

The main functions of interest - when modifying for another study are:

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*) bwh_ms_main
a) ssmSetupEnvironment
b) ssmMSPreprocessing (it's now set up to do preprocessing for the MS study).
c) ssmBuildStimulusMaps - set up for conditions of interest. these
names should match the name of the contrast specified in HRF_SPM.mat
file. (see ssmMSPreprocessing for details).

[params_opt, data, results]= ssmEstimateFull(data, env, 2, block_length, tol);

% params_opt - model parameters estimated from 'data' results -
% detailed information about all internal computation steps. mainly
% for debug and further analysis params structure (which is
% params_opt)

params =
    omega: [40x14 double]           % state transition parameters
           W: [40x14x14 double]      % "
           mu_z: [40x14 double]      % 'Z'-layer parameters (mean)
           Sigma_z: [40x40x14 double] % " variance
           H: [40x40x17 double]      % HRF (estimated one per FS)
           Sigma_eps: [40x40 double] % noise variance
           u: [704x40 double]        % predicted stimulus
           pred_error: [1x1 struct]   % detailed prediction error
           invSigma_eps: [40x40 double] % inverse of sigma_z and sigma_eps above
           invSigma_z: [40x40x14 double] % "
           K: 14                     % optimal number of states
           sseq: [1x1 struct]         % optimal state sequence
           Z: [704x40 double]        % estimated values of Z

% use data.u_idx to find the time points that are used for prediction
>> params.pred_error
    ch: [704x40 double]           % the error per stimulus channel per time point
    ch_tot: [1x40 double]         % the total error in each channel (regressor)
    all: [704x1 double]           % cumulative error (over channels) per time point
    all_tot: 5.2769               % cumulative error summed over time

% the optimal state sequence
>> params_opt.sseq
    x: [704x1 double]             % list of state labels (over time)
    log_p_opt: -2.2480e+004        % the "quality" of this sequence (higher the better, 0 is best)

% built up in bwh_ms_main and also in ssmEstimateFull. It is used/updated throughout the estimation
>> data
    D: 40                         % dimension of the fmri scan in feature-space
    T: 704                        % nscans
    TR: 2
    ch: 40
    s: [704x40 double]           % number of stimuli
    y: [704x40 double]           % stimulus vector (T x ch)
    tol: 0.0500                  % fMRI data (T x D)
    % stopping criterion. make it smaller to make results more exact.
    % but slower computation
    basis: [1x1 struct]          % internal structure to do parameter tuning
    set: [1x1 struct]            % " "
    L: 17                         % length of HRF (in TRs)
    mu_h: [17x1 double]          % prior on HRF (derived from ssmBuildHRF)
    Sigma_h: [17x17 double]      % " "
    invSigma_h: [17x17 double]   % " "
    K: 14                         % Number of states to be used in estimation
    lambda_w: 0.1000             % another hyper-parameter that balances between
    % effect of stimulus and previous state on transition probabilities
    u_idx: [112x1 double]        % indices (i.e. time points) to be used for prediction.

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