

COS 513 Blog Post

November 18, 2015

1 EEG fMRI

1.1 FFTs

We performed Discrete Fourier Transform (using FFT) on each 1000 ms section of EEG, time-locked to the onset of each stimuli. Then we extracted average spectral power of EEG components divided in the frequency band, including delta (1-3 Hz), theta (4-7 Hz), alpha (8-13 Hz), beta (14-30 Hz) and gamma (31-50 Hz), for each of the 34 channels.

1.2 CCA

We performed sparse CCA on the EEG features and fMRI features (just the voxels after standard preprocessing).

1.3 Classification results with SVM

The following is computed with 20% of the data (n=120) set aside for testing, 100 times cross-validation. We computed the average accuracy and the recall (the percentage of ‘target stimuli’ test examples correctly classified as ‘target stimuli’). We are really interested in the recall since target stimuli comprise only 20% of the data.

	Accuracy (%)	Recall (%)
EEG in original space	69.57	23.4
EEG in CCA space	75.6	16.7
EEG + fMRI in CCA space	71.0	29.2
FFT EEG	67.3	22.4
FFT EEG + fMRI in CCA space	70.0	28.1
Random 20-dim vectors	72.6	7

How do we evaluate these results? In particular, how do we assess if the differences in the Recall is significant? One way is to repeat our 100-times CV more times and plot the histogram of the Accuracy and Recall values, to get a better idea of the distribution of these metrics (since we do not have a probabilistic model of their distributions). However some of these values vary quite wildly, especially that for the random data, so we're not sure how good of a benchmark it is.