadi Sibai	
27	Cooperativity of Protein Binding to Vesicles	271
	Francisco Torrens and Gloria Castellano	
28	The Role of Independent Test Set in Modeling of Protein Folding Kinetics	279
	Nikola Štambuk and Paško Konjevoda	
Part IV Comparative Sequence, Genome Analysis, Genome Assembly, and Genome Scale Computational Methods		
29	Branch-and-Bound Approach for Parsimonious Inference of a Species Tree from a Set of Gene Family Trees	287
	Jean-Philippe Doyon and Cedric Chauve	
30	Sequence-Specific Sequence Comparison Using Pairwise Statistical Significance	297
	Ankit Agrawal, Alok Choudhary, and Xiaoqiu Huang	
31	Modelling Short Time Series in Metabolomics: A Functional Data Analysis Approach	307
	Giovanni Montana, Maurice Berk, and Tim Ebbels	
32	Modeling of Gene Therapy for Regenerative Cells Using Intelligent Agents	317
	Aya Sedky Adly, Amal Elsayed Aboutabl, and M. Shaarawy Ibrahim	
33	Biomarkers Discovery in Medical Genomics Data	327
	A. Benis and M. Courtine	
34	Computer Simulation on Disease Vector Population Replacement Driven by the Maternal Effect Dominant Embryonic Arrest	335
	Mauricio Guevara-Souza and Edgar E. Vallejo	
35	Leukocytes Segmentation Using Markov Random Fields	345
	C. Reta, L. Altamirano, J.A. Gonzalez, R. Diaz, and J.S. Guichard	

Part V Experimental Medicine and Analysis Tools

- 36 Ontology-Based Knowledge Discovery in Pharmacogenomics**357
 Adrien Coulet, Malika Smaïl-Tabbone, Amedeo Napoli, and Marie-Dominique Devignes
- 37 Enabling Heterogeneous Data Integration and Biomedical Event Prediction Through ICT: The Test Case of Cancer Reoccurrence**367
 Marco Picone, Sebastian Steger, Konstantinos Exarchos, Marco De Fazio, Yorgos Goletsis, Dimitrios I. Fotiadis, Elena Martinelli, and Diego Ardigò
- 38 Complexity and High-End Computing in Biology and Medicine**377
 Dimitri Perrin
- 39 Molecular Modeling Study of Interaction of Anthracenedione Class of Drug Mitoxantrone and Its Analogs with DNA Tetrameric Sequences**385
 Pamita Awasthi, Shilpa Dogra, Lalit K. Awasthi, and Ritu Barthwal
- 40 A Monte Carlo Analysis of Peritoneal Antimicrobial Pharmacokinetics**401
 Sanjukta Hota, Philip Croke, and John Hotchkiss

Part VI Computational Methods for Filtering, Noise Cancellation, and Signal and Image Processing

- 41 Histopathology Tissue Segmentation by Combining Fuzzy Clustering with Multiphase Vector Level Sets**413
 Filiz Bunyak, Adel Hafiane, and Kannappan Palaniappan
- 42 A Dynamically Masked Gaussian Can Efficiently Approximate a Distance Calculation for Image Segmentation**425
 Shareef M. Dabdoub, Sheryl S. Justice, and William C. Ray
- 43 Automatic and Robust System for Correcting Microarray Images' Rotations and Isolating Spots**433
 Anlei Wang, Naima Kaabouch, and Wen-Chen Hu

44	Multimodality Medical Image Registration and Fusion Techniques Using Mutual Information and Genetic Algorithm-Based Approaches	441
	Mahua Bhattacharya and Arpita Das	
45	Microcalcifications Detection Using Fisher's Linear Discriminant and Breast Density	451
	G.A. Rodriguez, J.A. Gonzalez, L. Altamirano, J.S. Guichard, and R. Diaz	
46	Enhanced Optical Flow Field of Left Ventricular Motion Using Quasi-Gaussian DCT Filter	461
	Slamet Riyadi, Mohd. Marzuki Mustafa, Aini Hussain, Oteh Maskon, and Ika Faizura Mohd. Nor	
47	An Efficient Algorithm for Denoising MR and CT Images Using Digital Curvelet Transform	471
	S. Hyder Ali and R. Sukanesh	
48	On the Use of Collinear and Triangle Equation for Automatic Segmentation and Boundary Detection of Cardiac Cavity Images	481
	Riyanto Sigit, Mohd. Marzuki Mustafa, Aini Hussain, Oteh Maskon, and Ika Faizura Mohd. Nor	
49	The Electromagnetic-Trait Imaging Computation of Traveling Wave Method in Breast Tumor Microwave Sensor System	489
	Zhi-fu Tao, Zhong-ling Han, and Meng Yao	
50	Medical Image Processing Using Novel Wavelet Filters Based on Atomic Functions: Optimal Medical Image Compression	497
	Cristina Juarez Landin, Magally Martinez Reyes, Anabelem Soberanes Martin, Rosa Maria Valdovinos Rosas, Jose Luis Sanchez Ramirez, Volodymyr Ponomaryov, and Maria Dolores Torres Soto	
51	Cancellation of Artifacts in ECG Signals Using Block Adaptive Filtering Techniques	505
	Mohammad Zia Ur Rahman, Rafi Ahamed Shaik, and D.V. Rama Koti Reddy	
52	Segmentation of Medical Image Sequence by Parallel Active Contour	515
	Abdelkader Fekir and Nacéra Benamrane	

- 53 Computerized Decision Support System for Mass Identification in Breast Using Digital Mammogram: A Study on GA-Based Neuro-Fuzzy Approaches**523
Arpita Das and Mahua Bhattacharya

Part VII Computer-Based Medical Systems

- 54 Optimization-Based Technique for Separation and Detection of Saccadic Movements and Eye-Blinking in Electrooculography Biosignals**537
Robert Krupiński and Przemysław Mazurek
- 55 A Framework for Lipoprotein Ontology**547
Meifania Chen and Maja Hadzic
- 56 Verbal Decision Analysis Applied on the Optimization of Alzheimer’s Disease Diagnosis: A Case Study Based on Neuroimaging**555
Isabelle Tamanini, Ana Karoline de Castro, Plácido Rogério Pinheiro, and Mirian Calíope Dantas Pinheiro
- 57 Asynchronous Brain Machine Interface-Based Control of a Wheelchair**565
C.R. Hema, M.P. Paulraj, Sazali Yaacob, Abdul Hamid Adom, and R. Nagarajan
- 58 Toward an Application to Psychological Disorders Diagnosis**.....573
Luciano Comin Nunes, Plácido Rogério Pinheiro, Tarcísio Cavalcante Pequeno, and Mirian Calíope Dantas Pinheiro
- 59 Enhancing Medical Research Efficiency by Using Concept Maps**581
Varadraj P. Gurupur, Amit S. Kamdi, Tolga Tuncer, Murat M. Tanik, and Murat N. Tanju
- 60 Analysis of Neural Sources of P300 Event-Related Potential in Normal and Schizophrenic Participants**589
Malihe Sabeti, Ehsan Moradi, and Serajeddin Katebi
- 61 Design and Development of a Tele-Healthcare Information System Based on Web Services and HL7 Standards**599
Ean-Wen Huang, Rui-Suan Hung, Shwu-Fen Chiou, Fei-Ying Liu, and Der-Ming Liou

62	Fuzzy Logic Based Expert System for the Treatment of Mobile Tooth	607
	Vijay Kumar Mago, Anjali Mago, Poonam Sharma, and Jagmohan Mago	
63	A Microcomputer FES System for Wrist Moving Control	615
	Li Cao, Jin-Sheng Yang, Zhi-Long Geng, and Gang Cao	
64	Computer-Aided Decision System for the Clubfeet Deformities	623
	Tien Tuan Dao, Frédéric Marin, Henri Bensahel, and Marie Christine Ho Ba Tho	
65	A Framework for Specifying Safe Behavior of the CIIP Medical System	637
	Seyed Morteza Babamir	
Part VIII Software Packages and Other Computational Topics in Bioinformatics		
66	Lotka–Volterra System with Volterra Multiplier	647
	Klaus Gürlebeck and Xinhua Ji	
67	A Biological Compression Model and Its Applications	657
	Minh Duc Cao, Trevor I. Dix, and Lloyd Allison	
68	Open Source Clinical Portals: A Model for Healthcare Information Systems to Support Care Processes and Feed Clinical Research	667
	Paolo Locatelli, Emanuele Baj, Nicola Restifo, Gianni Origgi, and Silvia Bragaglia	
69	Analysis and Clustering of MicroRNA Array: A New Efficient and Reliable Computational Method	679
	Luca Sterpone, Federica Collino, Giovanni Camussi, and Claudio Loconsole	
70	Stochastic Simulations of Mixed-Lipid Compartments: From Self-Assembling Vesicles to Self-Producing Protocells	689
	Kepa Ruiz-Mirazo, Gabriel Piedrafita, Fulvio Ciriaco, and Fabio Mavelli	
71	A New Genetic Algorithm for Polygonal Approximation	697
	Cecilia Di Ruberto and Andrea Morgera	

72	Challenges When Using Real-World Bio-data to Calibrate Simulation Systems	709
	Elaine M. Blount, Stacie I. Ringleb, and Andreas Tolk	
73	Credibility of Digital Content in a Healthcare Collaborative Community	717
	Wail M. Omar, Dinesh K. Saini, and Mustafa Hasan	
74	Using Standardized Numerical Scores for the Display and Interpretation of Biomedical Data	725
	Robert A. Warner	
75	ImagCell: A Computer Tool for Cell Culture Image Processing Applications in Bioimpedance Measurements	733
	Alberto Yúfera, Estefanía Gallego, and Javier Molina	
76	From Ontology Selection and Semantic Web to an Integrated Information System for Food-borne Diseases and Food Safety	741
	Xianghe Yan, Yun Peng, Jianghong Meng, Juliana Ruzante, Pina M. Fratamico, Lihan Huang, Vijay Juneja, and David S. Needleman	
77	Algebraic Analysis of Social Networks for Bio-surveillance: The Cases of SARS-Beijing-2003 and AH1N1 Influenza-México-2009	751
	Doracelly Hincapié and Juan Ospina	
	Index	763

Contributors

Amal Elsayed Aboutabl

Computer Science Department, Faculty of Computers and Information,
Helwan University, Cairo, Egypt
aaboutabl@helwan.edu.eg

Milu Acharya

Department of Computer Science and Engineering, Institute of Technical
Education and Research, Bhubaneswar, Orissa, India
ayasedky@helwan.edu.eg; ayasedky@yahoo.com

Aya Sedky Adly

Computer Science Department, Faculty of Computers and Information,
Helwan University, Cairo, Egypt
ayasedky@helwan.edu.eg; ayasedky@yahoo.com

Abdul Hamid Adom

School of Mechatronic Engineering, University Malaysia Perlis, 02600,
Pauh, Perlis, Malaysia

Ankit Agrawal

Department of Electrical Engineering and Computer Science, Northwestern
University, 2145 Sheridan Road, Evanston, IL 60208, USA
ankitag@eecs.northwestern.edu; ankit108@gmail.com

S. Hyder Ali

Research Scholar, Anna University, Chennai, Tamil Nadu, India

Lloyd Allison

National ICT Australia, Victorian Research Laboratory, University of Melbourne,
Parkville, VIC 3052, Australia

L. Altamirano

National Institute for Astrophysics, Optics, and Electronics, Luis Enrique Erro
No. 1, Puebla, 72840, Mexico
robles@inaoep.mx

Diego Ardigò

MultiMed s.r.l, Cremona, Italy
diego.ardigo@multi-med.it

Lalit K. Awasthi

Department of Computer Science and Engineering, National Institute of Technology, Hamirpur, Himachal Pradesh, India

Pamita Awasthi

Department of Chemistry, National Institute of Technology, Hamirpur, Himachal Pradesh, India
pamita@nitham.ac.in; p_awasthi@rediff.com; pamitawasthi@gmail.com

Seyed Morteza Babamir

University of Kashan, Kashan, Iran
babamir@kashanu.ac.ir

Emanuele Baj

Fondazione Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy
Emanuele.Baj@fondazione.polimi.it

Katherine-Andrea Baquero-Duarte

Laboratory for Automation, Microelectronics and Computational Intelligence (LAMIC), Faculty of Engineering, Universidad Distrital Francisco Jose de Caldas, Bogotá, Colombia
kabaquerod@correo.udistrital.edu.co

Ritu Barthwal

Department of Biotechnology, Indian Institute of Technology, Roorkee, India

F. Battke

Department of Information and Cognitive Sciences, Center for Bioinformatics Tübingen, University of Tübingen, Sand 14, 72076 Tübingen, Germany

Lluís A. Belanche-Muñoz

Departament de Llenguatges i Sistemes Informàtics, Universitat Politècnica de Catalunya, Omega Building, North Campus, 08034 Barcelona, Spain
belanche@lsi.upc.edu

Nacéra Benamrane

Computer Sciences Department, USTO Oran, B.P 1505 El ‘mnaouer 31000, Oran, Algeria
nabenamrane@yahoo.com

A. Benis

LIM&Bio – Laboratoire d’Informatique Médicale et de Bioinformatique – E.A.3969, Université Paris Nord, 74 rue Marcel Cachin, 93017 Bobigny, Cedex, France
benis.arriel@gmail.com

Henri Bensahel

Service de Chirurgie Infantile, Hôpital de Robert Debré, Paris, France
henriben@noos.fr

Maurice Berk

Mathematics, Imperial College, London, UK
maurice.berk01@imperial.ac.uk

Bharat Bhasker

Indian Institute of Management, Lucknow, India
bhasker@iiml.ac.in

Mahua Bhattacharya

Indian Institute of Information Technology and Management, Morena Link Road,
Gwalior 474010, India
mb@iiitm.ac.in; bmahua@hotmail.com

Elaine M. Blount

Old Dominion University, Norfolk, VA, USA

M. Bonin

Microarray Facility Tübingen, Calwer Straße 7, 72076 Tübingen, Germany

P. Boston

New Mexico Tech, Socorro, NM 87801, USA
pboston@nmt.edu

Silvia Bragaglia

A.O. Ospedale Niguarda Ca'Granda, Piazza Ospedale Maggiore 3, 20162
Milan, Italy
Silvia.Bragaglia@ospedaleniguarda.it

Filiz Bunyak

Department of Computer Science, University of Missouri-Columbia, Columbia,
MO 65211, USA
bunyak@missouri.edu

Giovanni Camussi

Dipartimento di Medicina Interna, Molecular Biotechnology Center, Università
di Torino, Turin, Italy

Gang Cao

Department of Stomatology, Jinling Hospital, Nanjing 210002, China
caogangfmmu@yahoo.com.cn

Li Cao

College of Civil Aviation, Nanjing University of Aeronautics and Astronautics,
Nanjing 210016, China
caoli@nuaa.edu.cn

Minh Duc Cao

Clayton School of Information Technology, Monash University, Clayton,
VIC 3800, Australia
minhduc@monash.edu

Gloria Castellano

Departamento de Ciencias Experimentales y Matemáticas, Universidad Católica
de Valencia San Vicente Mártir, Guillem de Castro-94, 46003 València, Spain
gloria.castellano@ucv.es

Vijender Chaitankar

School of Computing, The University of Southern Mississippi, Hattiesburg,
MS 39402, USA

Cedric Chauve

Department of Mathematics, Simon Fraser University, Burnaby, BC, Canada
cedric.chauve@sfu.ca

Dongsheng Che

Department of Computer Science, East Stroudsburg University, East Stroudsburg,
PA 18301, USA
dche@po-box.esu.edu; dongshengche@gmail.com

Meifania Chen

Digital Ecosystems and Business Intelligence Institute, Curtin University
of Technology, Enterprise Unit 4, De Laeter Way, Technology Park, Bentley,
WA 6102, Australia
m.chen@cbs.curtin.edu.au

Shwu-Fen Chiou

Department of Information Management, National Taipei College of Nursing,
Taipei, Taiwan, ROC

Alok Choudhary

Department of Electrical Engineering and Computer Science, Northwestern
University, 2145 Sheridan Road, Evanston, IL 60208, USA
choudhar@eecs.northwestern.edu

Liviu Ciortuz

Department of Computer Science, “Alexandru Ioan Cuza” University of Iași, Iași,
Romania
ciortuz@info.uaic.ro

Fulvio Ciriaco

Chemistry Department, University of Bari, Bari, Italy

Federica Collino

Dipartimento di Medicina Interna, Molecular Biotechnology Center, Università
di Torino, Turin, Italy

Courtney D. Corley

Pacific Northwest National Laboratory, Richland, WA, USA

court@pnl.gov

Adrien Coulet

Department of Medicine, Stanford University, Stanford, CA, USA

and

LORIA (CNRS UMR7503, INRIA Nancy Grand-Est, Nancy Université), Campus scientifique, 54506 Vandoeuvre-lès-Nancy, France

adrien.coulet@loria.fr

M. Courtine

LIM&Bio – Laboratoire d’Informatique Médicale et de Bioinformatique, E.A.3969 Université Paris Nord, 74 rue Marcel Cachin, 93017 Bobigny Cedex, France

courtine@limbio-paris13.org

Philip Crooke

Department of Mathematics, Vanderbilt University, Nashville, TN 37240, USA

J. Curnutt

California State University, San Bernardino, San Bernardino, CA 92407, USA

jcurnutt@r2labs.org

Marcin Czajkowski

Faculty of Computer Science, Bialystok University of Technology, Bialystok, Poland

m.czajkowski@pb.edu.pl

Shareef M. Dabdoub

The Biophysics Program, The Ohio State University, Columbus, OH 43210, USA

dabdoub.2@buckeyemail.osu.edu

Tien Tuan Dao

UTC – CNRS UMR, 6600 Biomécanique et Bioingénierie, Compiègne, France

tien-tuan.dao@utc.fr

Arpita Das

Department of Radio Physics and Electronics, University of Calcutta,

92 A.P.C. Road, Kolkata-700009, India

arpita.rpe@caluniv.ac.in

Shyama Das

Department of Computer Science, Cochin University of Science and Technology, Kochin, Kerala, India

shyamadas777@gmail.com

Rajashree Dash

Department of Computer Science and Engineering, Institute of Technical Education and Research, Bhubaneswar, Orissa, India

rajashree_dash@yahoo.co.in

Kenneth L. Davis

Department of Psychiatry, Mount Sinai School of Medicine, One Gustave L. Levy Place, NY 10029, USA

kenneth.davis@mssm.edu

Ana Karoline de Castro

Graduate Program in Applied Computer Sciences, University of Fortaleza (UNIFOR), Av. Washington Soares, 1321, Bl J Sl 30, 60.811-905, Fortaleza, Brazil

akcastrog@gmail.com

Marco De Fazio

STMicroelectronics, Milano, Italy

marco.de-fazio@st.com

Youping Deng

SpecPro Inc., 3909 Halls Ferry Rd, Vicksburg, MS 39180, USA

Marie-Dominique Devignes

LORIA (CNRS UMR7503, INRIA Nancy Grand-Est, Nancy Université), Campus Scientifique, 54506 Vandoeuvre-lès-Nancy, France

devignes@loria.fr

Cecilia Di Ruberto

Department of Mathematics and Computer Science, University of Cagliari, Cagliari, Italy

dirubert@unica.it

R. Diaz

National Institute for Astrophysics, Optics, and Electronics, Luis Enrique Erro No. 1, Puebla, 72840, Mexico

raqueld@inaoep.mx

Trevor I. Dix

Victorian Bioinformatics Consortium, Clayton, VIC 3800, Australia

trevor@infotech.monash.edu.au

Shilpa Dogra

Department of Chemistry, National Institute of Technology, Hamirpur, Himachal Pradesh, India

P. Dhanapal Durai Dominic

Department of Computer and Information Science, Universiti Teknologi PETRONAS, Bandar Seri Iskandar, 31750 Tronoh, Perak, Malaysia

dhanapal_d@petronas.com.my

Andrzej Dominik

Institute of Radioelectronics, Warsaw University of Technology, Nowowiejska 15/19, 00-665 Warsaw, Poland

a.dominik@elka.pw.edu.pl

Erin Doyle

Bioinformatics and Computational Biology Program, Iowa State University, Ames, IA 50010, USA

and

Department of Plant Pathology, Iowa State University, Ames, IA 50010, USA

edoyle@iastate.edu

Jean-Philippe Doyon

LIRMM, Université Montpellier 2 and CNRS, Montpellier, France

Jean-philippe.Doyon@lirmm.fr; doyonjea@iro.umontreal.ca

Tim Ebbels

Biomolecular Medicine, Imperial College, London, UK

t.ebbels@imperial.ac.uk

Wassim El-Hajj

Bioinformatics Lab, Department of Intelligent Systems, College of Information Technology, UAE University, 17551 Al-Ain, UAE

welhajj@uaeu.ac.ae

T.E. Ellingsen

Department of Biotechnology, SINTEF Materials and Chemistry, Sem Sælands vei 2a, 7465 Trondheim, Norway

Konstantinos Exarchos

Unit of Medical Technology and Intelligent Information Systems, Department of Materials Science and Engineering, University of Ioannina, Ioannina, Greece

and

Department of Medical Physics, Medical School, University of Ioannina, Ioannina, Greece

kexarcho@cc.uoi.gr

Abdelkader Fekir

Mathematics and Computer Science Department, Mascara University,

BP 763, Mamounia Route, 29000, Mascara, Algeria

aekfekir@gmail.com; aekfekir@univ-mascara.dz

José Jesús Fernández

Centro Nacional de Biotecnología (CSIC), Campus UAM, Cantoblanco, 28049 Madrid, Spain

JJ.Fernandez@cnb.csic.es

Dimitrios I. Fotiadis

Unit of Medical Technology and Intelligent Information Systems, Department of Materials Science and Engineering, University of Ioannina, Ioannina, Greece

fotiadis@cs.uoi.gr

Pina M. Fratamico

U.S. Department of Agriculture, Agricultural Research Service, Eastern Regional Research Center, Wyndmoor, PA 19038, USA

Estefanía Gallego

Electronic Technology Department, Computer Engineering School, Seville University, Av. Reina Mercedes s/n, 41012, Sevilla, Spain

Zhi-Long Geng

Department of Anesthesiology, Jincheng Hospital, Lanzhou 730050, China
zlgch@sina.com

Preetam Ghosh

School of Computing, The University of Southern Mississippi, Hattiesburg, MS 39402, USA

Yorgos Goletsis

Department of Economics, University of Ioannina, Ioannina, Greece
goletsis@cc.uoi.gr

E. Gomez

California State University, San Bernardino, San Bernardino, CA 92407, USA
ernestog@csusb.edu

Ping Gong

SpecPro Inc., 3909 Halls Ferry Rd, Vicksburg, MS 39180, USA

J.A. Gonzalez

National Institute for Astrophysics, Optics, and Electronics, Luis Enrique Erro No. 1, Puebla, 72840, Mexico
jagonzalez@inaoep.mx

Félix F. González-Navarro

Dept. de Llenguatges i Sistemes Informàtics, Universitat Politècnica de Catalunya, W-Building, North Campus, 08034 Barcelona, Spain
fgonzalez@lsi.upc.edu

Victor-Hugo Grisales-Palacio

Faculty of Engineering, Laboratory for Automation, Microelectronics and Computational Intelligence (LAMIC), Universidad Distrital Francisco Jose de Caldas, Colombia
vhgrisales@udistrital.edu.co

Mauricio Guevara-Souza

Computer Science Department, ITESM CEM, Carretera Lago de Guadalupe Km.3.5, Atizapan de Zaragoza, 52926, Mexico
A00456476@hotmail.com; guevara_mauricio@hotmail.com

J.S. Guichard

National Institute for Astrophysics, Optics, and Electronics, Luis Enrique Erro No. 1, Puebla, 72840, Mexico
jguichard@inaoep.mx

Klaus Gürlebeck

Institut Mathematik/Physik, Bauhaus-Universität Weimar, Coudraystr. 13, 99421 Weimar, Germany
klaus.guerlebeck@uni-weimar.de

Varadraj P. Gurupur

Department of Electrical and Computer Engineering, University of Alabama at Birmingham, Birmingham, AL 35294-1150, USA
varad@uab.edu

Maja Hadzic

Digital Ecosystems and Business Intelligence Institute, Curtin University of Technology, GPO Box U1987 Perth, Western Australia 6845, Australia
m.hadzic@curtin.edu.au

Adel Hafiane

ENSI de Bourges, Institut PRISME UPRES EA 4229, 88 boulevard Lahitolle, 18020 Bourges Cedex, France
adel.hafiane@ensi-bourges.fr

Zhong-ling Han

East China Normal University, 3663 North Zhong-Shan Rd, Shanghai 200062, P.R. China

Vahram Haroutunian

Mental Illness Research, Education and Clinical Centers, Bronx Veterans Affairs Medical Center, 130 West Kingsbridge Road, Bronx, NY 10468, USA
and
Department of Psychiatry, Mount Sinai School of Medicine, One Gustave L. Levy Place, NY 10029, USA
vahram.haroutunian@mssm.edu

Mustafa Hasan

Faculty of Computing and Information Technology, Sohar University, P.O. Box 44, P.C. 311 Sohar, Sultanate of Oman
m.hasan@soharuni.edu.om

C.R. Hema

School of Mechatronic Engineering, University Malaysia Perlis, 02600 Pauh, Perlis, Malaysia
hema@unimap.edu.my

A. Herbig

Center for Bioinformatics Tübingen, Department of Information and Cognitive Sciences, University of Tübingen, Sand 14, 72076 Tübingen, Germany

Doracelly Hincapié

Epidemiology Group, National School of Public Health, University of Antioquia, Medellín, Colombia
doracely@guajiros.udea.edu.co

Marie Christine Ho Ba Tho

UTC – CNRS UMR 6600 Biomécanique et Bioingénierie, Compiègne, France
hobatho@utc.fr

D.A. Hodgson

Department of Biological Science, University of Warwick, Gibbet Hill Road,
Coventry CV47AL, UK

Heike Hofmann

Bioinformatics and Computational Biology Program, Iowa State University,
Ames, IA 50010, USA

and

Department of Statistics, Iowa State University, Ames, IA 50010, USA
hofmann@iastate.edu

Sanjukta Hota

Department of Mathematics, Fisk University, Nashville, TN 37208, USA
sanjuktahota@gmail.com

John Hotchkiss

Department of Medicine, University of Pittsburgh, Pittsburgh, PA 15261, USA

Gabriela Hristescu

Computer Science Department, Rowan University, 201 Mullica Hill Road,
Glassboro, NJ 08028, USA

hristescu@rowan.edu

Wen-Chen Hu

Computer Science Department, University of North Dakota, ND 58202, USA

Ean-Wen Huang

Department of Information Management, National Taipei University of Nursing
and Health Sciences, 365, Ming-te-Road, Peitou District, Taipei, Taiwan, ROC

huang@ntunhs.edu.tw

Lihan Huang

U.S. Department of Agriculture, Agricultural Research Service, Eastern Regional
Research Center, Wyndmoor, PA 19038, USA

Xiaoqiu Huang

Department of Computer Science, Iowa State University, 226 Atanasoff Hall,
Ames, IA 50011, USA

xqhuang@cs.iastate.edu

Rui-Suan Hung

Department of Information Management, National Taipei College of Nursing,
Taipei, Taiwan, ROC

Aini Hussain

Department of Electrical, Electronic and Systems Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, Bangi, 43600 Selangor, Malaysia

Hieu Trung Huynh

Nguyen Tat Thanh College, University of Industry, Ho Chi Minh City, Vietnam
hthieu@hcmut.edu.vn; hieuhtvn@yahoo.com

M. Shaarawy Ibrahim

Computer Science Department, Faculty of Computers and Information, Helwan University, Cairo, Egypt
mhshaarawy@helwan.edu.eg

Sumam Mary Idicula

Department of Computer Science, Cochin University of Science and Technology, Kochin, Kerala, India
sumam@cusat.ac.in

Ø.M. Jakobsen

Department of Biotechnology, SINTEF Materials and Chemistry, Sem Sælands vei 2a, 7465 Trondheim, Norway

Xinhua Ji

Institute of Mathematics, Academy of Mathematics and Systems Science (AMSS), Chinese Academy of Sciences, Beijing 100190, China
xhji@math.ac.cn

Vijay Juneja

U.S. Department of Agriculture, Agricultural Research Service, Eastern Regional Research Center, Wyndmoor, PA 19038, USA

Sheryl S. Justice

The Center for Microbial Pathogenesis, The Research Institute at Nationwide Children's Hospital, Columbus, OH 43205, USA
sheryl.justice@nationwidechildrens.org

Naima Kaabouch

Electrical Engineering Department, University of North Dakota, ND 58202, USA
naimakaabouch@mail.und.edu

Amit S. Kamdi

UAB School of Public Health, University of Alabama at Birmingham, Birmingham, AL 35294-1150, USA
dramit99@gmail.com

Hesham M. Kamel

Bioinformatics Lab, Department of Intelligent Systems, College of Information Technology, UAE University, 17551 Al-Ain, UAE
hesham@uaeu.ac.ae

Serajeddin Katebi

Department of Computer Science and Engineering, School of Engineering, Shiraz University, Shiraz, Iran

Pavel Katsel

Mental Illness Research, Education and Clinical Centers, Bronx Veterans Affairs Medical Center, 130 West Kingsbridge Road, Bronx, NY 10468, USA
and

Department of Psychiatry, Mount Sinai School of Medicine, One Gustave L. Levy Place, NY 10029, USA

pavel.katsel@mssm.edu

Jung-Ja Kim

Chonbuk National University, Jeonju, Jeollabuk-do, Korea

jungjakim@jbnu.ac.kr

Lars Koenig

Department of Computer Science, Texas Tech University, Lubbock, TX 79409, USA

lars.koenig@ttu.edu

Peter Kokol

Faculty of Health Sciences, University of Maribor, Zitna ulica 15, 2000 Maribor, Slovenia

and

Faculty of Electrical Engineering and Computer Science, University of Maribor, Smetanova 17, 2000 Maribor, Slovenia

Paško Konjevoda

NMR Center, Ruđer Bošković Institute, Bijenička cesta 54, 10002 Zagreb, Croatia
pkonjev@irb.hr

Marek Krętowski

Faculty of Computer Science, Bialystok University of Technology, Bialystok, Poland

m.kretowski@pb.edu.pl

Robert Krupiński

Department of Signal Processing and Multimedia Engineering, West Pomeranian University of Technology in Szczecin, 26-Kwietnia 10 Str., 71-126 Szczecin, Poland

robert.krupinski@zut.edu.pl

Cristina Juarez Landin

Autonomous University of Mexico State, Hermenegildo Galena No.3, Col. Ma. Isabel, Valle de Chalco, Mexico State, Mexico

cjlandin@yahoo.com.mx

Der-Ming Liou

Institute of Biomedical Informatics, National Yang-Ming University Taipei, Taiwan, ROC

Fei-Ying Liu

Division of Mathematics, Daan Junior High School, Taipei, Taiwan, ROC

Qi Liu

College of Life Science and Biotechnology, Tongji University, Shanghai 200092, P.R. China

emailliuqizju@gmail.com

D.K. Lobiyal

Jawaharlal Nehru University, New Delhi, India

dkl@mail.jnu.ac.in

Paolo Locatelli

Fondazione Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Paolo.Locatelli@fondazione.polimi.it

Claudio Loconsole

Perceptual Robotics Laboratory, Scuola Superiore Sant'Anna, Pisa, Italy

Ling Ma

School of Information and Communication Engineering, Harbin Engineering University, Harbin 150001, China

Anjali Mago

Mago Dental Clinic, Jalandhar, India

Jagmohan Mago

Apeejay College of Fine Arts, Jalandhar, India

Vijay Kumar Mago

DAV College, Jalandhar, India

vijay.mago@gmail.com

Frédéric Marin

UTC – CNRS UMR 6600 Biomécanique et Bioingénierie, Compiègne, France

frederic.marin@utc.fr

Anabelem Soberanes Martin

Autonomous University of Mexico State, Hermenegildo Galena No.3, Col. Ma. Isabel, Valle de Chalco, Mexico State, Mexico

belemsobranes@yahoo.com.mx

Elena Martinelli

Azienda Ospedaliero-Universitaria di Parma – UO Chirurgia Maxillo-facciale, Parma, Italy

coordinator@neomark.eu

José Antonio Martínez

Department of Computer Architecture, University of Almeria, 04120 Almeria, Spain

Oteh Maskon

Cardiology Care Unit, Universiti Kebangsaan Malaysia Medical Center,
Kuala Lumpur 56000, Malaysia

Fabio Mavelli

Chemistry Department, University of Bari, Bari, Italy
mavelli@chimica.uniba.it

Przemysław Mazurek

Department of Signal Processing and Multimedia Engineering, West Pomeranian
University of Technology in Szczecin, 26-Kwietnia 10 St., 71-126 Szczecin, Poland
przemyslaw.mazurek@zut.edu.pl

Jianghong Meng

Joint Institute for Food Safety and Applied Nutrition (JIFSAN), University
of Maryland, College Park, MD 20742, USA

Rada Mihalcea

Department of Computer Science and Engineering, University of North Texas,
Denton, TX, USA
rada@cs.unt.edu

Armin R. Mikler

Department of Computer Science and Engineering, University of North Texas,
Denton, TX, USA
mikler@unt.edu

A.K. Mishra

Jawaharlal Nehru University, New Delhi, India
and
U.S.I., Indian Agricultural Research Institute, New Delhi, India
akmishra@iari.res.in; misamr@rediffmail.com

Bhartendu Nath Mishra

Department of Biotechnology, Institute of Engineering and Technology,
UP Technical University, Lucknow, India
profbnmishra@gmail.com

Debahuti Mishra

Department of Computer Science and Engineering, Institute of Technical Education
and Research, Siksha O Anusandhan University, Bhubaneswar, Orissa, India
debahuti@iter.ac.in

Irina Mohorianu

Department of Computer Science, “Alexandru Ioan Cuza” University of Iași, Iași,
Romania
irina.mohorianu@info.uaic.ro

Javier Molina

Electronic Technology Department, Computer Engineering School, Seville
University, Av. Reina Mercedes s/n, 41012, Sevilla, Spain

Giovanni Montana

Mathematics, Imperial College, London, UK
giovanni.montana@imperial.ac.uk

Ehsan Moradi

Department of Neurosurgery, Shiraz Medical School, Shiraz University of Medical Sciences, Shiraz, Iran

Andrea Morgera

Department of Mathematics and Computer Science, University of Cagliari, Cagliari, Italy
andrea.morgera@unica.it

Mohd. Marzuki Mustafa

Department of Electrical, Electronic and Systems Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, Bangi, 43600 Selangor, Malaysia
marzuki@eng.ukm.my

R. Nagarajan

School of Mechatronic Engineering, University Malaysia Perlis, 02600, Pauh, Perlis, Malaysia

Amedeo Napoli

LORIA (CNRS UMR7503, INRIA Nancy Grand-Est, Nancy Université), Campus Scientifique, 54506 Vandoeuvre-lès-Nancy, France
napoli@loria.fr

David S. Needleman

U.S. Department of Agriculture, Agricultural Research Service, Eastern Regional Research Center, Wyndmoor, PA 19038, USA

K. Nieselt

Faculty of Science, Center for Bioinformatics Tübingen, University of Tübingen, Sand 14, 72076 Tübingen, Germany
kay.nieselt@uni-tuebingen.de

Ika Faizura Mohd. Nor

Cardiology Care Unit, Universiti Kebangsaan Malaysia Medical Center, Kuala Lumpur 56000, Malaysia

Luciano Comin Nunes

Graduate Program in Applied Computer Sciences, University of Fortaleza, Av. Washington Soares, 1321 – B1 J, Sl 30, CEP: 60811-905, Fortaleza, Ceará, Brazil
lcominn@bnb.gov.br; lcominn@uol.com.br

Wail M. Omar

Faculty of Computing and Information Technology, Sohar University, P.O. Box 44, P.C. 311, Sohar, Sultanate of Oman
w.omar@soharuni.edu.om