Applied Deep Learning in Intracranial Neurophysiology Workshop

Workshop Details:
Time: 9:00 AM - 4:15 PM
Dates (s): September 16-17, 2019
Location: Kaiserin-Friedrich-Haus, Seminarraum, CCM Berlin; Robert-Koch-Platz 7, 10115 Berlin

Workshop Objectives:
Attendees will gain familiarity with technologies commonly used in deep learning (DL), they will gain understanding of DL programming paradigms, and they will become proficient in building, training, and evaluating deep neural networks as applied to extracellular neurophysiology data. Attendees will require a laptop as they will be working directly with intracranial recordings from humans and non-human primates.

Day 1	
Time	**Topic**
8:45 AM	**Registration & Welcome**
9:00 AM - 10:00 AM	**Getting Started with Deep Learning Tools:** • A short introduction to the required tools and computing environment.
10:00 AM - 10:30 AM	**Break & Refreshments:** • At the break, we will provide assistance to attendees who had trouble setting up their environment.
10:30 AM – 12:00 PM	**My First Neural Net:** • The second session will introduce neural nets and their basic components.
12:00 PM – 1:00 PM	**Lunch**
1:00 PM – 2:30 PM	**Introduction to CNNs:** • Examine convolutional neural nets and how they can be applied electrocorticography (ECoG) data to decode intention.
2:30 PM -2:45 PM	**Break**
2:45 PM - 4:15 PM	**VAEs:** • Session on variational auto-encoders applied to intracortical spiking data.

Day 2	
Time	**Topic**
8:45 AM	**Registration & Welcome**
9:00 AM - 10:00 AM	**RNNs:** • Interact with a dataset with within-trial sequence dynamics • Introduction to basic recurrent neural networks. • Extend RNNs with LSTM and GRU
10:00 AM - 10:30 AM	**Break**
10:30 AM – 12:30 PM	**LFADS and other RNN extensions:** • Build larger architectures composed of RNN and other components.
12:30 PM – 1:30 PM	**Lunch**
1:30 PM – 3:00 PM	**What can the brain teach us about artificial intelligence, and vice versa?** • Early successful neural networks were inspired by the brain. We'll look at how that continues with some toy examples. • Training neural networks to perform like the brain then inspecting the networks can provide insights about how the brain might function. We'll explore recent advances in this topic with some toy examples.
3:00 PM -3:30 PM	**Break**
3:30 PM – 4:15 PM	• Getting started on your own analyses. • Overflow time.