Editorial

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Biographical notes: Akash Kumar Bhoi (PhD, Sikkim Manipal University; MTech, Karunya University; BTech, TAT, BPUT) is working as Assistant Professor (Research) in the Department of Electrical and Electronics Engineering at Sikkim Manipal Institute of Technology (SMIT), SMU, India. His areas of research are biomedical signal processing, Internet of Things, Computational Approaches and Pattern Recognition etc. He is also a regular reviewer of journals of reputed publishers namely IEEE, Springer, Elsevier, Taylor and Francis, Inderscience etc. He has 90+ documents registered in the Scopus database. He has also served on numerous organising panels for the international conferences and workshops. He is currently editing several books with Springer Nature, Elsevier, CRC, etc.

Deepak Gupta is an eminent academic. With 13 years of teaching experience and having spent two years in industry, he focuses on rational and practical learning. He has served as Editor-in-Chief, Guest Editor, and Associate Editor of SCI and various other respected journals. He completed his postdoc at Inatel, Brazil, and PhD at Dr. A.P.J. Abdul Kalam Technical University. He has published widely in the fields of human–computer interaction, intelligent data analysis, nature-inspired computing, machine learning, and soft computing, including 35 books with national/international publishers (Elsevier, Springer, Wiley, Katson), and 87 papers in leading reputed international journals and conferences. He is the convener and organizer of 'ICICC' Springer conference series.

Pradeep Kumar Mallick is currently working as Associate Professor in the School of Computer Engineering, Kalinga Institute of Industrial technology (KIIT) Deemed to be University, Odisha, India. He was a postdoctoral fellow in Kongju National University South Korea. He received his PhD from Siksha O Anusandhan University, MTech (CSE) from Biju Patnaik University of Technology (BPUT), and MCA from Fakir Mohan University Balasore, India. Besides academics, he is also involved in various administrative activities – he is a Member of Board of Studies, Member of Doctoral Research Evaluation Committee, and Admission Committee. His areas of research include algorithm design and analysis, data mining, image processing, soft computing, and machine learning. He has published 5 books and more than 55 research papers in national and international journals and conference proceedings.

Chuan-Ming Liu is a Professor in the Department of Computer Science and Information Engineering (CSIE), National Taipei University of Technology (Taipei Tech), Taiwan, where he was the Department Chair from 2013 to 2017. Currently, he is pointed to be the Head of the Extension Education Center at the same school. He received his PhD in Computer Science from Purdue University in 2002 and joined the CSIE Department in Taipei Tech in the spring of 2003. In 2010 and 2011, he has held visiting appointments with Auburn University, Auburn, AL, USA, and the Beijing Institute of Technology, Beijing, China. He has services in many journals, conferences and societies as well as published more than 100 papers in many prestigious journals and international conferences. His current research interests include big data management and processing, uncertain data management, data science, spatial data processing, data streams, ad-hoc and sensor networks, location-based services.

There are profound computational challenges where the controls of software engineering and designing, biomedical informatics, medical data analysis and biomedical challenges overlap. Owing to the inevitable unpredictability of coupled nonlinear natural frameworks, the improvement of computational models is important for accomplishing a quantitative comprehension and addressing the healthcare problems. Interdisciplinary work models could be useful for handling such scenarios, and various methods and techniques have evolved that can be channelled for solving real-time problems in healthcare. The evolution of computer-based modelling and data analysis approaches has certainly made significant differences in decision making as compared with the conventional approaches. As an outcome of the multifaceted nature, understanding physiological frameworks for complex medical conditions and suitable solutions could be accomplished through quantitative displaying. The advancement in computational methodological tools and methods has emerged through a continuous process, and involvement of these methodologies in healthcare has transformed the medical disciplines, but still many challenges need to be addressed.

This special issue addresses the cutting-edge healthcare solutions with advanced computational techniques for emerging areas of research, such as predictive modelling, translational informatics, patient similarity analytics, visual analytics and cognitive decision support. Computation advances driven by machine learning, artificial intelligence and bio-inspired algorithms will certainly play crucial roles in achieving breakthroughs in understanding this complex landscape of diseases and critical health conditions. This special issue collects state-of-the-art research articles that contribute to the ongoing research problems and challenges related to software solutions for healthcare, computational intelligence, biomedical data computing and allied applications.

The paper titled 'Performance analysis of surrounding cylindrical gate all around nanowire transistor for biomedical application', by Amit Agarwal et al., presents the development of a highly sensitive, more accurate and faster device using silicon on insulator based cylindrical surrounding gate all around nanowire (SCGAA-NW) transistor. This method could be used for biomedical applications, i.e. diabetes sensor, gas sensor, pressure sensor and different materials present in the blood or environment by setting and analysing proper physical parameters of the device. In this paper, the authors have varied different physical parameters, i.e. channel material (i.e. SiN, CdS, GaN, ZnO, GaP, Si, GaAs, Ge), oxide material (i.e. SiO_2, Si_3N_4, Al_2O_3, Er_2O_3, Y_2O_3, HfO_2, Ta_2O_5, La_2O_3), channel radius (1–10 nm), oxide thickness (1–10 nm), concentration of different materials on the sensor acting as gate to source voltage, drain to source voltage (–0.5 V to 0.5 V), channel doping (10^7 to 10^{14}) for the best suitable biomedical application in different environments.

The paper titled 'Fuzzy logic system for diabetic eye morbidity prediction', by Tejas V. Bhatt et al., presents a fuzzy logic system for diabetic eye morbidity prediction. The work is divided into two parts. The first part is the examination of eye vision by the ophthalmologist and also other examinations such as postprandial blood sugar, hypotension, cholesterol, and duration of diabetes. The second part is the analysis of 400 patients' medical records collected in 2019. The fuzzy system proposed for prediction of diabetes retinopathy provides reliable accuracy for eye-vision threatening and eye morbidity.

Ranjit Panigrahi et al. in their article 'Survivability prediction of patients suffering hepatocellular carcinoma using diverse classifier ensemble of grafted decision tree' present two state-of-the-art survivability prediction schemes that have been proposed separately for male and female subjects suffering hepatocellular carcinoma. The prediction engine employs feature selection via concave minimisation feature ranking and the Sigmis feature selection scheme to extract limited features of both male and female subjects. An ensemble of decision tree grafting mechanism successfully predicts the chances of survivability of HCC patients.

The next paper, titled 'Detection of bifurcations and crossover points from retinal vasculature map using Modified Windows Feature-point Detection (MWFD) approach', by Meenu Garg et al., proposes a new approach called the Modified Window Feature-Point Detection (MWFD) to identify the vascular feature points in the fundus image. The MWFD technique makes use of two different windows, 3 x 3 and 5 x 5, with alternative vessel pixel property for the detection of all feature points.

The paper titled ‘Decision-making on the existence of soft exudates in diabetic retinopathy’ by A. Reyana et al., presents a new approach to detect and classify exudates in coloured retinal images, eliminating the replication of exudates by removing the optical disc region.

Shubham Kamlesh Shah et al., in their work entitled ‘Prediction of abnormal hepatic region using ROI thresholding based segmentation and deep learning based classification’, propose a novel Computer-Aided Diagnosis System (CADS) model using artificial intelligence to segment liver form abdomen CT scan. The basic CNN model yielded an accuracy of 50.00% while the DL-CNN model achieved an accuracy of 98.75%. It is also compared with other existing models, including AlexNet and adaBoostM1, and classifiers such as naïve Bayes, KNN, SVM and random forest classifier models.

In the paper titled ‘Remote homology detection using GA and NSGA-II on physicochemical properties’, by Mukti Routray and Niranjan Kumar Ray, the work is divided in three phases. Initially, the features are extracted from protein sequences using Principal Component Analysis (PCA) to build a chromosome set with representative features of each protein based on physicochemical properties. The second stage involves a genetic algorithm for the construction of a set of chromosomes for classification based on PCA and initialises the classifier to build up an error matrix. The third stage uses NSGA-II, crossover and mutation, and tournament selection for the next set of chromosomes.

The last paper, titled ‘Orthogonal matching pursuit-based feature selection for motor-imagery EEG signal classification’ by Rajdeep Chatterjee and Ankita Chatterjee, focuses on a framework that uses a small number of features to obtain high-quality classification accuracy of left/right-hand movement motor-imagery EEG signal. The obtained classification accuracy is 91.43%, the highest ever reported accuracy for the BCI Competition II dataset III. Subsequently, the orthogonal matching pursuit technique is used to select the subset of the most discriminating features from the entire feature-set. It reduces the computation cost but retains the quality of the classification results with only 1.43% information loss (that is, 90% classification accuracy), whereas the features-set size reduction is 75% for the same.

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