# SignalandNoise: to analyze responses to repeated white noise stimuli

**This program takes the power spectrum of a the average responses to a repeated fluctuating stimulus and the residual between each individual response and the average**

Each row of the matrix is a response epoch to the same stimulus.

The program performs the following main operations:

1. Ask the user to enter in the sampling interval (per second)

2. Ask the user to enter in the number of points preceding the stimulus

3. Ask the user to load the matrix containing the responses in rows
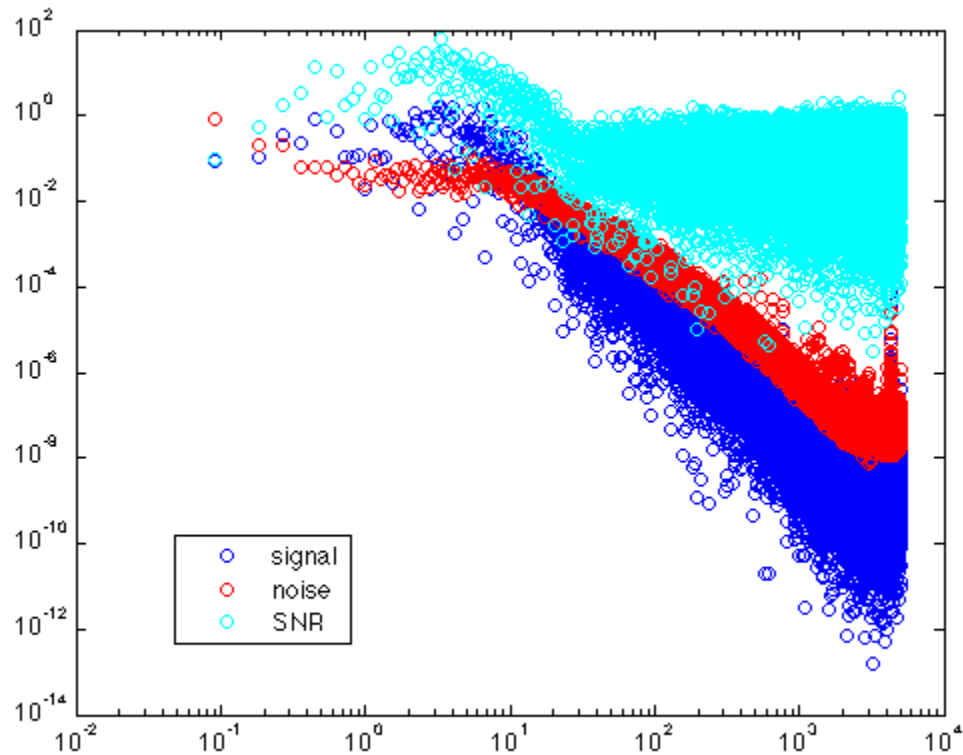


**Input:**

- Mat file: mat file containing the data in row vectors

- Reference points: What are the reference points?

**Output:**

- "Spectra.mat" Column vectors of the following: 1) Frequencies (Hz) 2) Signal power 3) Noise power 4) Noise standard deviation 5) Signal to noise ratio

**Dependencies:**

- PowerSpectrumFinder.m (power spectra that converts points to time)

```matlab
CellInfo.SampleRate = input('Sample rate per second ')%
CellInfo.PrePoints = input('Number of prepoints');

% load data in: matrix called data
[FileNamePoints, PathNamePoints] = uigetfile('*.mat');
load([PathNamePoints FileNamePoints]);

data_mean = mean(data); % how to make this generalizable?
data_mean = data_mean - mean(data_mean(1:CellInfo.PrePoints)); %
 subtract off baseline

figure
plot(data_mean)

[n, m] = size(FileNamePoints);

for count = 1:n
    datasubtract(count, :) = data(count, :) - mean(data(count,
 1:CellInfo.PrePoints));
    residual(count, :) = data_mean - datasubtract(count, :);
    [Power_x(count, :), Power(count, :)] =
 PowerSpectrumFinder(residual(count, :), CellInfo.SampleRate);
end

[Power_signal_x, Power_signal_y] = PowerSpectrumFinder(data_mean,
 CellInfo.SampleRate);

figure
loglog(Power_signal_x, Power_signal_y, 'o')

Power_noise_y = mean(Power);
Power_noise_sd = std(Power);

hold on
loglog(Power_x(1, :), Power_noise_y, 'ro')

SNR = Power_signal_y./Power_noise_y;
loglog(Power_x(1, :), SNR, 'co')

Spectra = cat(2, Power_signal_x', Power_signal_y', Power_noise_y',
 Power_noise_sd', SNR');

Error using input
Cannot call INPUT from EVALC.

Error in SignalandNoise (line 34)
CellInfo.SampleRate = input('Sample rate per second ')%

save Spectra Spectra -ascii -tabs % how to direct this to a directory?
```

# Changelog

***Version 1.0*** *created on 2017-09-28 by Felice Dunn*

*Published with MATLAB® R2016b*