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Biomedical Engineering Systems and Technologies

12th International Joint Conference, BIOSTEC 2019
Prague, Czech Republic, February 22–24, 2019
Revised Selected Papers

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Preface

The present book includes extended and revised versions of a set of selected papers from the 12th International Joint Conference on Biomedical Engineering Systems and Technologies (BIOSTEC 2019), held in Prague, Czech Republic, during February 22–24, 2019. BIOSTEC is composed of five colocated conferences, each specialized in a different knowledge area, namely BIODEVICES, BIOIMAGING, BIOINFORMATICS, BIOSIGNALS, and HEALTHINF.

BIOSTEC 2019 received 271 paper submissions from 47 countries, of which only 8% are included in this book. This reflects our care in selecting those contributions. These papers were selected by the conference chairs and their selection was based on a number of criteria that included the classifications and comments provided by the Program Committee members, the session chairs' assessment, and the program chairs' meta review of the papers that were included in the technical program. The authors of selected papers were invited to submit a revised, extended, and improved version of their conference paper, including at least 30% new material.

The purpose of the BIOSTEC joint conferences is to bring together researchers and practitioners, including engineers, biologists, health professionals, and informatics/computer scientists. Research presented at BIOSTEC included both theoretical advances and applications of information systems, artificial intelligence, signal processing, electronics, and other engineering tools in areas related to advancing biomedical research and improving healthcare.

The papers selected to be included in this book contribute to the understanding of relevant trends of current research on the biomedical engineering field. In particular, the book contains chapters describing novel trends in biodevices, namely the potential to apply microfluidic platforms to analyze cell deformability in biological fluids, the development of algorithms to compare electrical impedance diagnostics, the simulation of the magnetic navigation of micro robots in the body, or even a new platform for the robotic rehabilitation of balance impairment. This book also includes papers on machine learning – and specifically deep learning – for biosignal processing in medical contexts. This includes the classification of cardiac arrhythmias, stress, or non-stationarity of heart rate. Another trend is the focus on applicable sensor setups with high mobility and low degree of intrusiveness, such as commercially available wearables. Another set of papers included in this book contribute to the understanding of relevant trends of current research on medical image analysis. This includes both classic methods like active contours and modern deep learning techniques like convolutional neural networks. In both cases the crucial element is domain knowledge provided by the experts. It can be expressed either in natural language, which need to be transformed into semantic constraints applied while contour evolution, or as an annotated set of data, which is directly used for neural network training. Another group of papers presents novel algorithms to deal with involved research problems in structural bioinformatics, genomics and proteomics, model design and evaluation, and

drug discovery. Finally, some papers describing the role and acceptance of socially assistive robots in rehabilitation, detection of cognitive impairments and early Alzheimer's dementia, GDPR compliance of mHealth, and improvement of data management in healthcare by adopting FAIR principles and standardizing clinical caremaps were also included.

We would like to thank all the authors for their contributions and also to the reviewers who helped to ensure the quality of this publication.

February 2019

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Contents

Biomedical Electronics and Devices

Design and Evaluation of the Platform for Weight-Shifting Exercises with Compensatory Forces Monitoring.	3
<i>Wiktor Sieklicki, Robert Barański, Szymon Grocholski, Patrycja Matejek, and Mateusz Dyrda</i>	
Reinventing Biomedical Engineering Education Working Towards the 2030 Agenda for Sustainable Development	29
<i>Andrés Díaz Lantada</i>	
Magnetic Three-Dimensional Control System for Micro Robots	55
<i>Gaby Isabel Manzo Pantoja, Martín Alonso Muñoz Medina, and Oscar Andrés Vivas Albán</i>	
Features of Using Nonlinear Dynamics Method in Electrical Impedance Signals Analysis of the Ocular Blood Flow	80
<i>A. A. Kiseleva, P. V. Luzhnov, and E. N. Iomdina</i>	
Analogue Fluids for Cell Deformability Studies in Microfluidic Devices	90
<i>A. S. Moita, C. Caldeira, I. Gonçalves, R. Lima, E. J. Vega, and A. L. N. Moreira</i>	

Bioimaging

Stepwise Transfer of Domain Knowledge for Computer-Aided Diagnosis in Pathology Using Deep Neural Networks.	105
<i>Jia Qu, Nobuyuki Hiruta, Kensuke Terai, Hirokazu Nosato, Masahiro Murakawa, and Hidenori Sakanashi</i>	
Simultaneous Segmentation of Retinal OCT Images Using Level Set.	120
<i>Bashir Isa Dodo, Yongmin Li, Muhammad Isa Dodo, and Xiaohui Liu</i>	

Bioinformatics Models, Methods and Algorithms

Machine Learning and Combinatorial Optimization to Detect Gene-gene Interactions in Genome-wide Real Data: Looking Through the Prism of Four Methods and Two Protocols	139
<i>Hugo Boisauvert and Christine Sinoquet</i>	

The Properties of the Standard Genetic Code and Its Selected Alternatives in Terms of the Optimal Graph Partition	170
<i>Daniyah A. Aloqalaa, Dariusz R. Kowalski, Paweł Błażej, Małgorzata Wnętrzak, Dorota Mackiewicz, and Paweł Mackiewicz</i>	
Characteristic Topological Features of Promoter Capture Hi-C Interaction Networks	192
<i>Elde Lace, Gatis Melkus, Peteris Rucevskis, Edgars Celms, Kārlis Čerāns, Paulis Kikusts, Mārtiņš Opmanis, Darta Rituma, and Juris Viksna</i>	
Generating Reliable Genome Assemblies of Intestinal Protozoans from Clinical Samples for the Purpose of Biomarker Discovery	216
<i>Arthur Morris, Justin Pachebat, Graeme Tyson, Guy Robinson, Rachel Chalmers, and Martin Swain</i>	
Analysis of Discrete Models for Ecosystem Ecology	242
<i>Cinzia Di Giusto, Cédric Gaucherel, Hanna Klaudel, and Franck Pommereau</i>	
Application of Data Mining and Machine Learning in Microwave Radiometry (MWR).	265
<i>Vladislav Levshinskii, Christoforos Galazis, Lev Ovchinnikov, Sergey Vesnin, Alexander Losev, and Igor Goryanin</i>	
Bio-inspired Systems and Signal Processing	
Special Techniques in Applying Continuous Wavelet Transform to Non-stationary Signals of Heart Rate Variability	291
<i>Sergey Bozhokin, Irina Suslova, and Daniil Tarakanov</i>	
Cardiac Arrhythmia Detection from ECG with Convolutional Recurrent Neural Networks	311
<i>Jérôme Van Zaen, Ricard Delgado-Gonzalo, Damien Ferrario, and Mathieu Lemay</i>	
Heart Rate Variability and Electrodermal Activity Biosignal Processing: Predicting the Autonomous Nervous System Response in Mental Stress. . . .	328
<i>Rodrigo Lima, Daniel Osório, and Hugo Gamboa</i>	
ECGpp: A Framework for Selecting the Pre-processing Parameters of ECG Signals Used for Blood Pressure Classification	352
<i>Monika Simjanoska, Gregor Papa, Barbara Koroušić Seljak, and Tome Eftimov</i>	

Health Informatics

Investigating User's Preference for Anthropomorphism of a Social Robot Trainer in Physical Rehabilitation	381
<i>Baisong Liu, Panos Markopoulos, and Daniel Tetteroo</i>	
Dementia and mHealth: On the Way to GDPR Compliance	395
<i>Joana Muchagata, Soraia Teles, Pedro Vieira-Marques, Diogo Abrantes, and Ana Ferreira</i>	
Comparison of Texture Features and Color Characteristics of Digital Drawings in Cognitive Healthy Subjects and Patients with Amnestic Mild Cognitive Impairment or Early Alzheimer's Dementia	412
<i>Sibylle Robens, Thomas Ostermann, Petra Heymann, Stephan Müller, Christoph Laske, and Ulrich Elbing</i>	
Standardising Clinical Caremaps: <i>Model, Method</i> and <i>Graphical Notation</i> for Caremap Specification	429
<i>Scott McLachlan, Evangelia Kyrimi, Kudakwashe Dube, and Norman Fenton</i>	
Towards a More Reproducible Biomedical Research Environment: Endorsement and Adoption of the FAIR Principles	453
<i>Alina Trifan and José Luís Oliveira</i>	
Author Index	471