



Characterization of complex neural activity

Prerequisites:

044202 - Random signals

046326 - Introduction to biological signals and systems

Project require data analysis using Matlab software

Introduction:

Real-world biological signals, and neural activity in particular, have an amazingly complex statistical structure, reflecting the complexity of the underlying generating mechanisms. If we want to understand how neural activity is used as a base and carrier of brain function it is important to understand and characterize this activity. Standard signal analysis (e.g. Fourier-based spectral analysis) tools have severe limitations when applied to these signals, and more sophisticated tools are required.

Project Description:

The project goal is to define and explore measures to characterize complex neuronal activity with very long term temporal correlations. The project will include application of different tools, understanding of their limitation, applicability and meaning. Examples of such measures include measures from the fields of non-linear time series analysis and information theory. The test-data-set for the project will be recordings of networks and single neurons done in our lab but it might be applicable to any complex neuronal activity in general.

Project Requirements:

- Gaining background knowledge about complexity and complex time-series
- Exploring different analysis method to characterize real data. Understanding of the limitations and advantages of each.

Project Duration:

One semester, with an optional extension

Contact:

Asaf Gal (04-829)-5074 asafg1@gmail.com

Danny Eytan (04-829)-5074 dannye@techunix.technion.ac.il