Matlab programs for studying stimulus-response relation in critical E-I balanced network

used in paper *Criticality Enhances the Multilevel Reliability of Stimulus Responses in Cortical Neural Networks* by Junhao Liang and Changsong Zhou.

1. Scripts for performing spiking network dynamic simulations and mean-field theory calculations are presented. The correct interpretation of the codes is important for using them. Please also read annotations inside the scripts.
1) The function 'spikeNetSimul.m' simulates the spiking network dynamics with parameters generated in 'getParameters'.
2) The function 'meanfieldPrediction.m' computes quantities predicted from the field equation with parameters generated in 'getParameters'.

2. The folder 'DataAnalysis' contains the scripts for carrying out the analysis of the simulated network dynamic data, including

1) The spike train statistics: Pearson correlation coefficient ('Cor_afterfilter.m'), CV of ISI ('CV_of_ISI.m'), autocorrelation of neuron population activity ('autoCor_population.m'), neuronal avalanche ('avalanche.m').
2) Trial-to-trial variability analysis: the variance of LFP ('VolVariance.m'), Fano factor of neuron spike counts ('rawFF.m').
3) Power spectrum analyais: the PSD of LFP ('spectrumdensity.m'), the trial-averaged frequency components across time ('bandpower.m').
4) The NCC toolbox for analyzing neural avalanches can be found from the paper https://www.frontiersin.org/articles/10.3389/fphys.2016.00250/full

3. The folders 'Figx' (x=1~5) and 'FigSx' (x=1~10) in 'Figures' contain the scripts and corresponding data to draw the figures.
For example, the script 'plotFig1.m' in folder 'Fig1' can draw the Figure 1 in the maintext.

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