13th International Joint Conference on Biomedical Engineering Systems and Technologies (BIOSTEC 2020)

Volume 2: BIOIMAGING

Valletta, Malta 24 – 26 February 2020

Editors:

Filipe Soares Ana Fred Hugo Gamboa

ISBN: 978-1-7138-4028-2

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2020) by SCITEPRESS – Science and Technology Publications, Lda. All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact SCITEPRESS – Science and Technology Publications, Lda. at the address below.

SCITEPRESS – Science and Technology Publications, Lda. Avenida de S. Francisco Xavier, Lote 7 Cv. C, 2900-616 Setúbal, Portugal

Phone: +351 265 520 185 Fax: +351 265520 186

info@scitepress.org

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400 Fax: 845-758-2633 Email: curran@proceedings.com Web: www.proceedings.com

CONTENTS

INVITED SPEAKERS

KEYNOTE SPEAKERS	
Visualizing Health Data – From Fundamental Research to Successful Applications <i>Roy Ruddle</i>	5
Patient Innovation - When Patients Innovate and Improve Their Lives Helena Canhão	7
Uncertainty Modeling and Deep Learning Applied to Food Image Analysis Eduardo Aguilar, Bhalaji Nagarajan, Rupali Khatun, Marc Bolaños and Petia Radeva	9
Towards Robust Machine Learning in the Medical Domain Andreas Holzinger	17
PAPERS	
FULL PAPERS	
Photoluminescent Imaging for an Effective Cancer Diagnosis using Upconversion Nanoparticles <i>Rafia Rafique and Tae Jung Park</i>	23
Assessment of Gallbladder Wall Vascularity from Laparoscopic Images using Deep Learning Constantinos Loukas and Dimitrios Schizas	28
Curriculum Deep Reinforcement Learning with Different Exploration Strategies: A Feasibility Study on Cardiac Landmark Detection <i>Patricio Astudillo, Peter Mortier, Matthieu De Beule and Francis Wyffels</i>	37
Automated 3D Labelling of Fibroblasts and Endothelial Cells in SEM-Imaged Placenta using Deep Learning Benita S. Mackay, Sophie Blundell, Olivia Etter, Yunhui Xie, Michael D. T. McDonnel, Matthew Praeger, James Grant-Jacob, Robert Eason, Rohan Lewis and Ben Mills	46
Low-density EEG for Source Activity Reconstruction using Partial Brain Models Andres Felipe Soler, Eduardo Giraldo and Marta Molinas	54
Fully Automated Volumetric Measurement of Malignant Pleural Mesothelioma from Computed Tomography Images by Deep Learning: Preliminary Results of an Internal Validation Owen Anderson, Andrew C. Kidd, Keith A. Goatman, Alexander J. Weir, Jeremy Voisey, Vismantas Dilys, Jan P. Siebert and Kevin G. Blyth	64
BADRESC: Brain Anomaly Detection based on Registration Errors and Supervoxel Classification Samuel B. Martins, Alexandre X. Falcão and Alexandru C. Telea	74
Glioma Grade Classification via Omics Imaging Lucia Maddalena, Ilaria Granata, Ichcha Manipur, Mario Manzo and Mario R. Guarracino	82

SHORT PAPERS

Segmentation of Diabetic Retinopathy Lesions by Deep Learning: Achievements and Limitations <i>Pedro Furtado</i>	95
Food Recognition: Can Deep Learning or Bag-of-Words Match Humans? <i>Pedro Furtado</i>	102
Comparison of Gadolinium Contrast Agent Retention in Patients Receiving Multiple Contrast-enhanced MRI Exams Ryan Fisher, Vikas Jain, Jonathan Glaab and Aubrey McMillan	109
Exploiting Bilateral Symmetry in Brain Lesion Segmentation with Reflective Registration <i>Kevin Raina, Uladzimir Yahorau and Tanya Schmah</i>	116
Extraction of Intrinsic Fluorescence in Fluorescence Imaging of Turbid Tissues Gennadi Saiko and Alexandre Douplik	123
Water-sensitive Gelatin Phantoms for Skin Water Content Imaging Gennadi Saiko and Alexandre Douplik	130
PySpot: A Python based Framework for the Assessment of Laser-modified 3D Microstructures for Windows and Raspbian Hannah Janout, Bianca Buchegger, Andreas Haghofer, Dominic Hoeglinger, Jaroslaw Jacak, Stephan Winkler and Armin Hochreiner	135
HEp-2 Intensity Classification based on Deep Fine-tuning Vincenzo Taormina, Donato Cascio, Leonardo Abbene and Giuseppe Raso	143
3D Printed Human Foot Splint, Designed from MRI of the Luffa Cylindrica Dried Fruit Sergio Cerón-Escutia, Axayácatl Morales-Guadarrama, Silvia B. González-Brambila and David Vidal-García	150
Left Ventricle Computational Model based on Patients Three-dimensional MRI Maria Narciso, Ana Isabel Sousa, Fernando Crivellaro, Rui Valente de Almeida, António Ferreira and Pedro Vieira	156
On Benchmarking Cell Nuclei Segmentation Algorithms for Fluorescence Microscopy Frederike Wirth, Eva-Maria Brinkmann and Klaus Brinker	164
Modelling Brain Lesion Volume in Patches with CNN-based Poisson Regression <i>Kevin Raina</i>	172
Detection and Categorisation of Multilevel High-sensitivity Cardiovascular Biomarkers from Lateral Flow Immunoassay Images via Recurrent Neural Networks Min Jing, Donal McLaughlin, David Steele, Sara McNamee, Brian MacNamee, Patrick Cullen, Dewar Finlay and James McLaughlin	177
Image Quality Comparison between Synthetic 2D Mammograms Obtained with 15° and 40° X-ray Tube Angular Range: A Quantitative Phantom Study <i>R. Lamastra, P. Barca, M. G. Bisogni, D. Caramella, V. Rosso, R. M. Tucciariello, A. C. Traino and</i> <i>M. E. Fantacci</i>	184
The Behaviour of Neuro-2A Cells on Silicon Substrates with Various Topographies Generated by Femtosecond Laser Micromachining <i>Sara Mingu, Ihor Pavlov, Çağdaş Devrim Son and Alpan Bek</i>	192

Terahertz Reflection Imaging of Paraffin-embedded Human Breast Cancer Samples: Some First Results <i>Mohamed Boutaayamou, Delphine Cerica and Jacques G. Verly</i>	200
Artificial Neural Networks for Quantitative Microwave Breast Imaging M. Ambrosanio, S. Franceschini, F. Baselice and V. Pascazio	204
Object Tracking using CSRT Tracker and RCNN Khurshedjon Farkhodov, Suk-Hwan Lee and Ki-Ryong Kwon	209
Evaluating Deep Learning Uncertainty Measures in Cephalometric Landmark Localization Dušan Drevický and Oldřich Kodym	213
AUTHOR INDEX	221