Report from 2015 OHBM Hackathon (HI)

Highly Comparable Time-Series Analysis in Nitime

Project URL: https://github.com/benfulcher/hctsa_python

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1 Introduction

The aim of this project was to begin to extend an existing Matlab-based package for implementing thousands of time-series analysis methods, hctsa, to a python-based implementation, for potential future inclusion into Nitime.

Nitime is python-based package for performing time-series analysis on neuroscience data. The highly comparative time-series analysis approach [1] has an associated Matlab-based code package, *hctsa*, that extracts thousands of structural features from a time series and determines which are most useful for a given scientific task.

In order to apply highly comparative time-series analysis in the neuroscience community, it would be desirable to implement some time-series analysis methods into the Nitime package, or at least using the Nitime data format. This would facilitate not only their use by the neuroscience community, but also their maintenance and development within an open source framework.

2 Approach

An illustration of the approach is shown in Fig. 1. Each time series is converted to a vector of thousands of informative features using the *hctsa* package, and then machine learning methods are used to determine the most useful features. In this project, we want to demonstrate a feasible pathway for incorporating these useful features into the Nitime package.

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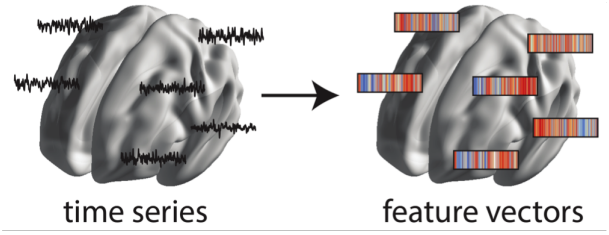

Figure 1 Illustration of the highly comparative approach to time-series data from neuroscience.

3 Results

I successfully implemented a handful of basic time-series analysis functions from Matlab into python using partials, with basic support for the Nitime data format. This proof-of-principle is here.

4 Conclusions

Our results demonstrate that time-series analysis methods, discovered using the hctsa package, can be implemented natively in python in a systematic way, with support for the time-series format used in Nitime. This will allow future work on time-series analysis to be incorporated straightforwardly into an open source environment.

Availability of Supporting Data

More information about this project can be found at: https://github.com/benfulcher/hctsa_python. Further data and files supporting this project are hosted in the *GigaScience* repository REFXXX.

Competing interests

None

Author's contributions

BF wrote the software and the report.

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References

1. Fulcher, B.D., Little, M.A., Jones, N.S.: Highly comparative time-series analysis: the empirical structure of time series and their methods. J. Roy. Soc. Interface **10**(83), 20130048 (2013)