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Temporal Brain Networks Dataset

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Inria

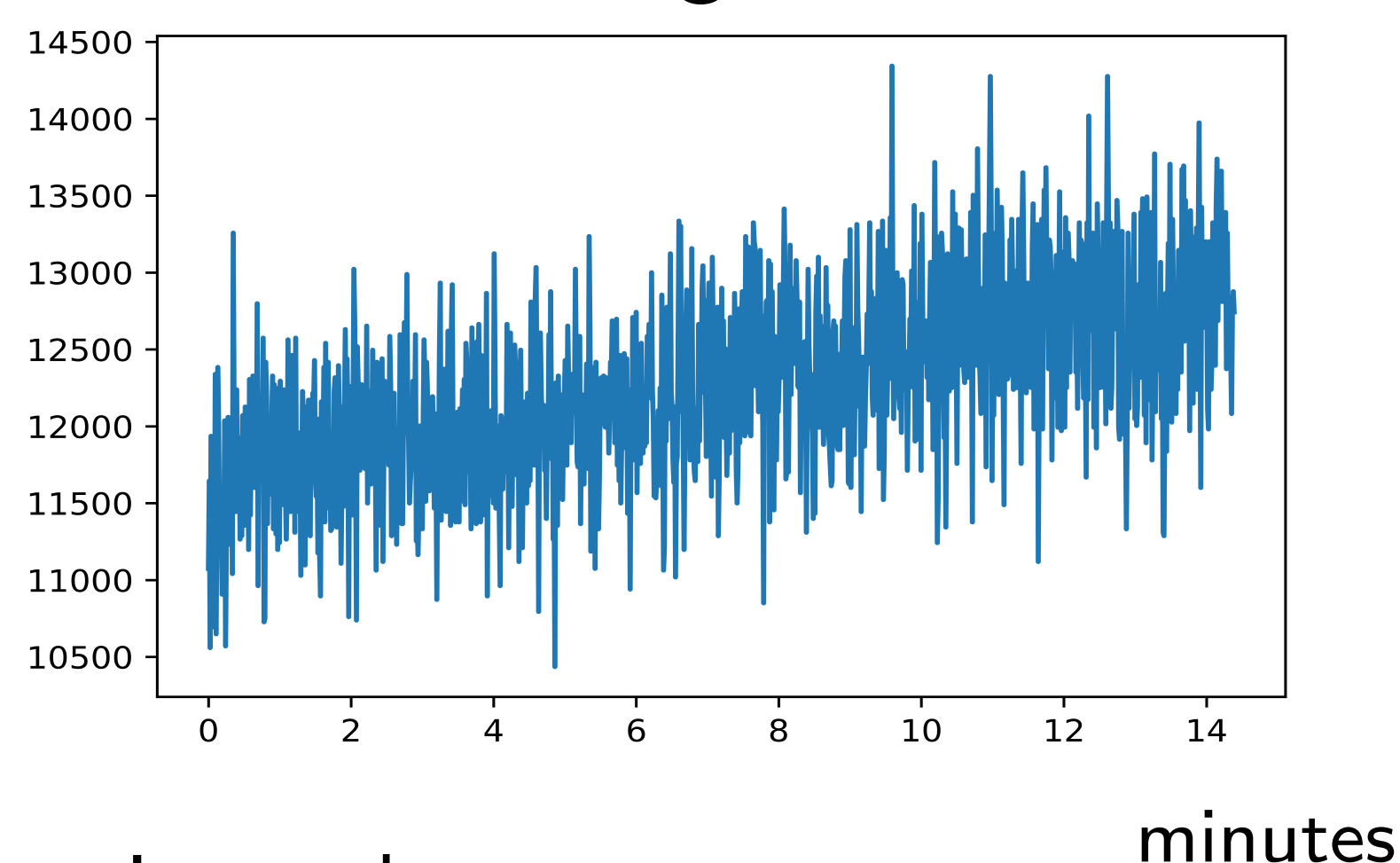
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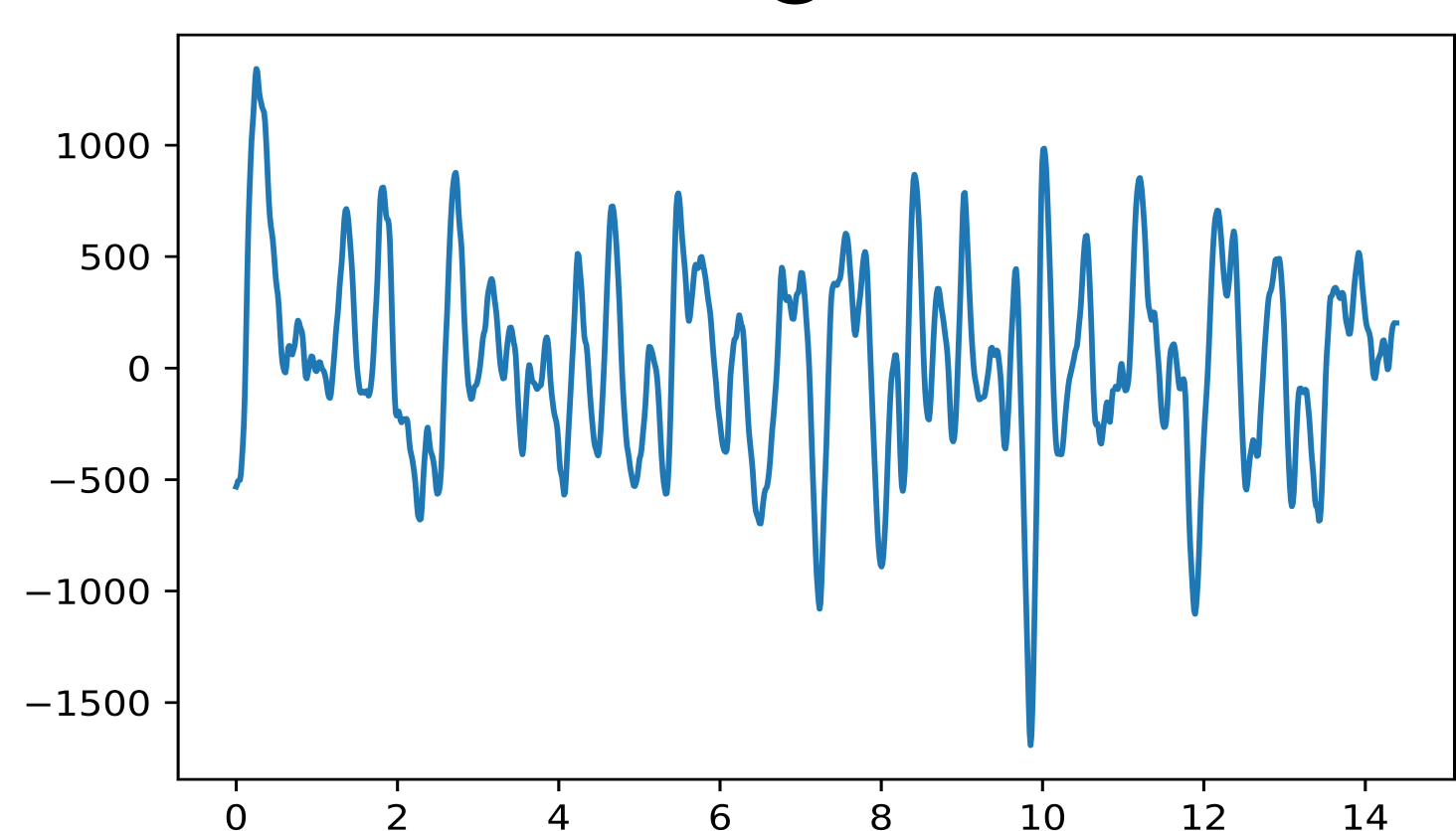
Pipeline

BOLD signal of a voxel



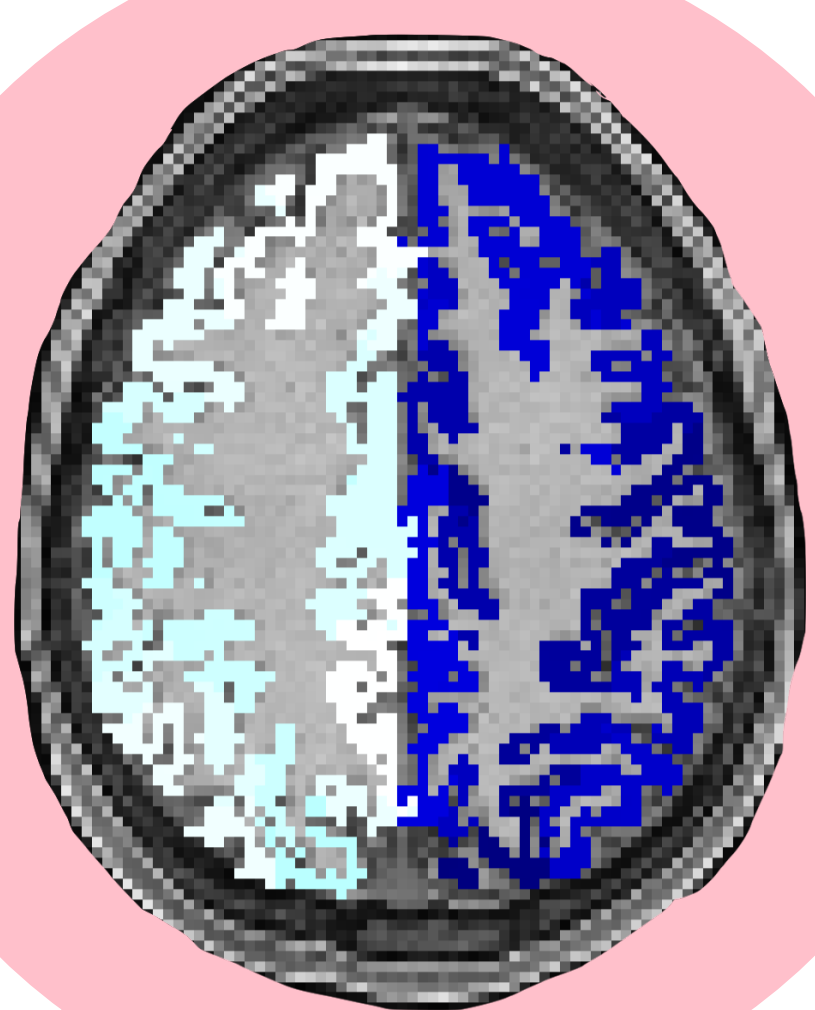
Linear Regression and Bandpass Filtering to remove patient respiratory and cardiac movements

Clean BOLD signal of a voxel

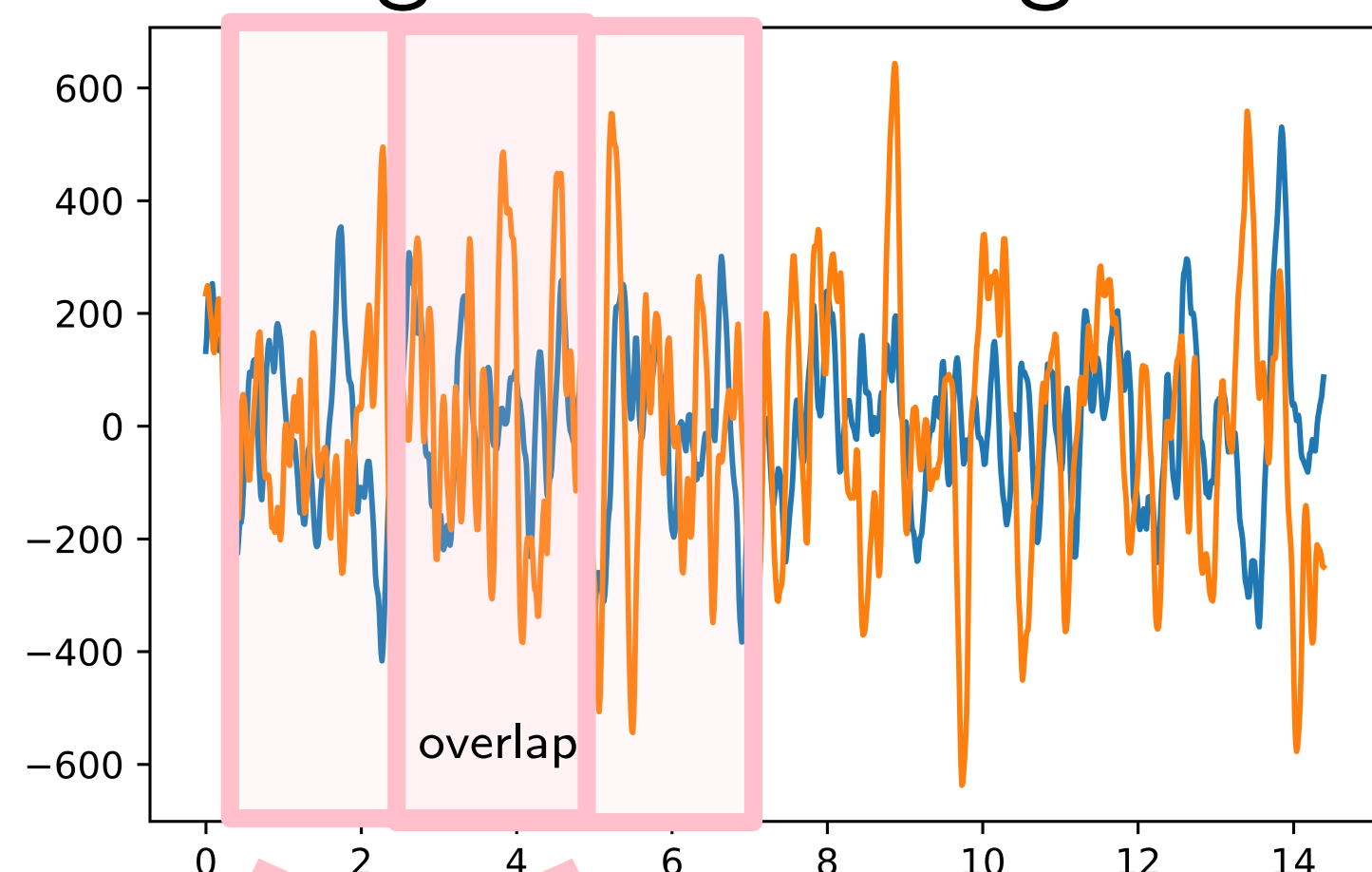


minutes

Selecting brain regions using an atlas

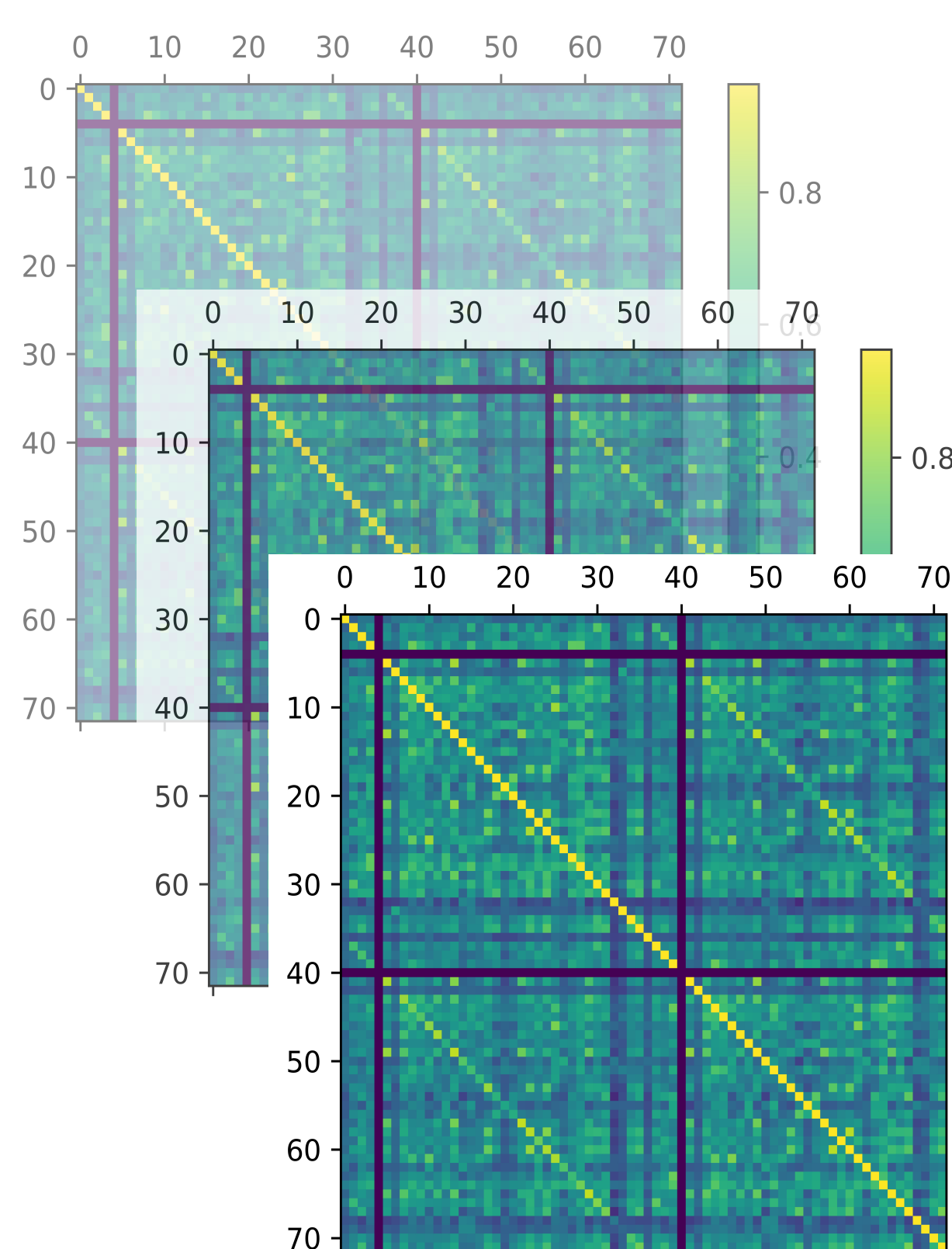


BOLD signal of two regions



minutes

Sliding windows method



Computing correlation coefficient within each window

Temporal
Brain
Network

Dataset

The dataset contains a collection of temporal brain networks.

The networks are obtained from **resting-state fMRI** data of 1047 subjects from the Human Connectome Project (HCP).

Networks are undirected and weighted. The number of nodes is fixed over time, instead the weights of the edges change.

- 100
 - 100.zip.001 (1.0 GB)
 - 100.zip.002 (445.3 MB)
- 200
- 300
- 400
- 500
- 600
- id_subjects.txt (7.2 KB)
- README.txt (1.3 KB)

The pipeline parameters

- Window size: 60 seconds
- Window overlap: 30 seconds
- Correlation: Pearson
- Atlas: Schaefer of different size from 100 to 600

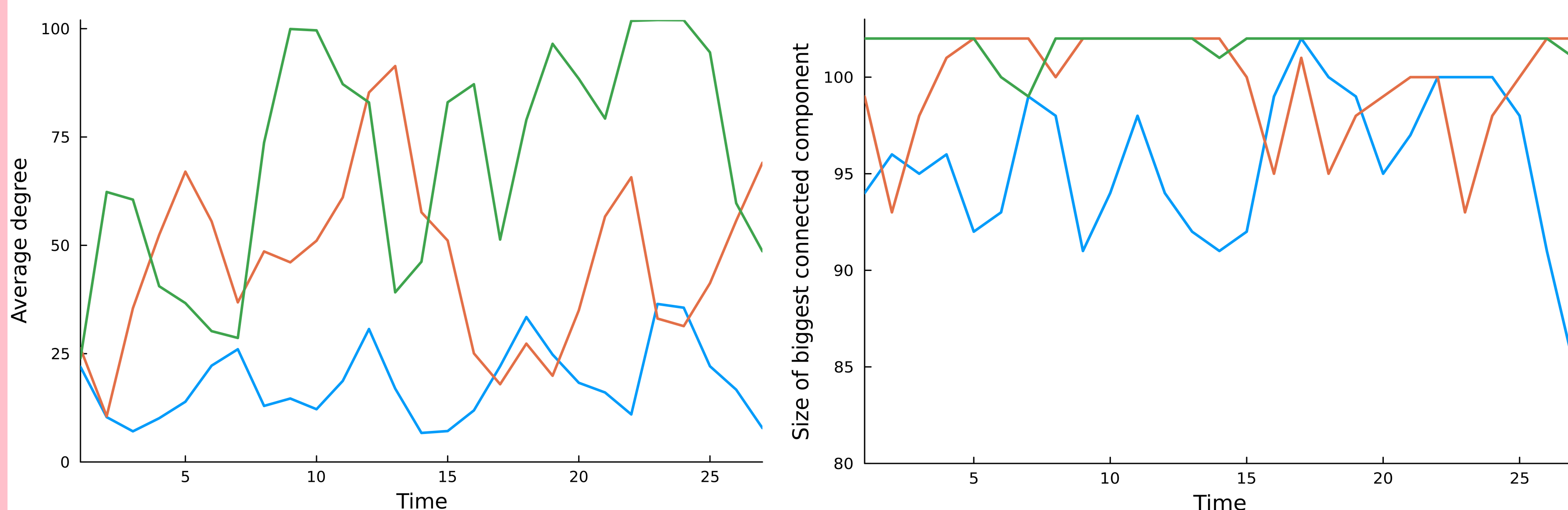
Structure

The dataset is organized as follows:

- The file **id_subjects.txt** contains the list of subject IDs, which are a selection of the HCP dataset
- Each folder contains a network for each subject in a **.txt** file. The networks are compressed into several **.zip files of 1 Gb** each to facilitate downloading
- The first line of each **.txt** file contains the number of nodes and the number of snapshots of the network divided by a space. The following lines contain the list of edges of the network in the form **i,j,t,w** meaning that the edge between node *i* and node *j* at time *t* has weight *w*

Examples of dataset analysis

Examples of measures computed on some subjects taken from the dataset: evolution of the average degree and the size of the biggest connected component over different snapshots of three subject using the atlas of dimension 100 and setting the threshold to 0.75



Acknowledgments and references

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Woolrich MW, Ripley BD, Brady JM, and Smith SM. (2001). Temporal autocorrelation in univariate linear modelling of fMRI data. *NeuroImage* 14(6):1370-1386.

Matthew F. Glasser, Stamatiou N. Sotiropoulos, J. Anthony Wilson, Timothy S. Coalson, Bruce Fischl, Jesper L. Andersson, Junqian Xu, Saad Jbabdi, Matthew Webster, Jonathan R. Polimeni, David C. Van Essen, and Mark Jenkinson (2013). The minimal preprocessing pipelines for the Human Connectome Project. *Neuroimage* 80: 105-124.

Conclusion

The limited availability of public datasets on temporal brain networks has led us to release a dataset consisting of temporal brain networks derived from 1047 subjects of different sizes.

This dataset is presented in an easy-to-read format to facilitate analysis and interpretation in the fields of neuroscience and computer science.

