Block/Canonical PDC/DC Module

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Abstract

Main documentation for the Blocks/Canonical Module for use that was developed for use with [1]. The model data structures require follow those of the AsympPDC package:

http://www.lcs.poli.usp.br/~baccala/pdc/CRCBrainConnectivity/AsympPDC/

which is recommended when dealing with model inference.
1 Introduction

The present module was developed to support the research described in [1]. Its functionality presumes the same data structure used in the AsympPDC package to whose future versions it will be incorporated.

This document contains installation, data and software structure information together with a short description of the routines used to compute examples from [1].

The core data structure is represented by Block_set which describes the channel grouping used in defining channel subsets.

Further implementation details are available by reading function descriptions in the respective *.m files.

1.1 Installation

The module is written in MATLAB (tested under version 7.14) and is best installed in the same path as the AsympPDC package with full access to its subdirectories.

2 Data Structures

The data structures are the same as in the AsympPDC package except for Block_set and is common to all core routines:

\%
\input: A - model matrix (Nchannels,Nchannels,order)
\%
\pf - residue covariance matrix
\%
\nf - number of frequencies in [0,.5]
\%
\Block_set - Matrix containing indices for each blocks
\%
\rows - number the blocks (=n) - nb blocks
\%
\columns - number provide the indices per block
\%
\ (=n - filled with zeros above the number of
\%
\valid indices)

where Block_set’s rows stand for the number of blocks while the columns contain the channel indices for each block (row). Rows with fewer channels have their unused positions filled with zeros.

Block PDC/DC\_ij outputs are numbered according to \( j \rightarrow i \) they relate as function of frequency index from 1 to \( nf \). The variables are denoted pdc\_b/dc\_b respectively.

Canonical PDC/DC\_ij have a fourth index to point to the component of interest. The number of valid components is denoted by len\_c. The variables are denoted pdc\_c/dc\_c respectively.

3 Routines

3.1 Main

The routines presume model availability as generated by the AsympPdc package.

The main routines are comprised of:
1. Block Computations
   • pdc_b_alg_A.m
   • dc_b_alg_A.m

2. Canonical Computations
   • pdc_c_alg_A.m
   • dc_c_alg_A.m

in the main_routines directory.

3.2 Support
The main computational support routines are (support_routines directory):

1. grab_block.m - used to select channels from the model.
2. ss_alg.m - used to compute the spectral density matrix.
3. ssi_alg.m - used to compute the inverse of the spectral density matrix.
4. A_to_f.m - A matrix frequency representation.
5. H_to_f.m - H matrix frequency representation.

3.3 Graphic Display
1. plot_block2.m
2. plot_block4.m
3. plot_canon1.m
4. plot_canon3.m
5. plot_canon4.m

in the support_routines directory which also contains other auxiliary plot routine internals not listed here.

4 Examples
The figures used in the examples in [1] have been edited for publication purposes. Their raw generation was provided by the following routines in PaperExamples directory. They should be considered as templates for further study.

4.1 Example 1
Example_1_Fig_2ab.m
4.2 Example 2
1. Example_2_Figs_4_5.m
2. Example_2_Figs_4_6.m

4.3 Real Data Example
Computations were performed using Regions_iictus_Fig_7 with the model parameters in results_iictus.mat which was obtained from data used in [2] whose raw data may be downloaded from the [3] website or from its CD.

5 Disclaimer and Copyright
This module is offered as is under the GPL 3.0 license rules.

References


http://www.lcs.poli.usp.br/~baccala/pdc/CRCBrainConnectivity/