

Example data from Yang Dan Lab

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General description of data

The data were obtained with extra-cellular recordings from the primary visual cortex of anesthetized adult cats. The visual stimuli were one-dimensional white noise (random bars) aligned to the preferred orientation of each cell and two-dimensional stimuli (natural images, natural phase, and random phase). These experiments were performed to measure the spatiotemporal receptive fields of cortical cells. We have previously used spike-triggered average and spike-triggered covariance to analyze these data. They can be used to test other methods for analyzing the stimulus-response relationship of visual cortical neurons.

The file locations and structures are described below. To get started, please read the *.log file for information about the stimuli. To get the spike train data, use fget_spk.m to load the *.sa0 files. To read visual stimuli in *.mat files simply use “load” in Matlab.

File Locations

At the top level, the files are organized into folders “1D_white_noise” and “2D_noise_natural” which respectively contain the 1D and 2D stimuli and data files. Within each of these directories are directories “Stimulus_Files” and “Spike_and_Log_Files” (which contain response data).

File Structures

DATA (in “Spike_and_Log_Files” directories).

*.log - Text File, Stimulus Log Information (contains stimulus size, stimulus name, frame rate, etc). Note: These files use repeated “null” characters (all bits zero) to separate the parameter names from the values. If you don’t see any parameter values (which are on the right side of each line), try viewing the files using a different program. Windows notepad should work. In the worst case, the unix “od” command will allow seeing the file contents.

*.sa0 - Binary File, List of Spike Times (spike times are in .0001 second scale)

Response to 1-D Stimuli:

*msq1D.sa0 - spike file where msq1D.mat was the stimulus (1D M-Sequence, 32767 Frames)

*imsq1D_rep20.sa0 - spike file where imsq1D.mat was the stimulus repeated 20 times (1D Inverted M-Sequence, 512 Frames)

Response to 2-D Stimuli:

equalpower.sa0 - spike file using natural images as stimuli (see log file to determine which stimulus file)

whitenednatural.sa0 - spike file using images with the same phase as natural images but flat power spectra (see log file to determine which stimulus file)

randomphase.sa0 - spike file using images with random phase but same power spectra as natural images (see log file to determine which stimulus file)

STIMULUS FILES

1-D Stimuli:

msq1D.mat - Matlab File, 1D M-Sequence Stimulus (16 Bars, 32767 Frames)

imsq1D.mat - Matlab File, 1D Inverted M-Sequence Stimulus (16 Bars, 512 Frames)

2-D Stimuli:

'Equalpower*.mat' are stimuli with natural images. Each frame is a small patch of natural image, but temporally they are uncorrelated.

'Randomphase*.mat' are stimuli with the same power spectra as the natural images, but randomized spatial phase.

'WhitenedNatural*.mat' are stimuli with the same spatial phase as the natural images, but flat power spectrum.

MATLAB FUNCTIONS

fget_spk.m - Matlab Function, Loads *.sa0 File and Returns Spike Times

fget_hdr.m - Matlab Function, Loads *.sa0 File and Returns Header

tvview.m - Matlab Function, Loads & Plots Orientation Tuning Curves (*tune.log).
(Files fretrieve_log.m and tori.m in the tvview directory contain support routines used by tvview.m).

For experimental procedures, see reference:

Touryan, J., Lau, B., & Dan, Y. (2002)

Isolation of relevant visual features from random stimuli for cortical complex cells.

Journal of Neuroscience 22(24):10811-8

Touryan, J, Felsen, G., and Dan, Y. (2005)

Spatial structure of complex cell receptive fields measured with natural images, Neuron 45, 781-791.

Felsen, G., Touryan, J., Han, F., and Dan, Y. (2005)

Cortical sensitivity to visual features in natural scenes, PLoS Biol. 3 (10), e342.