Bocconi

16 APRIL 2024
04:00 PM

Zoom meeting
(Streaming in Bocconi University
Room 3-E4-SR03
Via Röntgen 1, Milano, 3° floor)

Prediction of neural activity in connectome-constrained recurrent networks

Speaker

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Abstract

In this talk, I will explain a theory of connectome-constrained neural networks in which a "student" networks is trained to reproduce the activity of a ground-truth "teacher", representing a neural system for which a connectome is available. Unlike standard paradigms with unconstrained connectivity, here both networks have the same connectivity but they have different biophysical parameters, reflecting uncertainty in neuronal and synaptic properties. We find that the connectome is often insufficient to constrain the dynamics of networks that perform a specific task, illustrating the difficulty of inferring function from connectivity alone. However, recordings from a small subset of neurons can remove this degeneracy, producing dynamics in the student that agree with the teacher. Our theory can prioritize which neurons to record from to most efficiently unmeasured network activity. The analysis shows that the solution spaces of connectome-constrained and unconstrained models are qualitatively different, and provides a framework to determine when such models yield consistent dynamics.

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