1. Special Session Title: Deep-learning-based solutions in medical image based analysis

2. Contact for Correspondence:

Dr Pushan Kumar Dutta
Assistant Professor, Amity University Kolkata, West Bengal, India

Dr Karthik Chandran
Associate Professor Jyothi Engineering College, Thrissur, Kerala, India

Dr Subrata Chowdhury
Assistant Professor, SVCET Engineering College (A) Chittoor, AP, India

3. Details of Proposed Session

Data science and its applications heavily rely on deep learning (DL), a new computer intelligence technique. To learn as well as interpret data at various levels of abstraction, DL offers computational models with multiple processing layers. It is ideally adapted to a number of current hardware architectures and can effectively capture complex large-scale data structures. Recently, DL has succeeded in both academic and industrial domains and has established itself as a vital ingredient for a variety of medical image processing and analysis tasks, such as cancer detection, tumor classification, vascular segmentation, etc. Although DL models have a remarkable high prediction accuracy, they are known to be "black boxes" with numerous intricate layers. Meanwhile, it has recently been demonstrated that DLs are defenseless against counterfeiting using sophisticated manually crafted input samples. This primarily occurs in the area of medical image processing, where a single incorrect prediction could have negative effects, requiring a commitment to the trained DL model's ability to provide efficient and accurate data

processing. As a result, it has become crucial to comprehend how DL models function through validation and visualization procedures in order to develop DL models that are easy to grasp.

This session will certainly help the aims to provide a diverse but complementary set of contributions to demonstrate new developments and applications of deep learning to solve problems in medical image processing. The ultimate goal is to promote research and development of explainable deep learning for multimodal biomedical images by publishing high-quality research articles and reviews in this rapidly growing interdisciplinary field. A research area for this special session includes but not limited to:

1. Qualification, Visualization, and Interpretation of Deep Neural Network Model Learned Representations
2. Deep learning in biomedical engineering: A novel theoretical understanding
3. Multitasking and explainable transfer learning
4. analysis of the deep neural network learning bottleneck
5. On biological images, comprehensible joint semantic segmentation, object detection, and scene recognition
6. Deep network computation being improved; using parallel computing methods and GPU programming
7. Network structure inference and regularization for reliable prediction
8. applications in biomedicine and translational multimodality imaging (e.g., detection, diagnostic analysis, quantitative measurements, image guidance)
9. Deep neural networks and multi-dimensional deep learning for optimization
10. New convolutional neural network models with new structures
11. Defending against adversarial attacks in programs for analyzing medical images
12. Explainable fusion of deep learning with fuzzy systems and/or evolutionary computations
13. Generative Deep Learning for data augmentation
14. Predictive modelling of progression based on LSTM and RNN
15. How to make deep learning algorithms more explainable