

Workshop: Applying highly comparative time-series analysis to neural time-series data

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Many systems in the world around us are complex and evolve through time, and can be measured in the form of multivariate time series, $\mathbf{X}(t)$. Neural datasets are often in this form, and are being measured in increasing volumes, with unprecedented spatial and temporal resolution. How do we find and quantify interesting patterns in these complex, high-dimensional data?

In this workshop I will walk participants through the analysis of neural time series using the ‘highly comparative’ methodology that we developed. This methodology is implemented in software packages that facilitate the comparison of features of univariate dynamics of individual components of a system, *hctsa* [1], and the coupling between system components, *pyspi* [2].

After a brief introduction and demonstration of the tools, participants will be invited to work through the analysis of two open neural datasets. We will demonstrate how to process time-series data, perform feature-space embeddings, visualize low-dimensional projections, and tackle time-series classification problems. If appropriate, participants are also welcome to bring and analyze their own data.

References

- [1] B.D. Fulcher, N. S. Jones, *Cell Systems* **5**(5): 527 (2017).
- [2] O.M. Cliff, J.T. Lizier, N. Tsuchiya, B.D. Fulcher, *arXiv*: 2201.11941 (2022).