Lecture Notes in Computer Science 12140

Founding Editors

Gerhard Goos
Karlsruhe Institute of Technology, Karlsruhe, Germany

Juris Hartmanis
Cornell University, Ithaca, NY, USA

Editorial Board Members

Elisa Bertino
Purdue University, West Lafayette, IN, USA

Wen Gao
Peking University, Beijing, China

Bernhard Steffen
TU Dortmund University, Dortmund, Germany

Gerhard Woeginger
RWTH Aachen, Aachen, Germany

Moti Yung
Columbia University, New York, NY, USA

More information about this series at http://www.springer.com/series/7407

Valeria V. Krzhizhanovskaya ·
Gábor Závodszky · Michael H. Lees ·
Jack J. Dongarra · Peter M. A. Sloot ·
Sérgio Brissos · João Teixeira (Eds.)

Computational Science – ICCS 2020

20th International Conference
Amsterdam, The Netherlands, June 3–5, 2020
Proceedings, Part IV

Springer

Editors
Valeria V. Krzhizhanovskaya
University of Amsterdam
Amsterdam, The Netherlands

Michael H. Lees
University of Amsterdam
Amsterdam, The Netherlands

Peter M. A. Sloot
University of Amsterdam
Amsterdam, The Netherlands

ITMO University
Saint Petersburg, Russia

Nanyang Technological University
Singapore, Singapore

João Teixeira
Intellegibilis
Setúbal, Portugal

Gábor Závodszky
University of Amsterdam
Amsterdam, The Netherlands

Jack J. Dongarra
University of Tennessee
Knoxville, TN, USA

Sérgio Brissos
Intellegibilis
Setúbal, Portugal

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-030-50422-9 ISBN 978-3-030-50423-6 (eBook)
https://doi.org/10.1007/978-3-030-50423-6

LNCS Sublibrary: SL1 – Theoretical Computer Science and General Issues

© Springer Nature Switzerland AG 2020
This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.
The use of general descriptive names, registered names, trademarks, service marks, 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.
The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Twenty Years of Computational Science

Welcome to the 20th Annual International Conference on Computational Science (ICCS – https://www.iccs-meeting.org/iccs2020/).

During the preparation for this 20th edition of ICCS we were considering all kinds of nice ways to celebrate two decennia of computational science. Afterall when we started this international conference series, we never expected it to be so successful and running for so long at so many different locations across the globe! So we worked on a mind-blowing line up of renowned keynotes, music by scientists, awards, a play written by and performed by computational scientists, press attendance, a lovely venue… you name it, we had it all in place. Then corona hit us.

After many long debates and considerations, we decided to cancel the physical event but still support our scientists and allow for publication of their accepted peer-reviewed work. We are proud to present the proceedings you are reading as a result of that.

ICCS 2020 is jointly organized by the University of Amsterdam, NTU Singapore, and the University of Tennessee.

The International Conference on Computational Science is an annual conference that brings together researchers and scientists from mathematics and computer science as basic computing disciplines, as well as researchers from various application areas who are pioneering computational methods in sciences such as physics, chemistry, life sciences, engineering, arts and humanitarian fields, to discuss problems and solutions in the area, to identify new issues, and to shape future directions for research.

Since its inception in 2001, ICCS has attracted increasingly higher quality and numbers of attendees and papers, and 2020 was no exception, with over 350 papers accepted for publication. The proceedings series have become a major intellectual resource for computational science researchers, defining and advancing the state of the art in this field.

The theme for ICCS 2020, "Twenty Years of Computational Science", highlights the role of Computational Science over the last 20 years, its numerous achievements, and its future challenges. This conference was a unique event focusing on recent developments in: scalable scientific algorithms, advanced software tools, computational grids, advanced numerical methods, and novel application areas. These innovative novel models, algorithms, and tools drive new science through efficient application in areas such as physical systems, computational and systems biology, environmental systems, finance, and others.

This year we had 719 submissions (230 submissions to the main track and 489 to the thematic tracks). In the main track, 101 full papers were accepted (44%). In the thematic tracks, 249 full papers were accepted (51%). A high acceptance rate in the thematic tracks is explained by the nature of these, where many experts in a particular field are personally invited by track organizers to participate in their sessions.

ICCS relies strongly on the vital contributions of our thematic track organizers to attract high-quality papers in many subject areas. We would like to thank all committee members from the main and thematic tracks for their contribution to ensure a high standard for the accepted papers. We would also like to thank Springer, Elsevier, the Informatics Institute of the University of Amsterdam, the Institute for Advanced Study of the University of Amsterdam, the SURFsara Supercomputing Centre, the Netherlands eScience Center, the VECMA Project, and Intellegibilis for their support. Finally, we very much appreciate all the Local Organizing Committee members for their hard work to prepare this conference.

We are proud to note that ICCS is an A-rank conference in the CORE classification.

We wish you good health in these troubled times and hope to see you next year for ICCS 2021.

June 2020

Valeria V. Krzhizhanovskaya
Gábor Závodszky
Michael Lees
Jack Dongarra
Peter M. A. Sloot
Sérgio Brissos
João Teixeira

Organization

Thematic Tracks and Organizers

Advances in High-Performance Computational Earth Sciences: Applications and Frameworks – IHPCES

Takashi Shimokawabe
Kohei Fujita
Dominik Bartuschat

Agent-Based Simulations, Adaptive Algorithms and Solvers – ABS-AAS

Maciej Paszynski
David Pardo
Victor Calo
Robert Schaefer
Quanling Deng

Applications of Computational Methods in Artificial Intelligence and Machine Learning – ACMAIML

Kourosh Modarresi
Raja Velu
Paul Hofmann

Biomedical and Bioinformatics Challenges for Computer Science – BBC

Mario Cannataro
Giuseppe Agapito
Mauro Castelli
Riccardo Dondi
Rodrigo Weber dos Santos
Italo Zoppis

Classifier Learning from Difficult Data – CLD^2

Michał Woźniak
Bartosz Krawczyk
Paweł Ksieniewicz

Complex Social Systems through the Lens of Computational Science – CSOC

Debraj Roy
Michael Lees
Tatiana Filatova

Computational Health – CompHealth

Sergey Kovalchuk
Stefan Thurner
Georgiy Bobashev

Computational Methods for Emerging Problems in (dis-)Information Analysis – DisA

Michal Choras
Konstantinos Demestichas

Computational Optimization, Modelling and Simulation – COMS

Xin-She Yang
Slawomir Koziel
Leifur Leifsson

Computational Science in IoT and Smart Systems – IoTSS

Vaidy Sunderam
Dariusz Mrozek

Computer Graphics, Image Processing and Artificial Intelligence – CGIPAI

Andres Iglesias
Lihua You
Alexander Malyshev
Hassan Ugail

Data-Driven Computational Sciences – DDCS

Craig C. Douglas
Ana Cortes
Hiroshi Fujiwara
Robert Lodder
Abani Patra
Han Yu

Machine Learning and Data Assimilation for Dynamical Systems – MLDADS

Rossella Arcucci
Yi-Ke Guo

Meshfree Methods in Computational Sciences – MESHFREE

Vaclav Skala
Samsul Ariffin Abdul Karim
Marco Evangelos Biancolini
Robert Schaback

Rongjiang Pan
Edward J. Kansa

Multiscale Modelling and Simulation – MMS

Derek Groen
Stefano Casarin
Alfons Hoekstra
Bartosz Bosak
Diana Suleimenova

Quantum Computing Workshop – QCW

Katarzyna Rycerz
Marian Bubak

Simulations of Flow and Transport: Modeling, Algorithms and Computation – SOFTMAC

Shuyu Sun
Jingfa Li
James Liu

Smart Systems: Bringing Together Computer Vision, Sensor Networks and Machine Learning – SmartSys

Pedro J. S. Cardoso
João M. F. Rodrigues
Roberto Lam
Janio Monteiro

Software Engineering for Computational Science – SE4Science

Jeffrey Carver
Neil Chue Hong
Carlos Martinez-Ortiz

Solving Problems with Uncertainties – SPU

Vassil Alexandrov
Aneta Karaivanova

Teaching Computational Science – WTCS

Angela Shiflet
Alfredo Tirado-Ramos
Evguenia Alexandrova

Uncertainty Quantification for Computational Models – UNEQUIvOCAL

Wouter Edeling
Anna Nikishova
Peter Coveney

Program Committee and Reviewers

Ahmad Abdelfattah
Samsul Ariffin Abdul Karim
Evgenia Adamopoulou
Jaime Afonso Martins
Giuseppe Agapito
Ram Akella
Elisabete Alberdi Celaya
Luis Alexandre
Vassil Alexandrov
Evguenia Alexandrova
Hesham H. Ali
Julen Alvarez-Aramberri
Domingos Alves
Julio Amador Diaz Lopez
Stanislaw Ambroszkiewicz
Tomasz Andrysiak
Michael Antolovich
Hartwig Anzt
Hideo Aochi
Hamid Arabnejad
Rossella Arcucci
Khurshid Asghar
Marina Balakhontceva
Bartosz Balis
Krzysztof Banas
João Barroso
Dominik Bartuschat
Nuno Basurto
Pouria Behnoudfar
Joern Behrens
Adrian Bekasiewicz
Gebrai Bekdas
Stefano Beretta
Benjamin Berkels
Martino Bernard
Daniel Berrar
Sanjukta Bhowmick
Marco Evangelos Biancolini
Georgiy Bobashev
Bartosz Bosak
Marian Bubak
Jérémy Buisson
Robert Burduk
Michael Burkhart
Allah Bux
Aleksander Byrski
Cristiano Cabrita
Xing Cai
Barbara Calabrese
Jose Camata
Mario Cannataro
Alberto Cano
Pedro Jorge Sequeira Cardoso
Jeffrey Carver
Stefano Casarin
Manuel Castañón-Puga
Mauro Castelli
Eduardo Cesar
Nicholas Chancellor
Patrikakis Charalampos
Ehtzaz Chaudhry
Chuanfa Chen
Siew Ann Cheong
Andrey Chernykh
Lock-Yue Chew
Su Fong Chien
Marta Chinnici
Sung-Bae Cho
Michal Choras
Loo Chu Kiong
Neil Chue Hong
Svetlana Chuprina
Paola Cinnella
Noélia Correia
Adriano Cortes
Ana Cortes
Enrique Costa-Montenegro
David Coster
Helene Coullon
Peter Coveney
Attila Csikasz-Nagy
Loïc Cudennec
Javier Cuenca
Yifeng Cui
António Cunha
Ben Czaja
Pawel Czarnul
Flávio Martins
Bhaskar Dasgupta
Konstantinos Demestichas
Quanling Deng
Nilanjan Dey
Khaldoon Dhou
Jamie Diner
Jacek Dlugopolski
Simona Domesová
Riccardo Dondi
Craig C. Douglas
Linda Douw
Rafal Drezewski
Hans du Buf
Vitor Duarte
Richard Dwight
Wouter Edeling
Waleed Ejaz
Dina El-Reedy

Amgad Elsayed
Nahid Emad
Chriatian Engelmann
Gökhan Ertaylan
Alex Fedoseyev
Luis Manuel Fernández
Antonino Fiannaca
Christos Filelis-Papadopoulos
Rupert Ford
Piotr Frackiewicz
Martin Frank
Ruy Freitas Reis
Karl Frinkle
Haibin Fu
Kohei Fujita
Hiroshi Fujiwara
Takeshi Fukaya
Wlodzimierz Funika
Takashi Furumura
Ernst Fusch
Mohamed Gaber
David Gal
Marco Gallieri
Teresa Galvao
Akemi Galvez
Salvador García
Bartlomiej Gardas
Delia Garijo
Frédéric Gava
Piotr Gawron
Bernhard Geiger
Alex Gerbessiotis
Ivo Goncalves
Antonio Gonzalez Pardo
Jorge González-Domínguez
Yuriy Gorbachev
Pawel Gorecki
Michael Gowanlock
Manuel Grana
George Gravvanis
Derek Groen
Lutz Gross
Sophia Grundner-Culemann
Pedro Guerreiro
Tobias Guggemos
Xiaohu Guo
Piotr Gurgul
Filip Guzy
Pietro Hiram Guzzi
Zulfiqar Habib
Panagiotis Hadjidoukas
Masatoshi Hanai
John Hanley
Erik Hanson
Habibollah Haron
Carina Haupt
Claire Heaney
Alexander Heinecke
Jurjen Rienk Helmus
Álvaro Herrero
Bogumila Hnatkowska
Maximilian Höb
Erlend Hodneland
Olivier Hoenen
Paul Hofmann
Che-Lun Hung
Andres Iglesias
Takeshi Iwashita
Alireza Jahani
Momin Jamil
Vytautas Jancauskas
João Janeiro
Peter Janku
Fredrik Jansson
Jirí Jaroš
Caroline Jay
Shalu Jhanwar
Zhigang Jia
Chao Jin
Zhong Jin
David Johnson
Guido Juckeland
Maria Juliano
Edward J. Kansa
Aneta Karaivanova
Takahiro Katagiri
Timo Kehrer
Wayne Kelly
Christoph Kessler
Jakub Klikowski
Harald Koestler
Ivana Kolingerova
Georgy Kopanitsa
Gregor Kosec
Sotiris Kotsiantis
Ilias Kotsireas
Sergey Kovalchuk
Michal Koziarski
Slawomir Koziel
Rafal Kozik
Bartosz Krawczyk
Elisabeth Krueger
Valeria Krzhizhanovskaya
Pawel Ksieniewicz
Marek Kubalcík
Sebastian Kuckuk
Eileen Kuehn
Michael Kuhn
Michal Kulczewski
Krzysztof Kurowski
Massimo La Rosa
Yu-Kun Lai
Jalal Lakhlili
Roberto Lam
Anna-Lena Lamprecht
Rubin Landau
Johannes Langguth
Elisabeth Larsson
Michael Lees
Leifur Leifsson
Kenneth Leiter
Roy Lettieri
Andrew Lewis
Jingfa Li
Khang-Jie Liew
Hong Liu
Hui Liu
Yen-Chen Liu
Zhao Liu
Pengcheng Liu
James Liu
Marcelo Lobosco
Robert Lodder
Marcin Los
Stephane Louise

Frederic Loulergue
Paul Lu
Stefan Luding
Onnie Luk
Scott MacLachlan
Luca Magri
Imran Mahmood
Zuzana Majdisova
Alexander Malyshev
Muazzam Maqsood
Livia Marcellino
Tomas Margalef
Tiziana Margaria
Svetozar Margenov
Urszula Markowska-Kaczmar
Osni Marques
Carmen Marquez
Carlos Martinez-Ortiz
Paula Martins
Flávio Martins
Luke Mason
Pawel Matuszyk
Valerie Maxville
Wagner Meira Jr.
Roderick Melnik
Valentin Melnikov
Ivan Merelli
Choras Michal
Leandro Minku
Jaroslaw Miszczak
Janio Monteiro
Kourosh Modarresi
Fernando Monteiro
James Montgomery
Andrew Moore
Dariusz Mrozek
Peter Mueller
Khan Muhammad
Judit Muñoz
Philip Nadler
Hiromichi Nagao
Jethro Nagawkar
Kengo Nakajima
Ionel Michael Navon
Philipp Neumann
Mai Nguyen
Hoang Nguyen
Nancy Nichols
Anna Nikishova
Hitoshi Nishizawa
Brayton Noll
Algirdas Noreika
Enrique Onieva
Kenji Ono
Eneko Osaba
Aziz Ouaarab
Serban Ovidiu
Raymond Padmos
Wojciech Palacz
Ivan Palomares
Rongjiang Pan
Joao Papa
Nikela Papadopoulou
Marcin Paprzycki
David Pardo
Anna Paszynska
Maciej Paszynski
Abani Patra
Dana Petcu
Serge Petiton
Bernhard Pfahringer
Frank Phillipson
Juan C. Pichel
Anna Pietrenko-Dabrowska
Laércio L. Pilla
Armando Pinho
Tomasz Piontek
Yuri Pirola
Igor Podolak
Cristina Portales
Simon Portegies Zwart
Roland Potthast
Ela Pustulka-Hunt
Vladimir Puzyrev
Alexander Pyayt
Rick Quax
Cesar Quilodran Casas
Barbara Quintela
Ajaykumar Rajasekharan
Celia Ramos
Lukasz Rauch
Vishal Raul
Robin Richardson
Heike Riel
Sophie Robert
Luis M. Rocha
Joao Rodrigues
Daniel Rodriguez
Albert Romkes
Debraj Roy
Katarzyna Rycerz
Alberto Sanchez
Gabriele Santin
Alex Savio
Robert Schaback
Robert Schaefer
Rafal Scherer
Ulf D. Schiller
Bertil Schmidt
Martin Schreiber
Alexander Schug
Gabriela Schütz
Marinella Sciortino
Diego Sevilla
Angela Shiflet
Takashi Shimokawabe
Marcin Sieniek
Nazareen Sikkandar Basha
Anna Sikora
Janaína De Andrade Silva
Diana Sima
Robert Sinkovits
Haozhen Situ
Leszek Siwik
Vaclav Skala
Peter Sloot
Renata Slota
Grazyna Slusarczyk
Sucha Smanchat
Marek Smieja
Maciej Smolka
Bartlomiej Sniezynski
Isabel Sofia Brito
Katarzyna Stapor
Bogdan Staszewski

Jerzy Stefanowski
Dennis Stevenson
Tomasz Stopa
Achim Streit
Barbara Strug
Pawel Strumillo
Dante Suarez
Vishwas H. V. Subba Rao
Bongwon Suh
Diana Suleimenova
Ray Sun
Shuyu Sun
Vaidy Sunderam
Martin Swain
Alessandro Taberna
Ryszard Tadeusiewicz
Daisuke Takahashi
Zaid Tashman
Osamu Tatebe
Carlos Tavares Calafate
Kasim Tersic
Yonatan Afework Tesfahunegn
Jannis Teunissen
Stefan Thurner
Nestor Tiglao
Alfredo Tirado-Ramos
Arkadiusz Tomczyk
Mariusz Topolski
Paolo Trunfio
Ka-Wai Tsang
Hassan Ugail
Eirik Valseth
Pavel Varacha
Pierangelo Veltri
Raja Velu
Colin Venters
Gytis Vilutis
Peng Wang
Jianwu Wang
Shuangbu Wang
Rodrigo Weber dos Santos
Katarzyna Wegrzyn-Wolska
Mei Wen
Lars Wienbrandt
Mark Wijzenbroek
Peter Woehrmann
Szymon Wojciechowski
Maciej Woloszyn
Michal Wozniak
Maciej Wozniak
Yu Xia
Dunhui Xiao
Huilin Xing
Miguel Xochicale
Feng Xu
Wei Xue
Yoshifumi Yamamoto
Dongjia Yan
Xin-She Yang
Dongwei Ye
Wee Ping Yeo
Lihua You
Han Yu
Gábor Závodszky
Yao Zhang
H. Zhang
Jinghui Zhong
Sotirios Ziavras
Italo Zoppis
Chiara Zucco
Pawel Zyblewski
Karol Zyczkowski

Contents – Part IV

Classifier Learning from Difficult Data

Different Strategies of Fitting Logistic Regression for Positive and Unlabelled Data 3
Paweł Teisseyre, Jan Mielniczuk, and Małgorzata Łazęcka

Branch-and-Bound Search for Training Cascades of Classifiers 18
Dariusz Sychel, Przemysław Klęsk, and Aneta Bera

Application of the Stochastic Gradient Method in the Construction of the Main Components of PCA in the Task Diagnosis of Multiple Sclerosis in Children 35
Mariusz Topolski

Grammatical Inference by Answer Set Programming 45
Wojciech Wieczorek, Łukasz Strąk, Arkadiusz Nowakowski, and Olgierd Unold

Dynamic Classifier Selection for Data with Skewed Class Distribution Using Imbalance Ratio and Euclidean Distance 59
Paweł Zyblewski and Michał Woźniak

On Model Evaluation Under Non-constant Class Imbalance 74
Jan Brabec, Tomáš Komárek, Vojtěch Franc, and Lukáš Machlica

A Correction Method of a Base Classifier Applied to Imbalanced Data Classification 88
Pawel Trajdos and Marek Kurzynski

Standard Decision Boundary in a Support-Domain of Fuzzy Classifier Prediction for the Task of Imbalanced Data Classification 103
Pawel Ksieniewicz

Employing One-Class SVM Classifier Ensemble for Imbalanced Data Stream Classification 117
Jakub Klikowski and Michał Woźniak

Clustering and Weighted Scoring in Geometric Space Support Vector Machine Ensemble for Highly Imbalanced Data Classification 128
Paweł Ksieniewicz and Robert Burduk

Performance Analysis of Binarization Strategies for Multi-class Imbalanced Data Classification 141
Michał Żak and Michał Woźniak

Towards Network Anomaly Detection Using Graph Embedding 156
Qingsai Xiao, Jian Liu, Quiyun Wang, Zhengwei Jiang, Xuren Wang, and Yepeng Yao

Maintenance and Security System for PLC Railway LED Sign Communication Infrastructure 170
Tomasz Andrysiak and Łukasz Saganowski

Fingerprinting of URL Logs: Continuous User Authentication from Behavioural Patterns 184
Jakub Nowak, Taras Holotyak, Marcin Korytkowski, Rafał Scherer, and Slava Voloshynovskiy

On the Impact of Network Data Balancing in Cybersecurity Applications . . . 196
Marek Pawlicki, Michał Choraś, Rafał Kozik, and Witold Hołubowicz

Pattern Recognition Model to Aid the Optimization of *Dynamic Spectrally-Spatially Flexible Optical Networks* 211
Paweł Ksieniewicz, Róża Goścień, Mirosław Klinkowski, and Krzysztof Walkowiak

Missing Features Reconstruction Using a Wasserstein Generative Adversarial Imputation Network 225
Magda Friedjungová, Daniel Vašata, Maksym Balatsko, and Marcel Jiřina

Complex Social Systems Through the Lens of Computational Science

Cooperation for Public Goods Under Uncertainty 243
Jeroen Bruggeman and Rudolf Sprik

An Information-Theoretic and Dissipative Systems Approach to the Study of Knowledge Diffusion and Emerging Complexity in Innovation Systems. . . 252
Guillem Achermann, Gabriele De Luca, and Michele Simoni

Mapping the Port Influence Diffusion Patterns: A Case Study of Rotterdam, Antwerp and Singapore 266
Peng Peng and Feng Lu

Entropy-Based Measure for Influence Maximization in Temporal Networks . . . 277
Radosław Michalski, Jarosław Jankowski, and Patryk Pazura

Evaluation of the Costs of Delayed Campaigns for Limiting the Spread of Negative Content, Panic and Rumours in Complex Networks 291
Jaroslaw Jankowski, Piotr Bartkow, Patryk Pazura, and Kamil Bortko

From Generality to Specificity: On Matter of Scale in Social Media Topic Communities 305
Danila Vaganov, Mariia Bardina, and Valentina Guleva

Computational Health

Hybrid Text Feature Modeling for Disease Group Prediction Using Unstructured Physician Notes 321
Gokul S. Krishnan and S. Sowmya Kamath

Early Signs of Critical Slowing Down in Heart Surface Electrograms of Ventricular Fibrillation Victims 334
Berend Nannes, Rick Quax, Hiroshi Ashikaga, Mélèze Hocini, Remi Dubois, Olivier Bernus, and Michel Haïssaguerre

A Comparison of Generalized Stochastic Milevsky-Promislov Mortality Models with Continuous Non-Gaussian Filters 348
Piotr Śliwka and Leslaw Socha

Ontology-Based Inference for Supporting Clinical Decisions in Mental Health 363
Diego Bettiol Yamada, Filipe Andrade Bernardi, Newton Shydeo Brandão Miyoshi, Inácia Bezerra de Lima, André Luiz Teixeira Vinci, Vinicius Tohoru Yoshiura, and Domingos Alves

Towards Prediction of Heart Arrhythmia Onset Using Machine Learning 376
Agnieszka Kitlas Golińska, Wojciech Lesiński, Andrzej Przybylski, and Witold R. Rudnicki

Stroke ICU Patient Mortality Day Prediction 390
Oleg Metsker, Vozniuk Igor, Georgy Kopanitsa, Elena Morozova, and Prohorova Maria

Universal Measure for Medical Image Quality Evaluation Based on Gradient Approach 406
Marzena Bielecka, Andrzej Bielecki, Rafał Obuchowicz, and Adam Piórkowski

Constructing Holistic Patient Flow Simulation Using System Approach 418
Tesfamariam M. Abuhay, Oleg G. Metsker, Aleksey N. Yakovlev, and Sergey V. Kovalchuk

Investigating Coordination of Hospital Departments in Delivering Healthcare for Acute Coronary Syndrome Patients Using Data-Driven Network Analysis 430
Tesfamariam M. Abuhay, Yemisrach G. Nigatie, Oleg G. Metsker, Aleksey N. Yakovlev, and Sergey V. Kovalchuk

A Machine Learning Approach to Short-Term Body Weight Prediction in a Dietary Intervention Program 441
Oladapo Babajide, Tawfik Hissam, Palczewska Anna, Gorbenko Anatoliy, Arne Astrup, J. Alfredo Martinez, Jean-Michel Oppert, and Thorkild I. A. Sørensen

An Analysis of Demographic Data in Irish Healthcare Domain to Support Semantic Uplift 456
Kris McGlinn and Pamela Hussey

From Population to Subject-Specific Reference Intervals 468
Murih Pusparum, Gökhan Ertaylan, and Olivier Thas

Analyzing the Spatial Distribution of Acute Coronary Syndrome Cases Using Synthesized Data on Arterial Hypertension Prevalence 483
Vasiliy N. Leonenko

The Atrial Fibrillation Risk Score for Hyperthyroidism Patients 495
Ilya V. Derevitskii, Daria A. Savitskaya, Alina Y. Babenko, and Sergey V. Kovalchuk

Applicability of Machine Learning Methods to Multi-label Medical Text Classification. 509
Iuliia Lenivtceva, Evgenia Slasten, Mariya Kashina, and Georgy Kopanitsa

Machine Learning Approach for the Early Prediction of the Risk of Overweight and Obesity in Young People 523
Balbir Singh and Hissam Tawfik

Gait Abnormality Detection in People with Cerebral Palsy Using an Uncertainty-Based State-Space Model 536
Saikat Chakraborty, Noble Thomas, and Anup Nandy

Analyses of Public Health Databases via Clinical Pathway Modelling: TBWEB 550
Anderson C. Apunike, Lívia Oliveira-Ciabati, Tiago L. M. Sanches, Lariza L. de Oliveira, Mauro N. Sanchez, Rafael M. Galliez, and Domingos Alves

Preliminary Results on Pulmonary Tuberculosis Detection in Chest X-Ray Using Convolutional Neural Networks 563
Márcio Eloi Colombo Filho, Rafael Mello Galliez, Filipe Andrade Bernardi, Lariza Laura de Oliveira, Afrânio Kritski, Marcel Koenigkam Santos, and Domingos Alves

Risk-Based AED Placement - Singapore Case 577
Ivan Derevitskii, Nikita Kogtikov, Michael H. Lees, Wentong Cai, and Marcus E. H. Ong

Time Expressions Identification Without Human-Labeled Corpus for Clinical Text Mining in Russian 591
Anastasia A. Funkner and Sergey V. Kovalchuk

Experiencer Detection and Automated Extraction of a Family Disease Tree from Medical Texts in Russian Language 603
Ksenia Balabaeva and Sergey Kovalchuk

Computational Methods for Emerging Problems in (dis-)Information Analysis

Machine Learning – The Results Are Not the only Thing that Matters! What About Security, Explainability and Fairness? 615
Michał Choraś, Marek Pawlicki, Damian Puchalski, and Rafał Kozik

Syntactic and Semantic Bias Detection and Countermeasures 629
Roman Englert and Jörg Muschiol

Detecting Rumours in Disasters: An Imbalanced Learning Approach 639
Amir Ebrahimi Fard, Majid Mohammadi, and Bartel van de Walle

Sentiment Analysis for Fake News Detection by Means of Neural Networks 653
Sebastian Kula, Michał Choraś, Rafał Kozik, Paweł Ksieniewicz, and Michał Woźniak

Author Index 667