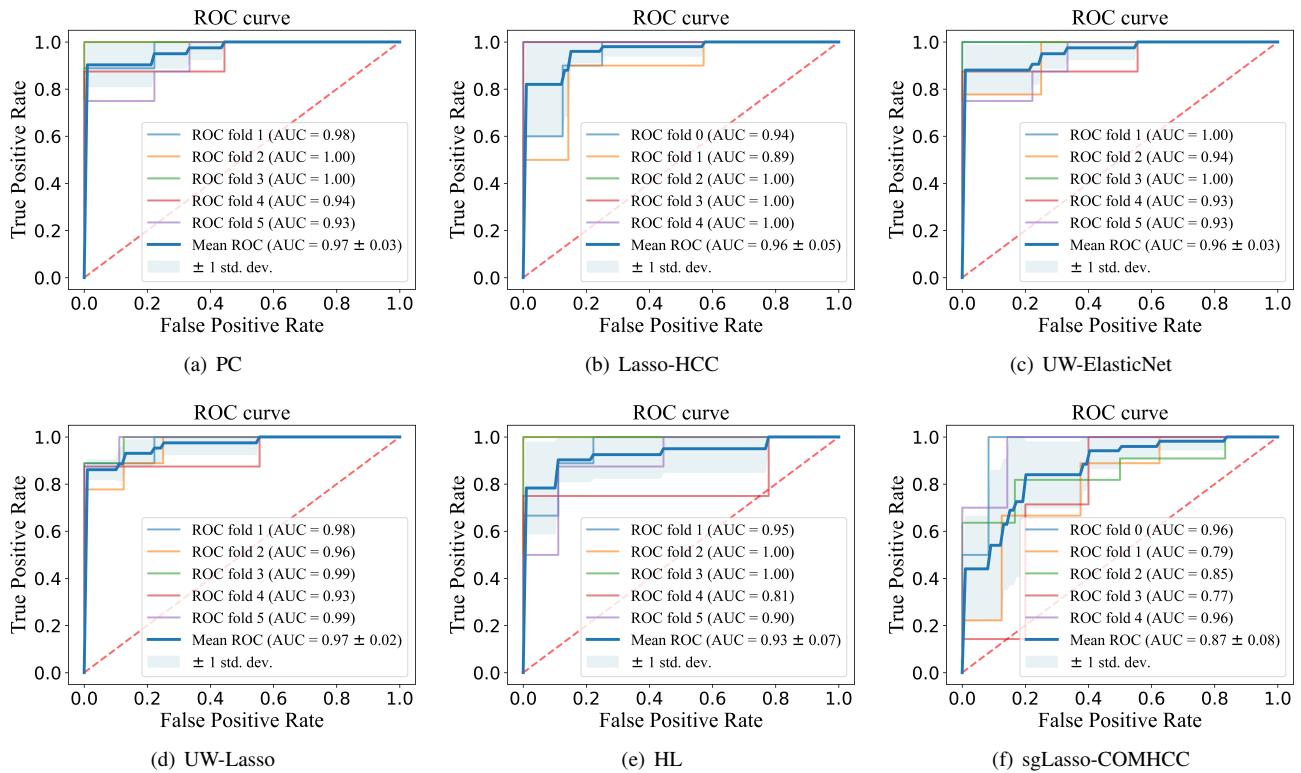


Supplementary Material for "Hypergraph-Based Fuzzy Cognitive Maps for Functional Connectivity Analysis on fMRI Data"

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I. DATA PREPROCESSING

We need to preprocess the original functional images and extract the fMRI time series of ROIs. fMRI data are preprocessed using Data Processing Assistant for Resting-State fMRI package [1] (DPARSF)¹. The steps are as given follows: 1) Slice timing: the initial 10 time points are removed, and the slice-timing correction is performed; 2) Realign: the subjects with head motion exceeding 2.5 mm and 2.5 degrees are excluded; 3) Co-registered: the functional images are co-registered to the T1-weighted structural images, which are further segmented into gray matter, white matter, and cerebrospinal fluid by the segmentation method in SPM²; 4) Normalized: the functional images are normalized into the Montreal Neurological Institute (MNI) space by the Diffeomorphic Anatomical Registration Through Exponentiated Lie algebra (DARTEL); 5) Smooth: to reduce the uncertainty of the co-registered, the functional images are smoothed by a 4mm full width at half maximum (FWHM) Gaussian kernel; 6) Filter: functional time series are band-pass filtered at 0.01-0.1 Hz.



¹<http://rfmri.org/DPARSF>

²<http://www.fil.ion.ucl.ac.uk/spm>

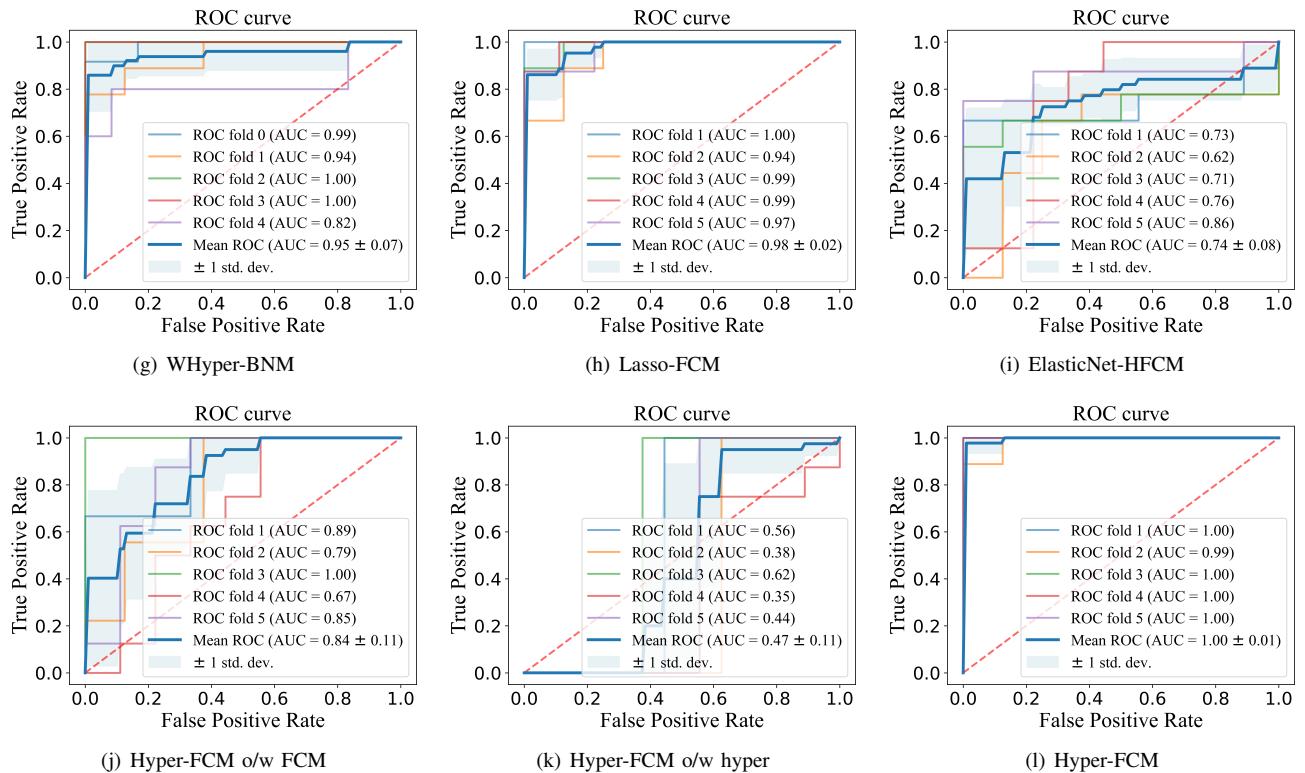
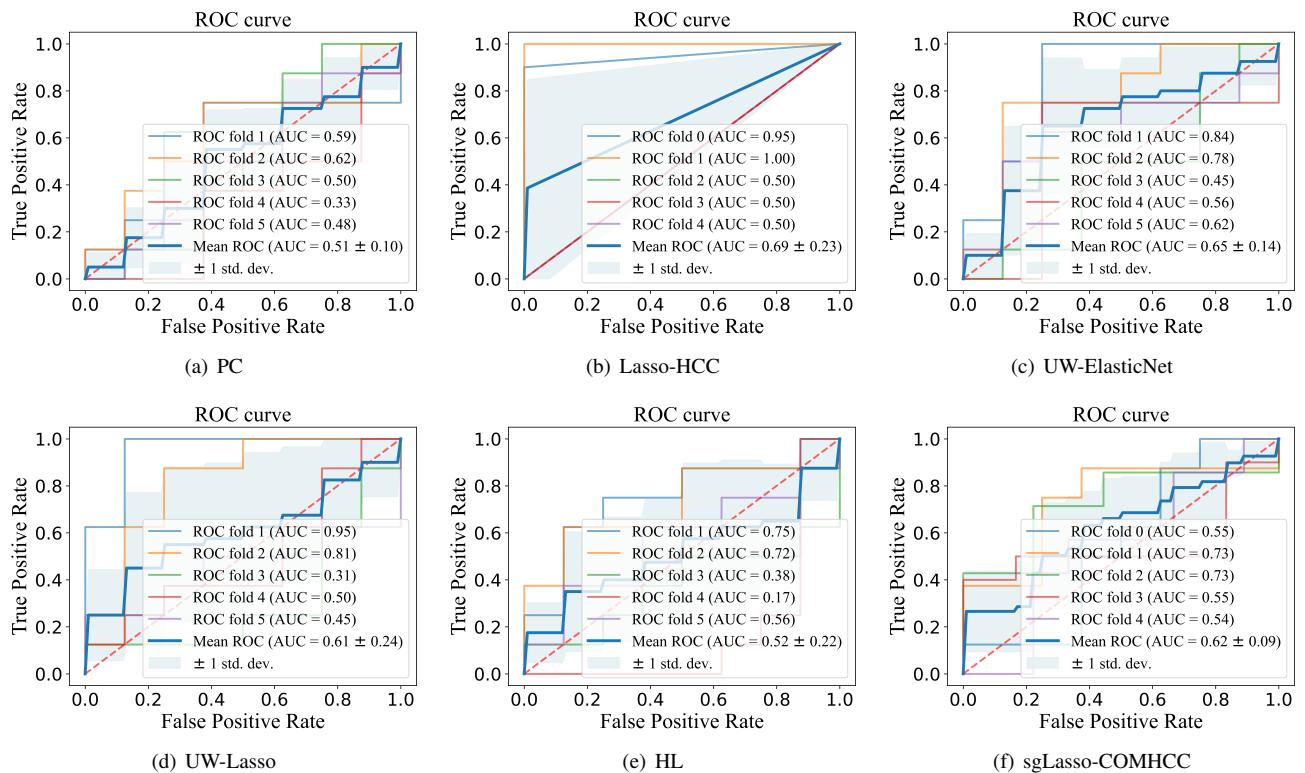


Fig. S1. The 5-fold crossover ROC curves of 12 methods on resting-state classified fMRI II data. (a) PC, (b) Lasso-HCC, (c) UW-ElasticNet, (d) UW-Lasso, (e) HL, (f) sgLasso-COMHCC, (g) WHyper-BNM, (h) Lasso-FCM, (i) ElasticNet-HFCM, (j) Hyper-FCM o/w FCM, (k) Hyper-FCM o/w hyper, and (l) Hyper-FCM.



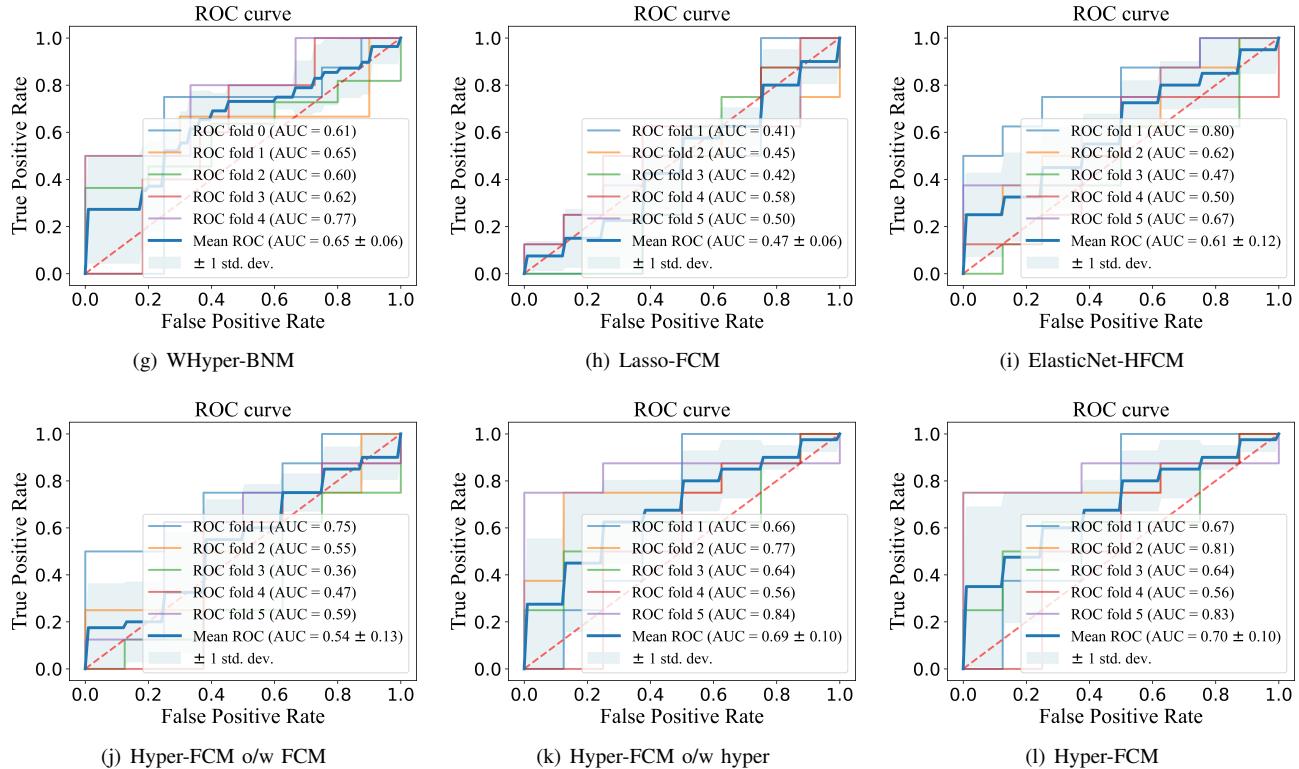
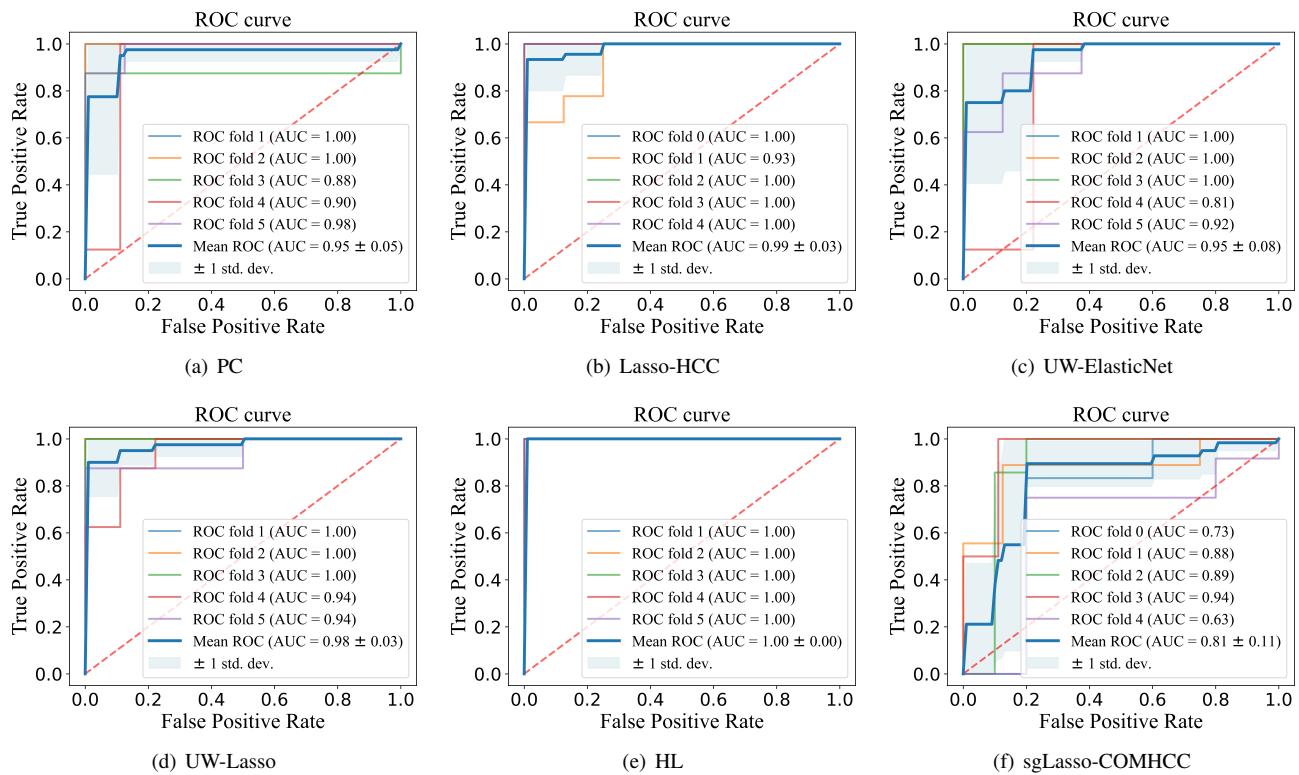


Fig. S2. The 5-fold crossover ROC curves of 12 methods on Alzheimer's disease fMRI data. (a) PC, (b) Lasso-HCC, (c) UW-ElasticNet, (d) UW-Lasso, (e) HL, (f) sgLasso-COMHCC, (g) WHyper-BNM, (h) Lasso-FCM, (i) ElasticNet-HFCM, (j) Hyper-FCM o/w FCM, (k) Hyper-FCM o/w hyper, and (l) Hyper-FCM.



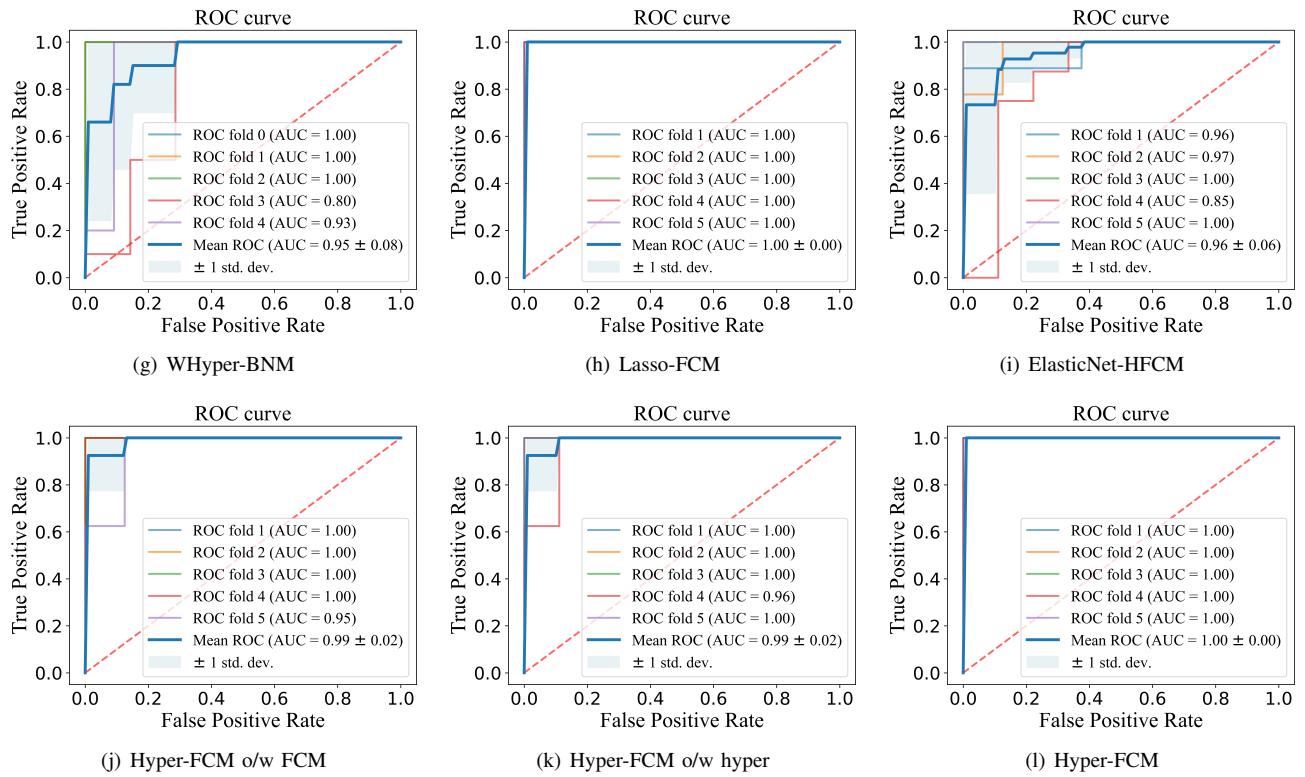


Fig. S3. The 5-fold crossover ROC curves of 12 methods on Reading Brain L1 Adult fMRI data. (a) PC, (b) Lasso-HCC, (c) UW-ElasticNet, (d) UW-Lasso, (e) HL, (f) sgLasso-COMHCC, (g) WHyper-BNM, (h) Lasso-FCM, (i) ElasticNet-HFCM, (j) Hyper-FCM o/w FCM, (k) Hyper-FCM o/w hyper, and (l) Hyper-FCM.

REFERENCES

- [1] C. G. Yan, X. D. Wang, X. N. Zuo, and Y. F. Zang, “DPABI: data processing & analysis for (resting-state) brain imaging,” *Neuroinformatics*, vol. 14, pp. 339–351, 2016.