Contents

1 Introduction

This gives background.

2 Experiment

2.1 Setup

Calcium images were scanned using a Two-photon calcium imaging device on mice injected with GCaMP6f. Firing rates of these cells were then inferred using a fast nonnegative deconvolution algorithm on the Calcium imaging data.

Visual stimuli
Creation of noise movies. We developed an algorithm that allowed us to create noise images with a user-defined spectral slope. To do so, we took advantage of the inverse-square law: $P \sim k^{-\alpha}$, which translates to a circle with radius α in two-dimensional Fourier space. Thus, we constructed all noise movies in the Fourier domain. We first defined a matrix of the same size as the original image (256 $\times$ 256 pixels) and then created a noise amplitude spectrum as a 2D circle of radius α , with α taking values from 0 (K0 movie) to $\sqrt{2}$ (K2 movie). This was due to the squared relationship between the amplitude spectrum and the power spectrum. To create the final noise image, we combined this noise amplitude spectrum with a random phase spectrum, where phase values were randomly sampled from the range $0 - 2\pi$. The final noise images were visualized by comput- ing its 2D inverse Fourier transform. Each frame of the noise movie was created using a new random seed, and as a result, the raw noise movies had no temporal correlations between frames. Noise-masking procedure. Figure **??** provides a schematic of the noise- masking procedure. First, each frame of a natural movie was decomposed into its Fourier components (phase and amplitude) via a 2D fast Fourier transform implemented in MATLAB. Next, a noise image was created as described above. The phase spectrum of the original movie was then combined with the amplitude spectrum of the noise movie. The resulting image was then inverse Fourier transformed to yield a noise-masked movie frame. This procedure was repeated for all frames. We used a total of five different natural movies, each 4 s in duration, from the van Hat- eren movie database

2.2 Data

MATLAB datafile AmpMov.mat contains the following fields.
Experiments are done various days, the data corresponding to each day are in each folder.
Subscript _nat corresponds to responses to video stimuli for original natural scenes video. similarly subscripts _K0, _K_1, _K1_5, _K_2 denote responses to manipulated natural scenes video stimuli.

Field	Description
Sorted.SpikeRate	blah blah
Blank	Dimension 47 x 16800
NumNeurons	Number of neurons sampled
NumMovies	Number of movies used as stimulus
M_nat	Dimension 4 x 47 x 1200
MT_nat	Dimension 4 x 47 x 200 x 6
MTA_nat	Dimension 4 x 47 x 200
MTNA_nat	Dimension 4 x 47 x 1200