

Study of properties and dynamics in trained recurrent neural networks (RNNs)

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In this workshop, decision-making and temporal tasks will be analyzed, exploring connectivity patterns, dynamics, and biological constraints of trained recurrent neural networks (RNNs) [1]. The focus of this study, relevant to Computational Neuroscience, lies on modeling brain regions such as the cortex and prefrontal cortex in particular, and their recurrent connections associated with various cognitive tasks. The workshop aims to explain and give tools to understand the dynamics underlying these models, leading to the formulation of hypotheses about brain function and the interpretation of experimental results.

Dynamics is investigated through numerical simulations, and the obtained results will be classified and interpreted [2]. The workshop will shed light on the existence of multiple solutions for the same tasks and the relationship between the spectra of linearized trained networks and their dynamics. Furthermore, the distribution of eigenvalues in the recurrent weight matrix will be examined and correlated with the dynamics observed in each task [3-4]. The workshop will present theoretical aspects as well as provide simple implementation examples to illustrate the concepts discussed.

Attendees will also be introduced to various approaches and methods based on trained networks, emphasizing the importance of having a software framework that facilitates the testing of different hypotheses and constraints [5].

References

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