Bridging the interface between time series analysis and network science
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In a complex system, information is usually retrieved in two ways.

First, the dynamics and evolution of the system is recorded and measured via time series. Examples include mobility traces in social systems, stock price fluctuations in finance, or EEG records in neuroscience. The area of Time Series Analysis concentrates on extracting information from this representation of data.

Second, the architecture of the interactions between the elements of the complex systems, usually labelled as the backbone of the system, can be measured and described as a network. Examples include the usual suspects: social networks, economic networks, brain networks, etc. The area of Network Science concentrates on extracting information from this representation of data.

This project aims to explore the interface between Network Science and Time Series Analysis. We will explore how one can use time series to characterise networks and how one can use networks to characterise time series, and hence will provide alternative ways of extracting patterns from data.

The project has a mathematical component (where the student will have to push forward our understanding in the links between time series analysis and network science from a theoretical viewpoint) and an applied component, where the student will be expected to model, process, and analysis large datasets from several origins, and come up with creative ways and innovative ideas to connect time series and networks. For the application part, we will develop new methods and use standard tools from Machine Learning as well.