Portfolio_assignment6_model_estimation

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fMRI model estimation excercise

In this exercise, we will estimate the model of the data that we designed in exercise 4.This means that we get the results and report them, if there are any. You do not need R for this excercise.

Deadline

March 22, 2018.

Details:

Model estimation (SPM manual p. 229)

If you have made the model from excercise 4, you should have a file called "SPM.mat" saved in your model directory.

Choose "estimate" in the SPM menu (or add it to your batch). Choose "Specify" under the "Select SPM.mat"-menu and locate your design file.

Save the job as estimate.mat and press the Run button.

Making contrasts (SPM manual p. 229)

After estimation: - Press "Results" - Select the SPM.mat file. This will invoke the contrast manager

T-contrasts

To see the effect of a specific condition we need to to turn all the other conditions "off", we do this by making a vector of 1s and 0s which will tell SPM which conditions we are interested in.

The contrast manager displays the design matrix (surfable) in the right panel and lists specified contrasts in the left panel. Either "t-contrast" or "F-contrast" can be selected. To examine statistical results for condition effects: - Select "Define new contrast" For each condition specify a positive t-contrast by making a vector with a 1 for the condition and 0s for all other (see also Flandin & Novak p. 70), e.g.

pos_story1: [1 0 0 0 0 0 0 0 0 0 0]

pos_story1rating: [0 1 0 0 0 0 0 0 0 0 0]

pos_story2: [0 0 1 0 0 0 0 0 0 0 0]

pos_story2rating: [0 0 0 1 0 0 0 0 0 0 0]

pos_rating: [0 0 0 0 1 0 0 0 0 0 0]

Do the same with negative effects (i.e. use -1 instead of 1). This will find voxels that have a negative BOLD response.

Make t-contrasts by subtracting conditions: [story1-story2] and [story2-story1] using +1 and -1, both for main effect and rating effect. This will find areas that differ in their response to the two conditions.

F-constrast

In order to investigate whether anything in the data is explained by the 6 motion parameters, make an F-contrast. If you model contains two story conditions, one response condition and two rating covariates, this can be done by creating a contrast matrix using the following formula:

[zeros(6,5) eye(6)]

Note: Since here, we are only interested in the effect of the realignment parameters, we want to "turn off"" the other covariates. We therefore set them to zero using zeros(6,5) which gives a square matrix of zeroes (if you have more than five non-realigment parameters you need to change the last number). eye(6) makes an identity matrix identifies the six realigment parameters, so our analysis will show if and where they explain any variance in the data.

Results

For each contrast, see if there are any significant results when correcting for multiple comparisons using family-wise error correction (FWE) for multiple comparisons (see Flandin and Novak p. 71). If you find nothing using the correction, try using an uncorrected threshold ($p<0.001$). Although this threshold is strictly speaking not statistically significant, it is often used anyway.

Displaying results

Under "display" use "overlays" and "sections" to choose image as background for activations. Choose either normalised structural image for participant or canonical image (found in the /SPM12/canonical folder under "single_subj_t1.nii")

Things to report:

1. Report the output coordinate table for each of the 14 contrasts, both significant and non-significant (e.g. using the "save figure" function in the "SPM Figure" menu).
2. For significant constrast, include a nice overlayed image, displaying the most significant effect.
3. How many voxels are included in your analysis? Recall that a p-value reflects the probability of finding a specific effect, given that the null hypothesis is true. If all voxels were independent, how many voxels would then on average appear to be activated by chance in this analysis if using an uncorrected threshold of $p<0.001$?

Reporting:

Collect material and submit as a single file (pdf) to Blackboard.