



# ADVANCED FUNCTIONAL BRAIN IMG.

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Assignment 4: Optimising preprocessing steps (Visu...

## Assignment 4: Optimising preprocessing steps (Visual Cortex)

**Objective:** In this assignment, you'll have to optimise preprocessing (using your own codes) and run GLM analysis on a single subject using fsl.

### Description of Data:

The data is taken from openfMRI and its accession number is ds000113d, subject id sub-001

### Imaging details:

T2\* weighted echo-planar images.

**TR:** 2s

### **Acquisition:** Ascending

There are four runs and each run has 156 volumes. The four runs have been concatenated and have 624 volumes. The data for both single runs and concatenated have been made available to you. In this assignment, you have to work on the concatenated data. The other data has been provided should you want to explore more.

**Data Location:** /mnt/project1/COL786/Spring17/Assign4

Pre-processing Steps done in the paper:

( <http://www.nature.com/articles/sdata201693> )

Slice time correction (ascending order)

Spatial Smoothing using a 4mm kernel

High pass filtering with a cut off value of 100s.

### **Contrast to be done:**

All images (average)

### **Expected output:**

Provided alongside the data at cerebrum

### **Description of Protocol:**

Participants were presented with four block-design runs, with two 16 s blocks per stimulus category in each run, while they also performed a one-back matching task to keep them attentive. The order of blocks was randomized so that all six conditions appeared in random order in both the first and second halves of a run. However, due to a coding error, the block-order was identical across all four runs; though the actual per-block image sequence was a different random sequence for each run.

In each block, 16 unique images were presented on a medium-gray background (with a superimposed green fixation cross). Each image was shown for 900 ms and images were separated in time by 100 ms. The participant's task was to press a button (index finger, right hand) when any image was

immediately followed by its mirrored equivalent. These events happened randomly either once, twice, or never in each block. In order to alert the participant, the fixation cross turned green 1.5 s prior to the start of a block, remained green throughout a block, and was white during the rest period.

To understand the task further, check out - <http://www.nature.com/articles/sdata201693> [Section - Localizer for higher visual areas]

### Models:

You have to use model files present in the folder models. These represents models for different types of objects. The names of the model files are self-explanatory. The models1 contain models for single runs and are for exploration purpose.

### What to Submit:

1. Optimum parameters of high pass filter and optimal FWHM.
2. Table of parameters and cluster size as in Assignment 3.
3. zstat values (thresholded and clustered) for the optimal parameters (both registered and unregistered)
4. Labels of areas found in the optimum zstat.


### Note:

1. The data in this assignment was acquired in an ascending order.
2. There is no structural data available for this. In order to register, use function to standard transformation.
3. Use model files from the folder 'models'. model001.txt contains onsets for all the images blocks irrespective of their category. The other model files contain onsets for individual object categories (categories evident from the file names). You can either use the first model alone or you can use average over different categories using the six model files.

### References:

1. <http://www.nature.com/articles/sdata201693>
2. <https://openfmri.org/dataset/ds000113d/>

## Submission status

Submission status	Submitted for grading
Grading status	Not graded
Due date	Wednesday, 5 April 2017, 11:55 PM
Time remaining	Assignment was submitted 1 hour 15 mins early
Last modified	Wednesday, 5 April 2017, 10:40 PM
File submissions	 2014EE30506_Assignment4.zip
Submission comments	► Comments (0)

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