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Title: Model-free estimation of time-varying correlation coefficients and their confidence intervals with an application to fMRI data

One of main interests in fMRI (functional magnetic resonance imaging) research is the study of associations between time series from different brain regions, so called functional connectivity (FC). Recently, it has become increasingly important to assess dynamic changes in FC, both during resting state and task-based fMRI experiments, as this is thought to provide the information needed to better understand the brain's inner workings. Currently, the most common approach to estimate these dynamic changes is by computing the correlation coefficient between time series within a sliding-window. However, one of the disadvantages of this method is that it tends to overestimate the association between the time series obtained from different brain regions (Lindquist et al. 2014). Here we propose a new approach for estimating time-varying FC using the correlation between two time series and provide valid confidence bands for this estimator. We propose an algorithm based on the sliding-window approach which utilizes the multivariate linear process bootstrap. Both numerical results and an application to fMRI study will be presented.

References:

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