

When machines look at neurons: machine learning with neuroscience time series

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Understanding how the brain works in healthy and pathological conditions is considered as one of the challenges for the 21st century. After the first electroencephalography (EEG) measurements in 1929, the 90's was the birth of modern functional brain imaging with the first functional MRI (fMRI) and full head magnetoencephalography (MEG) system. By offering noninvasively unique insights into the living brain, imaging has revolutionized in the last twenty years both clinical and cognitive neuroscience. More recently, the field of brain imaging and electrophysiology has embraced a new set of tools. Using statistical machine learning new applications have emerged, going from brain computer interaction systems, "mind reading" to algorithms to image the brain at a millisecond time scale. In this talk, I will briefly explain what the different techniques can offer and show how modern computational and machine learning tools, such as convex optimization and sparse regression in high dimension, can help uncover neural activations in multivariate time series.