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Neuroscience ML challenges using CodaBench: Decoding multi-limb trajectories from two-photon calcium imaging

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In this talk, we present the ML challenge using CodaBench for the Neuroscience dataset. The ML challenge is hosted by the Accelerated AI Algorithms for Data-Driven Discovery (A3D3) Institute.

Neural decoding is the process of predicting behavior from brain signals, which is crucial for gaining insights into the functions of various brain regions and for advancing technology, such as the brain-computer interface, to aid individuals suffering from neurological injuries and diseases. Two-photon calcium imaging is a promising technique for neural decoding to record the activity of thousands of neurons in a single-cell resolution. Dadarlatlab at Purdue University organized the dataset of neural signals recorded by two-photon calcium imaging and running trajectories of mice. Decoding two-photon calcium imaging data has been challenging because the calcium signal indirectly and non-linearly represents action potential, has slow kinematics from a long decay time of calcium fluorescence, and has low sampling rates during imaging compared to natural behavior. Artificial intelligence can be a promising solution to overcome these challenges.

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