

Aug 23

Practiced presentation for the lab.

Gave lab talk:

- why are MC MI estimates going to the max MI value when decoder is performing badly?
- one possible explanation: low number of trials and as a result - incorrectly estimating covariance matrix for a high-dimensional case and biasing MI up

Aug 24

Modified “testGaussInfoAcrossNumChsAndNumTr” script to plot “true” MI based on calculations with “means” and “covs” instead of “ftsr” and “conds”. With large number of trials estimated MI gets closer to “true”.

Ran “testGaussInfoAcrossNumChsAndNumTr” with constructed data (“pick” method) instead of real data (“data” method) and informative channels #10 and #20. Resulting plot confirms that low number of trials leads to strong upward bias in MC MI.

Ran “testGaussInfoAcrossNumChsAndNumTr” with constructed data (“pick” method) on “taylor” and “upper” methods. They both show behavior similar to “monteCarlo” but have stronger bias.

Aug 25

Weekend. Day off.

Aug 26

Sent email with latest developments about MI to XXXXX.

Aug 27

Found papers on robust covariance matrix estimators (shrinkage algorithms). Implemented several of them in “shrinkCov” script. Ran “testGaussInfoAcrossNumChsAndNumTr” using shrinkCov instead of cov with “monteCarlo” method. This method significantly improves MI estimates! Bias is much lower!

Sent new results to XXXXX.

Aug 28

Wrote the information paper for 45 min.

Tested “oas” vs. “rblw” vs. “lw” shrinkage algorithms for covariance matrix estimation in the Gaussian case. “Oas” and “lw” perform the best (and with “monteCarlo” method).

Ran “extractLfpFeatures” to extract:

1) 15-25Hz

a) align event - 36 (go cue)

time window - [-1000 - -500] ms

sessions: SS011311, SS012711, SS020911, SS022411, SS031011, SS032411, SS040711, SS042111, SS050511

b) align event - 8 (go cue)

time window - [-750 - -250] ms

sessions: CS20120316, CS20120324, CS20120407, CS20120421, CS20120505, CS20120520, CS20120523, CS20120613, CS20120619

2) 80-500Hz

a) align event - 36 (go cue)

time window - [-1000 - 0] ms

sessions: SS011311, SS012711, SS020911, SS022411, SS031011, SS032411, SS040711, SS042111, SS050511

b) align event - 8 (go cue)

time window - [-750 - 0] ms

sessions: CS20120316, CS20120324, CS20120407, CS20120421, CS20120505, CS20120520, CS20120523, CS20120613, CS20120619

Saved results in the “\!analysis\!features” folder.

Read XXXXX's paper "Online Regularized Discriminant Analysis". He uses shrinkage and regularization algorithms to estimate covariance matrix. Need to talk to him about the parameter selection. Sent XXXXX an email.

Wrote the information paper for 30 min. Sent the current paper draft to XXXXX and XXXXX.

Ran "infoAnalysisNumChs" on all newly extracted features (2 sets of LFP powers, 9 sessions, 2 array types) overnight. Saved results in the "\\analysis\\gauss_info" folder.

Aug 29

Found a bug in the code which was running overnight. Re-ran it calculating MI when adding channels in their number order ("I" matrix) and highest ANOVA info order ("Ibest").

Ran "plotInfoNumChs" to compare NA and UA on 15-25Hz and 80-500Hz LFP power features (across 9 sessions for each array). Saved results to the "analysis-figures/info2" folder. Using "shrinkCov" instead of "cov" MI does not increase to 100% of maxMI even with 64 channels (smaller MI bias). UA carries higher info than NA for both feature sets. Variance of the UA MI is very high!