PROCEEDINGS OF
THE 2015 INTERNATIONAL CONFERENCE ON
BIOINFORMATICS & COMPUTATIONAL BIOLOGY

BIOCOMP 2015

Editors

Hamid R. Arabnia
Quoc-Nam Tran, Mary Q. Yang

Associate Editors

George Jandieri, Ashu M. G. Solo
Fernando G. Tinetti

WORLDCOMP'15
July 27-30, 2015
Las Vegas Nevada, USA
www.world-academy-of-science.org

©CSREA Press

This volume contains papers presented at The 2015 International Conference on Bioinformatics & Computational Biology (BIOCOMP'15). Their inclusion in this publication does not necessarily constitute endorsements by editors or by the publisher.

Copyright and Reprint Permission

Copying without a fee is permitted provided that the copies are not made or distributed for direct commercial advantage, and credit to source is given. Abstracting is permitted with credit to the source. Please contact the publisher for other copying, reprint, or republication permission.

Copyright © 2015 CSREA Press
ISBN: 1-60132-410-3
Printed in the United States of America

CSREA Press
U. S. A.

Foreword

It gives us great pleasure to introduce this collection of papers to be presented at the 2015 International Conference on Bioinformatics & Computational Biology (BIOCOMP'15), July 27-30, 2015, at Monte Carlo Resort, Las Vegas, USA.

An important mission of the World Congress in Computer Science, Computer Engineering, and Applied Computing (a federated congress to which this conference is affiliated with) includes *"Providing a unique platform for a diverse community of constituents composed of scholars, researchers, developers, educators, and practitioners. The Congress makes concerted effort to reach out to participants affiliated with diverse entities (such as: universities, institutions, corporations, government agencies, and research centers/labs) from all over the world. The congress also attempts to connect participants from institutions that have* ***teaching*** *as their main mission with those who are affiliated with institutions that have* ***research*** *as their main mission. The congress uses a quota system to achieve its institution and geography diversity objectives."* By any definition of diversity, this congress is among the most diverse scientific meeting in USA. We are proud to report that this federated congress has authors and participants from 78 different nations representing variety of personal and scientific experiences that arise from differences in culture and values. As can be seen (see below), the program committee of this conference as well as the program committee of all other tracks of the federated congress are as diverse as its authors and participants.

The program committee would like to thank all those who submitted papers for consideration. About 55% of the submissions were from outside the United States. Each submitted paper was peer-reviewed by two experts in the field for originality, significance, clarity, impact, and soundness. In cases of contradictory recommendations, a member of the conference program committee was charged to make the final decision; often, this involved seeking help from additional referees. In addition, papers whose authors included a member of the conference program committee were evaluated using the double-blinded review process. One exception to the above evaluation process was for papers that were submitted directly to chairs/organizers of pre-approved sessions/workshops; in these cases, the chairs/organizers were responsible for the evaluation of such submissions. The overall paper acceptance rate for regular papers was 27%; 21% of the remaining papers were accepted as poster papers (at the time of this writing, we had not yet received the acceptance rate for a few individual tracks.)

We are very grateful to the many colleagues who offered their services in organizing the conference. In particular, we would like to thank the members of the Program Committee of BIOCOMP'15, members of the congress Steering Committee, and members of the committees of federated congress tracks that have topics within the scope of BIOCOMP. Many individuals listed below, will be requested after the conference to provide their expertise and services for selecting papers for publication (extended versions) in journal special issues as well as for publication in a set of research books (to be prepared for publishers including: Springer, Elsevier, BMC, and others).

- *Prof. Abbas M. Al-Bakry (Congress Steering Committee); University President, University of IT and Communications, Baghdad, Iraq*
- *Prof. Nizar Al-Holou (Congress Steering Committee); Professor and Chair, Electrical and Computer Engineering Department; Vice Chair, IEEE/SEM-Computer Chapter; University of Detroit Mercy, Detroit, Michigan, USA*
- *Dr. Hamid Ali Abed Alasadi (Congress Steering Committee); Head, Department of Computer Science, Basra University, Iraq; Member of Optical Society of America (OSA), USA; Member of The International Society for Optical Engineering (SPIE), Bellingham, Washington, USA*
- *Prof. Christine Amaldas; Ritsumeikan Asia Pacific University, Kyoto, Japan*
- *Prof. Hamid R. Arabnia (Congress Steering Committee & Coordinator); Professor of Computer Science; The University of Georgia, USA; Editor-in-Chief, Journal of Supercomputing (Springer); Editor-in-Chief, Emerging Trends in Computer Science and Applied Computing (Elsevier); Editor-in-Chief, Transactions of Computational Science & Computational Intelligence (Springer); Elected Fellow, Int'l Society of Intelligent Biological Medicine (ISIBM); USA*
- *Prof. Juan Jose Martinez Castillo; Director, The Acantelys Alan Turing Nikola Tesla Research Group and GIPEB, Universidad Nacional Abierta, Venezuela*

- *Dr. En Cheng; Department of Computer Science, The University of Akron, Akron, Ohio, USA*
- *Dr. Ravi Chityala (HIMS'15 + BIOENG'15); Elekta Inc, Sunnyvale, California, USA; and University of California Santa Cruz Extension, San Jose, California, USA*
- *Prof. Kevin Daimi (Congress Steering Committee); Director, Computer Science and Software Engineering Programs, Department of Mathematics, Computer Science and Software Engineering, University of Detroit Mercy, Detroit, Michigan, USA*
- *Prof. Youping Deng; Director of Bioinformatics and Biostatistics, Rush University Medical Center, Chicago, Illinois, USA*
- *Dr. Lamia Atma Djoudi (Chair, Doctoral Colloquium & Demos Organizer); Synchrone Technologies, France*
- *Prof. Mary Mehrnoosh Eshaghian-Wilner (Congress Steering Committee); Professor of Engineering Practice, University of Southern California, California, USA; Adjunct Professor, Electrical Engineering, University of California Los Angeles, Los Angeles (UCLA), California, USA*
- *Arjang Fahim; Department of Computer Science and Engineering; University of South Carolina, Columbia, South Carolina, USA*
- *Prof. George A. Gravvanis (Congress Steering Committee); Director, Physics Laboratory & Head of Advanced Scientific Computing, Applied Math & Applications Research Group; Professor of Applied Mathematics and Numerical Computing and Department of ECE, School of Engineering, Democritus University of Thrace, Xanthi, Greece; former President of the Technical Commission on Data Processing, Social Security for the Migrant Workers, European Commission, Hellenic Presidency, Greece*
- *Prof. Houcine Hassan; Universitat Politecnica de Valencia, Spain*
- *Prof. Mohammad Shahadat Hossain (PhD, UMIST, Manchester), MBCS; Department of Computer Science and Engineering, University of Chittagong, Bangladesh; Visiting Academic Staff, The University of Manchester, UK*
- *Prof. George Jandieri (Congress Steering Committee); Georgian Technical University, Tbilisi, Georgia; Chief Scientist, The Institute of Cybernetics, Georgian Academy of Science, Georgia; Editorial Board Member: International Journal of Microwaves and Optical Technology, The Open Atmospheric Science Journal, American Journal of Remote Sensing*
- *Dr. Abdeldjalil Khelassi; Associate Professor and Head of Knowledge and Information Engineering Research Team, Computer Science Department, University of Tlemcen, Algeria*
- *Prof. Byung-Gyu Kim (Congress Steering Committee); Multimedia Processing Communications Lab.(MPCL), Department of Computer Science and Engineering, College of Engineering, SunMoon University, South Korea*
- *Prof. Tai-hoon Kim; School of Information and Computing Science, University of Tasmania, Australia*
- *Assoc. Prof. Dr. Guoming Lai; Computer Science and Technology, Sun Yat-Sen University, Guangzhou, P. R. China*
- *Dr. Ying Liu; Division of Computer Science, Mathematics and Science, St. John's University, Queens, New York, USA*
- *Dr. Yan Luo; National Institutes of Health, Bethesda, Maryland, USA*
- *Prof. George Markowsky (Congress Steering Committee); Professor & Associate Director, School of Computing and Information Science; Chair International Advisory Board of IEEE IDAACS; Director 2013 Northeast Collegiate Cyber Defense Competition; President Phi Beta Kappa Delta Chapter of Maine; Cooperating Prof. Mathematics & Statistics Department UMaine; Cooperating Prof. School of Policy & Int'l Affairs UMaine; University of Maine, Orono, Maine, USA*
- *Dr. Andrew Marsh (Congress Steering Committee); CEO, HoIP Telecom Ltd (Healthcare over Internet Protocol), UK; Secretary General of World Academy of BioMedical Sciences and Technologies (WABT) a UNESCO NGO, The United Nations*
- *Prof. G. N. Pandey (Congress Steering Committee); Vice-Chancellor, Arunachal University of Studies, Arunachal Pradesh, India; Adjunct Professor, Indian Institute of Information Technology, Allahabad, India*
- *Prof. James J. (Jong Hyuk) Park (Congress Steering Committee); Department of Computer Science and Engineering (DCSE), SeoulTech, Korea; President, FTRA, EiC, HCIS Springer, JoC, IJITCC; Head of DCSE, SeoulTech, Korea*
- *Prof. R. Ponalagusamy; Department of Mathematics, National Institute of Technology, Tiruchirappalli, India; and Editor-in-Chief, International Journal of Mathematics and Engineering with Computers*
- *Dr. Alvaro Rubio-Largo; University of Extremadura, Caceres, Spain*
- *Prof. Khemaissia Seddik; University of Tebessa, Algerie, Algeria*
- *Dr. Akash Singh (Congress Steering Committee); IBM Corporation, Sacramento, California, USA; Chartered Scientist, Science Council, UK; Fellow, British Computer Society; Member, Senior IEEE, AACR, AAAS, and AAAI; IBM Corporation, USA*
- *Ashu M. G. Solo, (Publicity Chair), Fellow of British Computer Society, Principal/R&D Engineer, Maverick Technologies America Inc.*

- *Prof. Fernando G. Tinetti (Congress Steering Committee); School of Computer Science, Universidad Nacional de La Plata, La Plata, Argentina; Co-editor, Journal of Computer Science and Technology (JCS&T)*
- *Prof. Quoc-Nam Tran (BIOCOMP'15 Co-Chair); Professor and Chair, Department of Computer Science, University of South Dakota, USA*
- *Prof. Shiuh-Jeng Wang (Congress Steering Committee); Department of Information Management, Central Police University, Taiwan; Program Chair, Security & Forensics, Taiwan; Director, Information Crypto and Construction Lab (ICCL) & ICCL-FROG*
- *Prof. Xiang Simon Wang; Head, Laboratory of Cheminfomatics and Drug Design, Howard University College of Pharmacy, Washington, DC, USA*
- *Prof. Mary Q. Yang (Congress Steering Committee & Vice Chair of BIOCOMP'15); Director, Mid-South Bioinformatics Center and Joint Bioinformatics Ph.D. Program, Medical Sciences and George W. Donaghey College of Engineering and Information Technology, University of Arkansas, USA*
- *Prof. Jane You (Congress Steering Committee); Associate Head, Department of Computing, The Hong Kong Polytechnic University, Kowloon, Hong Kong*
- *Peng Zhang; Biomedical Engineering Department, Stony Brook University, Stony Brook, New York, USA*
- *Prof. Wenbing Zhao; Department of Electrical and Computer Engineering, Cleveland State University, Cleveland, Ohio, USA*

We would like to extend our appreciation to the members of the program committees of individual sessions, tracks, and workshops; their names do not appear in this document; they are listed on the web sites of individual tracks.

As Sponsors-at-large, partners, and/or organizers each of the followings (separated by semicolons) provided help for at least one track of the World Congress: Computer Science Research, Education, and Applications Press (CSREA); US Chapter of World Academy of Science (http://www.world-academy-of-science.org/) ; American Council on Science & Education & Federated Research Council (http://www.americancse.org/); HoIP, Health Without Boundaries, Healthcare over Internet Protocol, UK (http://www.hoip.eu); HoIP Telecom, UK (http://www.hoip-telecom.co.uk); and WABT, Human Health Medicine, UNESCO NGOs, Paris, France (http://www.thewabt.com/). In addition, a number of university faculty members and their staff (names appear on the cover of the set of proceedings), several publishers of computer science and computer engineering books and journals, chapters and/or task forces of computer science associations/organizations from 4 countries, and developers of high-performance machines and systems provided significant help in organizing the conference as well as providing some resources. We are grateful to them all.

We express our gratitude to keynote, invited, and individual conference/tracks and tutorial speakers - the list of speakers appears on the conference web site. We would also like to thank the followings: UCMSS (Universal Conference Management Systems & Support, California, USA) for managing all aspects of the conference; Dr. Tim Field of APC for coordinating and managing the printing of the proceedings; and the staff of Monte Carlo Resort (Convention department) in Las Vegas for the professional service they provided. Last but not least, we would like to thank the Co-Editors and Associate Co-Editors of BIOCOMP'15: Prof. Hamid R. Arabnia, Prof. George Jandieri, Ashu M. G. Solo, Prof. Fernando G. Tinetti, Prof. Quoc-Nam Tran, and Dr. Mary Q. Yang.

We present the proceedings of BIOCOMP'15.

Steering Committee, 2015
http://www.world-academy-of-science.org/

Contents

SESSION: BIOINFORMATICS AND RELATED ISSUES

Shannon's Entropy of The Stochastic Context-Free Grammar and an Application to RNA Secondary Structure Modeling **3**
Amirhossein Manzourolajdad

Structure of the Intracellular Loop Domain in the GABAa Receptor alpha-Subunit **8**
Julie Mustard, Jonathan Worley, Norbert Seidler

SESSION: PROTEIN CLASSIFICATION and STRUCTURE PREDICTION, FOLDING, and COMPUTATIONAL STRUCTURAL BIOLOGY + DRUG DESIGN

An Investigation of Minimum Data Requirement for Successful Structure Determination of Pf2048.1 with REDCRAFT **17**
Casey Cole, Daniela Ishimaru, Mirko Hennig, Homayoun Valafar

An improved Stochastic Proximity Embedding to Protein Structure Determination **25**
Ivan da Silva Sendin, Indiara Barbosa Vale, Marcos Aurelio Batista

Chinese Whispers for Protein-Protein Interaction Network Analysis to Discover Overlapping Functional Modules **31**
Ying Liu

Profrager Web Server: Fragment Libraries Generation for Protein Structure Prediction **38**
Karina Baptista dos Santos, Raphael Trevizani, Fabio Lima Custodio, Laurent Emmanuel Dardenne

Ant Colony Optimization for Construction of Common Patterns of the Protein Motifs **43**
Junior Altamiranda, Jose Aguilar, Christian Delamarche

Revealing Protein-ligand Interaction Patterns Through Frequent Subgraph Mining **50**
Sabrina Silveira, Alexandre Fassio, Carlos Silveira, Raquel Melo-Minardi

SESSION: GENE EXPRESSION, REGULATORY NETWORKS, MICROARRAY, SEQUENCING, ALIGNMENT, AND RELATED STUDIES

De Novo Assembly of Uca minax Transcriptome from Next Generation Sequencing **59**
Hanin Omar, Casey Cole, Arjang Fahim, Giuliana Gusmaroli, Stephen Borgianini, Homayoun Valafar

A Bitwise Encoding Scheme Designed to Improve the Speed of Large Scale Gene Set Comparison **67**
Tham H. Hoang, Pujan Joshi, Seung-Hyun Hong, Dong-Guk Shin

Exploring Effects Of Various Data Preprocessing Methods On The Classification of DNA Microarray Data **74**
Samuel Dong

A Simplified Linear Model for Reconstruction of Gene Regulatory Networks **80**
Xi Wu, Bei Yang, Wonryull Koh, Ping Gong, Chaoyang Zhang

KLAST: Fast and Sensitive Software to Compare Large Genomic Databanks on Cloud **85**
Ivaylo Petrov, Sebastien Brillet, Erwan Drezen, Sylvain Quiniou, Ludovic Antin, Patrick Durand, Dominique Lavenier

Model-driven analysis of gene expression data application to metabolic re-programming during T-cell Activation **91**
Alyaa Abdel-Haleem, Ayman Abuelela, Victor Solovyev, Neema Jamshidi, Nathan Lewis

SESSION: SIGNAL PROCESSING, IMAGING SCIENCE, AND DATA QUALITY ENHANCEMENT + HEALTH INFORMATION SYSTEMS

The Stacked Frame Display for Optimizing the Display and Interpretation of Analog Data **99**
Robert A. Warner

Refinement BRATUMASS' Data of Breast Phantom Processing based on Compressive Sensing **105**
Luxi Li, Weimin Ji, Yizhou Yao, Meng Yao, Blair Fleet, Erik Goodman, Huiyan Wang, John R Deller

A Proposed Warped Modified-B Time-Frequency Distribution Applied to Doppler Blood Flow Measurement **110**
Fabian Garcia Nocetti, Julio Solano Gonzalez, Ernesto Rubio Acosta

An Exploration of the Relationship between Resilience and Quality of Life **115**
Daxin Zhu, Xiaodong Wang, Jun Tian

SESSION: POSTER PAPERS

Advances in Bioinformatics and Computational Biology: Don't take them too seriously anyway **123**
Emanuel Diamant

Feedback and Coupled Feedback Loop Identification within KEGG and Reactome Pathway Database **125**
Yin-Jie Liu, Chen-Lung Liu, Tun-Wen Pai, Wen-Shyong Tzou, Chin-Hwa Hu

Comparative Analysis of Two Bacterial Binding Lectins **127**
Sim-Kun Ng, Yi-En Chen, Sheng-Hao Chou , Jiun-Hau Fu, Tse-Kai Fu, Tung-Kung Wu, Margaret Dah-Tsyr Chang

SESSION: BIOINFORMATICS, COMPUTATIONAL BIOLOGY, AND RELATED ISSUES + LATE BREAKING PAPERS AND POSITION PAPERS

Improved and Novel Cluster Analysis for Bioinformatics, Computational Biology and All Other Data **131**
Ruming Li, Xiu-Qing Li, Guixue Wang

Classification of Mass and Non-Mass Mammography Based on Tsallis Entropy **140**
Rafaela S. Alcantara, Perfilino Eugenio Ferreira Junior

SESSION: LATE BREAKING PAPERS: BIOINFORMATICS AND COMPUTATIONAL BIOLOGY

A Novel Algorithm for Finding Long Term Influence and Sensitivity of Genes in Probabilistic Genetic Regulatory Networks **147**
Quoc-Nam Tran

In Silico Prediction of 3D Structure of Anopheles Gambiae CYP6Z3 Protein **157**
Marion Adebiyi, Adaobi Okafor

Epidemic Analysis Using Traditional Model Checking and Stochastic Simulation **163**
Kanishka Chauhan, Moiez Gohar, M.V. Panduranga Rao