multitempCCfilter

A multi-temporal InSAR coherence magnitude filter

The filter achieves coherence estimates with reduced variance using a co-registered time-series of InSAR coherence amplitude images, acquired over the same target. Each set in the series must pre-processed to obtain a co-registered stack of $|\gamma|$ data.

The method is described and some applications discussed in chapter 9 of the book:

De Grandi G. and De Grandi EC., "Spatial Analysis for Radar Remote Sensing of the Tropical Forests", CRC Press, 2021, ISBN: 978-0-367-25940-2

Usage

Packages required:

numpy matplotlib scipy math

Input parameters

dir: input data set directory

filelist: string array holding the filenames of the input time series data set

wavdir: directory for wavelet data representation and other temporary files

outfileroot: prefix of the filtered data set filenames

dp: number of pixel in the input data set

dl: number of lines in the input data set

skipdwt: switch set to 1 to skip the wavelet transform step (only if already performed)

multitempCCfilter(dir, filelist, wavdir, outfileroot, dp, dl, skipdwt)

Input data sets

The input data set consists of a series of N files (float32) holding coherence amplitude data

Some InSAR data processor generate coherence files with NaN values. These should be converted to 0.0.

The procedure stripnan(dir, file, outdir, outfile, dp, dl) can be used for the purpose.

Output data sets

The N filtered time series (float32) will be stored in directory dir with file names:

outfileroot_n_filt with n=1..N

Sample call

from multitempCCfilter import multitempCCfilter

dir='O:/pythonTest/SungaiCC'

wavdir='O:/pythonTest/SungaiCC/wav4'

filelist=['set1HH_cc_clean', 'set2HH_cc_rsp_clean', 'set3HH_cc_rsp_clean', 'set4HH_cc_rsp_clean']

outfileroot='set_HH_cc'

dp=3472

dl=6840

skipdwt=0

multitempCCfilter(dir, filelist, wavdir, outfileroot, dp, dl, skipdwt)

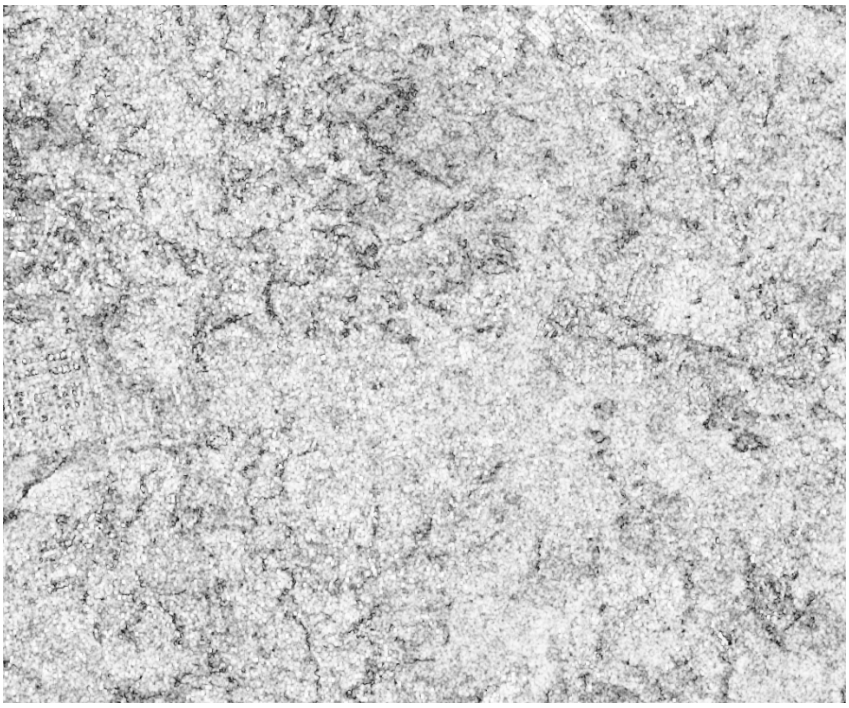
Test cases

The code was tested using

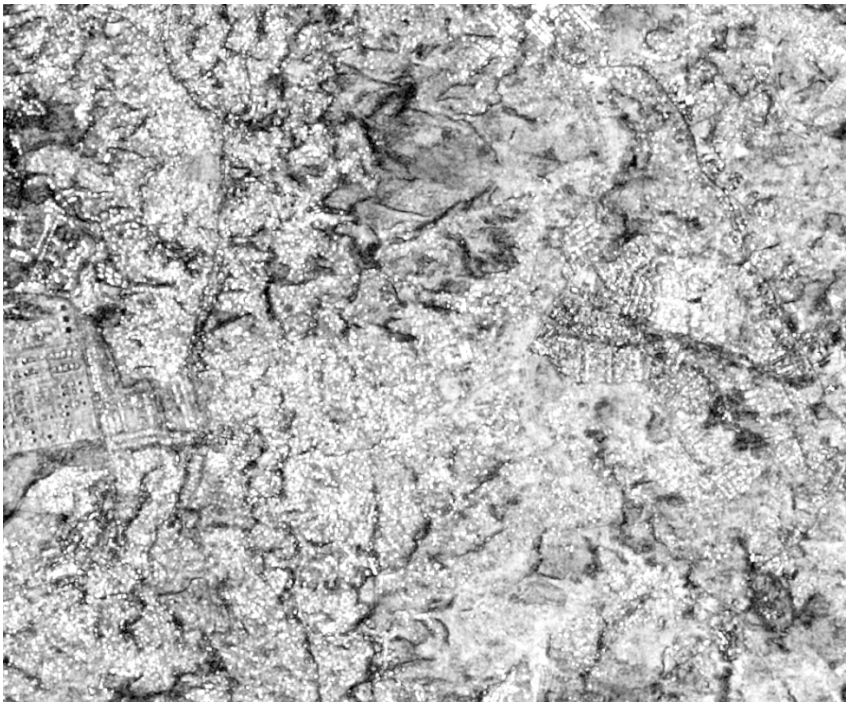
1) A time series of 8 simulated coherence modulus sets generated by a Monte Carlo method (see cha. 9 of the book).
2) A time series of Tandem-X data supplied by DLR through a research project (AO VEGE6702) aimed at characterizing forest heterogeneity in a disturbance gradient of the Sungai Wain Protection Forest (SWPF).

Example

One set of a time series of Tandem-X data supplied by DLR through a research project (AO VEGE6702).



Original unfiltered coherence modulus.



Filtered coherence modulus.