

# APPLICATIONS OF DEEP LEARNING AND SIGNAL PROCESSING

## METHODS TO EEG SIGNALS

**Abstract:** Electroencephalogram (EEG) signals are spatiotemporal integration of millions of neurons in the brain. Functional changes in the brain, raised by different psychiatric and neurologic diseases, can be detected through analysis of EEG signals and also the disease severity can be quantitatively measured. In this talk, I introduce deep learning and signal processing methods for continuous estimation of Beck score for depressed patients and also propose efficient methods for classifying four levels of depression. An efficient deep network is introduced to estimate Bispectral Index Scale (BIS) continuously, from EEG signals, as a reliable measure of depth of anesthesia during surgery operations. I also explain how to differentiate five levels of pain by analysis of EEG signals using signal processing methods. A few attempts have been made by my team to estimate Montreal Cognitive Assessment (MOCA) scale and Unified Parkinson's Disease Rating Scale (UPDRS) continuous score as measures of Parkinson's severity by applying deep neural networks and also deep fuzzy networks to raw EEG signals.

