README BFAST3D

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This document describes the **B**ayesian **F**ast **A**ccurate **S**patial **T**ricks in **3D** (BFAST3D) code that can be used to run the Spatial variational Bayes (SVB) and Markov chain Monte Carlo (MCMC) methods in Sidén et al. (2016). The code is an add-on to the SPM12 software (Ashburner et al., 2013) and to its Bayesian single subject method (Penny et al., 2003, 2005b,a, 2007; Penny and Flandin, 2005). To use the code, follow these steps

(1) Download/duplicate your `spm12`-directory (downloadable at http://www.fil.ion.ucl.ac.uk/spm/software/spm12/).
(2) Delete the `spm_spm_vb.m`−file in the new `spm12`-directory.
(3) Copy the `svb`-folder from this package into the new `spm12`-directory.

`runExample.m` gives an example on how to run the code and calls the functions `runSVB.m` and `runMCMC.m` which are adapted for the OpenfMRI data ds105, available at https://openfmri.org/dataset/ds000105/. Use at own risk.

In the current version, various settings are defined in different files and some of these are described below:

- To not run SVB in parallel, in `spm12/svb/2D/spm_spm_vb.m` or `spm12/svb/3D/spm_spm_vb.m`, change the variable `SPM.ParallelGMRFSampling` to 0.
- Change the number of SVB iterations in `spm12/svb/2D/spm_spm_vb.m` or `spm12/svb/3D/spm_spm_vb.m`, variable `SPM.PPM.maxits` (default 50).
- In the beginning of `spm12b/svb/spm_svb_init.m` one can change some SVB settings, e.g. the number of expectation approximation samples N_s (default 100) and the PCG tolerance δ (default 10^{-8}).
- For the MCMC-method, settings are changed in `runMCMC.m`, e.g. the number of MCMC iterations, warmup iterations, thinning factor and PCG tolerance δ can be changed by changing the variables `niter`, `warmup`, `thinningFactor` and `PCGTol`.

`computePPMs.m` depends on the `Tools for NIfTI and ANALYZE image`-package (http://www.mathworks.com/matlabcentral/fileexchange/8797-tools-for-nifti-and-analyze-image). To compute joint PPMs, `R` is required and so is the `excursions`-package (Bolin and Lindgren, 2015), development version (https://bitbucket.org/davidbolin/excursions) and also the R-package `R.matlab`. Be aware that for large data sets the time and memory requirements can be quite demanding, especially for MCMC, which can be quick-fixed by limiting the number of iterations.

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