CRCNS.org pfc-3 data description

Version 0.8 (May 9, 2016)

Single-neuron spike train recordings from macaque prefrontal cortex during a visual working memory task before and after training.

Summary

This dataset is published together with the following manuscript that performs dimensionality reduction of several PFC datasets:

* Kobak, D., Brendel, W., Constantinidis, C., Feierstein, C. E., Kepecs, A., Mainen, Z. F., Romo, R., Qi, X.-L., Uchida, N., & Machens, C. K. (2016). Demixed principal component analysis of neural population data. eLife, 5. http://dx.doi.org/10.7554/eLife.10989

Original publications

* Meyer, T., Qi, X. L., Stanford, T. R., & Constantinidis, C. (2011). Stimulus selectivity in dorsal and ventral prefrontal cortex after training in working memory tasks. The Journal of Neuroscience, 31(17), 6266-6276.

* Qi, X. L., Meyer, T., Stanford, T. R., & Constantinidis, C. (2011). Changes in Prefrontal Neuronal Activity after Learning to Perform a Spatial Working Memory Task. Cerebral cortex, 21(12), 2722-2732.

How to cite

When using this dataset, please cite the two original publications (Meyer et al. 2011 and Qi et al. 2011) as well as the dataset itself:

* Christos Constantinidis, Xue-Lian Qi, Travis Meyer (2016). Single-neuron spike train recordings from macaque prefrontal cortex during a visual working memory task before and after training. CRCNS.org http://dx.doi.org/10.6080/K0ZW1HVD

Animals

This dataset contains the recordings from prefrontal cortex of four monkeys, ADR, BEN, ELV, and SCR. It encompasses two tasks (spatial task and feature task) and both pre-training and post-training recordings.

Data format

The data folder contains 8041 .mat files, each corresponding to one neuron. Two additional files are SummaryDatabase.xlsx and FeatureSpatialClass.xlsx. SummaryDatabase.xlsx lists all neurons in each of the tasks (on different sheets).

All .mat files have names of the form 'ADR001_1_3000.mat'.

1) The first three letters refer to the monkey

2) The first three numbers is a sequential number of the dataset (do not refer to the date of recording!)

3) The next one digit number references the sequential stimulus set used (spatial, feature or conjunction); the exact modality is containted in "SummaryDatabase.xlsx".

4) The set of first 8 characters represents a single electrode recording session; the last four digits refer to the single neurons identified from spike sorting.

Within a file you find 8 or 9 blocks of 12 trials. Trials are organized in “classes”, organized based on the identity of the cue (first stimulus). There are eight possible feature stimuli that appear as cues, nine spatial locations in the spatial set, and eight feature-spatial combinations that were used as cues in each conjunction set.

Within each block fields are named with 'Cue_onT', 'Sample_onT', 'Reward_onT', 'Target_onT', etc. Cue_onT will be the time (in s) of the cue onset, the same for Sample_onT, Reward_onT and Target_onT. The latter parameter (Target_onT) is not present in the passive tasks. The TS field contains the spike time series in a single trial, for times around the task events. The parameters 'fix', 'cuerate', 'cuedelay', 'samplerate', 'sampledelay'; these parameters are there just for convenience; they contain the mean spike rate in the fixation period, cue period etc. They are redundant, since these can be inferred by the TS spike time series.

-- Spatial task --

The spatial location index for the grid is as follows (starting from the right, counterclockwise, with 9 at the center location):

4 3 2
5 9 1
6 7 8

When the first target was not in the centre, it was always followed by a diametric one. The center position was followed by a nonmatch either to the left (position 5) or to the right (position 1).

-- Feature task --

The last number of the feature class tag denotes the spatial location where the features were presented. FEATURE9 (the most common) means that all the features were presented at the center, foveal location. FEATURE1 would be the right location and so on. There are eight different shapes in the feature task that appear as the cue in classes number 1 through 8:

"Circle",
"Diamond",
"H letter",
"Number sign",
"Plus sign",
"Square",
"Triangle"
"Y inverted"

These are followed by nonmatches which differ between sets (FEATUREX, FEATUREXa, FEATUREXb), see FeatureSpatialClass.xls.

Feature set 10 and 20, have an additional 2 or 10 shapes included, beyond the 8 basic shapes. These are always presented in the fovea (so FEATURE10 should really have been named FEATURE9_10 in the naming convention above).