In recent decades, deep learning has initiated a big revolution in neuroimage processing. The practice of deep learning in neuroimaging has started from the successful application of deep neural networks to predict Alzheimer’s disease, and then it has quickly spread across various aspects of neuroimaging such as neuroradiology, neuroimaging for mental health prediction, etc. The tremendous evolution of deep learning algorithms and the fast development of computing power have enabled the successful use of deep learning for neuroimaging processes. Generally, neuroimaging investigation covers various aspects of brain physiology that ranges from the observation of blood oxygenation to brain metabolism activities. At present, researchers focus on complementary imaging techniques to investigate how the different brain regions are integrated and function in healthy and diseased conditions. The regional brain activities and inter-regional interactions change from one mental state to another mental state (i.e., from healthy to diseased state). These changes are stimulated through neuroimaging signals measured from the brain. Since each signal modalities have different strengths, multiple modals signals are used to predict the brain state. For example, an electroencephalogram (EEG) explores temporary changes in the brain, but it has the disadvantage of low spatial resolution. Another approach called functional magnetic resonance imaging (fMRI) provides higher spatial resolution. Thus, a careful analysis of brain signals provides an enormous amount of information relating to the functioning of the human brain. However, it is highly difficult to extract intrinsic features from the miscellaneous brain signals. Magnetic resonance imaging (MRI), magnetoencephalography (MEG), and electroencephalography (EEG) are some of the significant approaches used in neuroimaging that predicts the state of the brain using neuro signals.

Deep learning is a branch of machine learning that learns data representations through multiple processing layers. The data representations are more abstract at higher layers in contrast to the lower layers. Deep learning has considerably significant applications across various fields, including artificial intelligence, speech recognition, image retrieval, audio recognition, etc. The existing research works in neuroimaging using deep learning focus on analysis and understanding of diverse brain signals to identify brain diseases. Deep learning in the context of neuroimaging is an emerging area of research and has limited application in practice. These limitations are mainly due to the reason that neuroimaging signals are highly miscellaneous and difficult to handle. Complimentary solutions such as enhancing the existing deep learning models with additional filtering layers can improve the applicability of deep learning algorithms for neuroimaging.

This special issue on “Deep Learning for Neuroimaging” aims to provide practical benefits of effective neuroimaging for patients, researchers, and society in general. We welcome the researchers to present their novel solutions on deep learning in neuroimage analysis, decoding, and understanding diverse brain signals to identify various brain diseases. The solutions could
Topics to be covered:

- Application of deep learning in neuroimaging to identify and understand various neural mechanisms comprising mental states such as mental fatigue and mental workload
- Deep learning in the context of neuroimaging to treat various brain diseases such as schizophrenia, Alzheimer’s disease, autism, etc.
- Cognitive therapy for brain diseases using deep learning models
- Diagnosis and classification of brain diseases using deep learning algorithms
- Effective measures to understand and interpret active regional brain signals using deep learning algorithms
- Role of deep learning in personalized neuroimage analysis and future directions
- Understanding and analysis of brain imaging and psychiatry using deep learning
- New trends in deep learning for neuroimage analysis and disease prediction
- Prevention and diagnosis of neurodegenerative diseases using deep learning models
- Effective measures to identify brain disease biomarkers using deep learning
- Deep learning & neuroradiology: State of the are review and Future directions
- Deep learning based prediction methodologies for brain aging and early diagnosis
- Application of deep learning in diffusion MRI scans
- Clinical applications of deep learning in neurology and its enhancements with future directions
- Prediction of tissue outcomes in active brain regions and effective disease prevention mechanisms using deep learning models
- Deep learning in neuroimaging current trends, perspectives and prospects.

IMPORTANT DATES

Submission of manuscript: March 15, 2020
Deadline for new submissions: August 13, 2020
Publication: As per the policy of journal

HOW TO SUBMIT

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