Calculating bicoherence

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This note summarizes steps to run bicoherence routines developed for non-stationary systems with built in hypothesis testing [1].

The released version of NTI Wavelet Tools repository is to be found at /afs/ipp-garching.mpg.de/home/p/pog/AUG_NTI_Wavelet_Tools, while development is managed at https://github.com/fusion-flap/ntiwt, and any contribution is most welcome.

Instructions on bicoherence for transient signals

Open IDL at the folder of NTI Wavelet Tools or open IDL and use the cd command to enter the said folder.

Run h5conv2savrelease to convert data from single data vector h5 to the required sav file format.

Optionally, he resulting sav file can be loaded to do time-frequency analysis with nti_wavelet_gui.

Run runbicoherenceh5 to produce the bicoherence figures. This is an interactive program.

It will ask for the maximum frequency (kHz). If higher than the Nyquist (Shannon) frequency, it will have no effect.

It then asks for the sample number, which will determine the accuracy of the distribution function. This could be number about 500 to avoid running too long (but you have the right to set a higher value, just it takes a long run time and more memory in your computer).

The confidence level should then be given in decimal form. *0.95* and *0.997* are the two recommended values. The latter is better, but it requires higher ample number.

The results of the run appear in the subfolder of the date, which are automatically generated when the result is generated.

Bicoherence is coming up soon, you can check it out in the *fig / day date* folder. But for the filtered version will have to wait, the program will send you to drink a coffee. Come back earlier than promised by the program because it is likely to overestimate your coffee break by a factor of 10. There is a progress indicator in the command line.

References

[1] Peter Zsolt Poloskei, Gergely Papp, Gabor Por, Laszlo Horvath, Gergo I. Pokol: Bicoherence analysis of nonstationary and nonlinear processes, https://arxiv.org/abs/1811.02973 (2017)