Preface

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Biographical notes: Akash Kumar Bhoi is working as a Principal Consultant at AB-Tech eResearch (ABTeR), India. His research association are with Department of Computer Science and Engineering at KIET Group of Institutions, India as an Adjunct Faculty and Adjunct Research Faculty at Sikkim Manipal University, India. He is appointed as the honorary title of Adjunct Fellow at Victoria University, Melbourne, Australia and Research Associate at Institute of Information Science and Technologies, National Research Council (ISTI-CRN) Pisa, Italy. His research areas are biomedical technologies, the internet of things, computational intelligence, antenna, and renewable energy. He has published several papers in national and international journals and conferences. He is currently editing several books with Springer Nature, Elsevier, and Routledge and CRC Press.

Pradeep Kumar Mallick is currently working as a Senior Associate Professor in the School of Computer Engineering, KIIT Deemed to be University, Odisha, India. He has completed a Post-doctoral Fellowship from Kongju National University South Korea, PhD from Siksha Ó' Anusandhan University, MTech (CSE) from Biju Patnaik University of Technology, and MCA from Fakir Mohan University Balasore, India. Besides academics, he is also involved in various administrative activities, member of board of studies to C.V. Ramman Global University Bhubaneswar, member of Doctoral Research Evaluation Committee, Admission Committee, etc. His areas of research include data mining, image processing, soft computing, and machine learning. He is an editorial member of the Korean Convergence Society for SMB. He has published 13 edited books, one text book, and more than 80 research papers in national and international journals and conference proceedings.

Paolo Barsocchi is a senior researcher at the Information Science and Technologies Institute of the National Research Council at Pisa, Italy. In 2008, he was a visiting researcher at the Universitat Autònoma de Barcelona, Spain. Since 2017, he has been the Head of the Wireless Networks Research Laboratory. He is included in the World's Top 2% Scientists according to the Stanford University List in 2020 and 2021. His research interests are in the areas of the internet of things, wireless sensor networks, cyber-physical systems, machine learning and data analysis techniques, smart environments, ambient assisted living, activity recognition and indoor localisation.

Victor Hugo C. de Albuquerque is a Professor and senior researcher at the Department of Teleinformatics Engineering (DETI)/Graduate Program in Teleinformatics Engineering at the Federal University of Ceará, Brazil. He earned his PhD in Mechanical Engineering from the Federal University of Paraíba in 2010, and MSc in Teleinformatics Engineering from the PPGETI/UFC in 2007. He completed his BSE in Mechatronics Engineering at the Federal Center of Technological Education of Ceará in 2006. He specialises in image data science, IoT, machine/deep learning, pattern recognition, automation and control, and robotics.

In the coming years, the soft computational approaches, i.e., artificial intelligence, machine learning, evolutionary computing, swarm intelligence and fuzzy systems, will play a vital and significant role the rapidly developing medical industries and biomedical research divisions. This special issue focuses on the challenges, and future scope of machine learning-based medical image and signal analysis techniques.

The advances in digital signal/image processing techniques have already contributed immense informative inputs in terms of bio-signals/images that are acquired using specific digital sensors. These bio-signals could be originated due to electrical, chemical or mechanical activities during certain biological events, which are often referred to as bioelectrical signals. Bio-signals are continually measured and monitored with space, time, or space-time records. Bio-signals/images are the primary investigative tools or inceptive markers in the monitoring and diagnostic gateway for certain abnormalities and conditions. The overall objective of this special issue is to compile the recent advances in the machine learning techniques in bio-signal/image analysis from the various engineering and healthcare industry sectors. Biomedical signals/images of different nature are explored via soft computing paradigms, including machine learning, artificial intelligence, neural network, fuzzy logic, swarm optimisation and intelligence and evolutionary computing. The papers in this issue focus on the state-of-the-art machine learning and artificial intelligence techniques applied to biomedical signals and images and solutions for critical diseases with predictive approaches. They also focus on the advanced biomedical signal and image registration techniques, estimation of diagnostic parameters for monitoring and evaluation and different methods for quality evaluation processing and system up-gradation.

Abhishek Das and Mihir Narayan Mohanty, in their paper entitled 'Classification of magnetic resonance images of brain using concatenated deep neural network', have explored the deep learning techniques in the ensemble and stacking approach with less complexity and improved performance. Convolutional neural network, recurrent neural network, and long-short-term memory are used as base classifiers for feature extraction and first stage brain image classification.

The paper titled 'Relevant gene selection using ANOVA-ant colony optimisation approach for malaria vector data classification', by Micheal Olaolu Arowolo et al., discusses the malaria infection and transmission, gene expression data classification using dimensionality reduction.

In 'A novel framework for segmentation of uterus fibroids in ultrasound images using machine learning models', K.T. Dilna et al. put forward a method for segmentation for fibroid detection. The proposed segmentation model overcomes the drawbacks of existing methodologies of fibroid detection using ultrasound images in all stages.

An ANN-SVM hybrid model is proposed by Rajshree Srivastava and Pardeep Kumar in their paper titled 'A hybrid model for the identification and classification of thyroid nodules in medical ultrasound images'.

Sumeet Goyal et al., in their paper titled 'Mathematical modelling for prediction of spread of corona virus and artificial intelligence/machine learning-based technique to detect COVID-19 via smartphone sensors', describe the mathematical model (SEIR) for the prediction of infectious diseases, which is a modification of conventional SIR model, and which can be used to predict the cases.

In the paper titled 'Quantum grey wolf optimisation and evolutionary algorithms for diagnosis of Alzheimer's disease', Moolchand Sharma et al. have conducted a comparative analysis of various evolutionary algorithms for extracting meaningful information from the Alzheimer's dataset, which is then used to predict whether or not a patient has the illness.

Sibo Prasad Patro et al., in their paper titled 'An improved ensemble learning approach for the prediction of cardiovascular disease using majority voting prediction', propose a new ensemble classification model by combining multiple classifiers for improving the accuracy of weak algorithms. An ensemble classifier was applied by using a

majority vote-based technique for cardiovascular disease prediction and classification.

Bhoopesh Singh Bhati et al., in their paper titled 'An ensemble-based approach for image classification using voting classifier', propose a scheme of using the voting classifier to provide better results with high performance, and they describe how the drawback of machine learning algorithms is overcome by using voting classifier, as it helps to improve the results by combining multiple machine learning algorithms.