



BrainIAK Education: User-Friendly Tutorials for Advanced, Computationally-Intensive fMRI Analysis

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Yale

UNIVERSITY

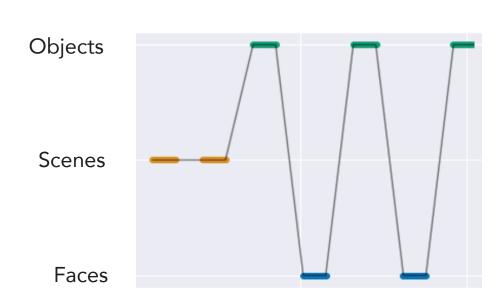
Available now at:

https://brainiak.org/tutorials

Getting started

Data Handling

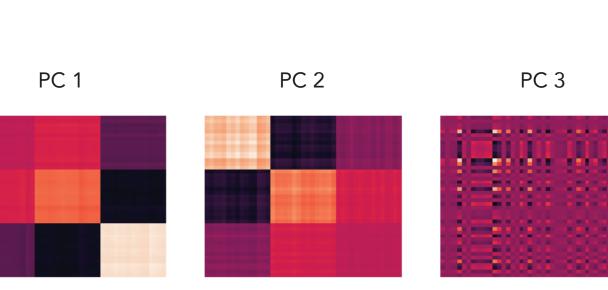
Load, reshape and normalize fMRI data in Python



Condition membership of each TR from a run

Dimensionality Reduction

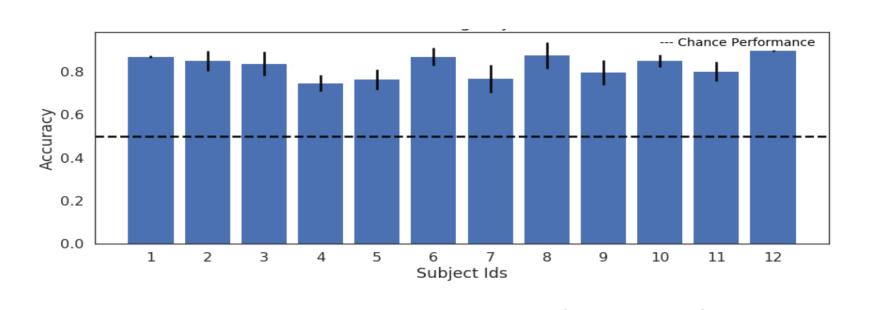
Apply PCA and other feature selection techniques



Activity of each PC for all runs and stimuli

Classification

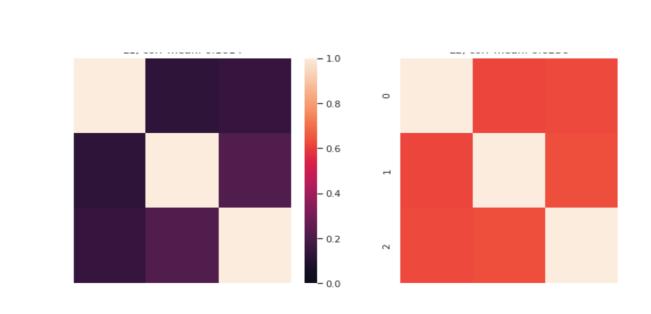
Run a classifier using leave-one-run-out cross-validation



Face vs scene classification for each participant

Classifier optimization

Use cross-validation to optimize classifier hyperparameters

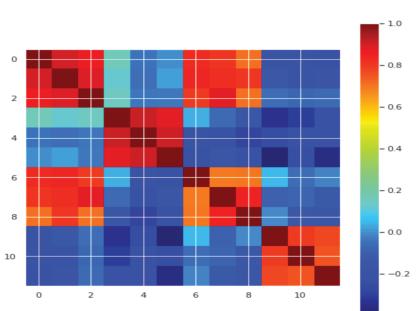


Inter-run consistency of L1 (left) and L2 (right) weights

Advanced Techniques

RSA

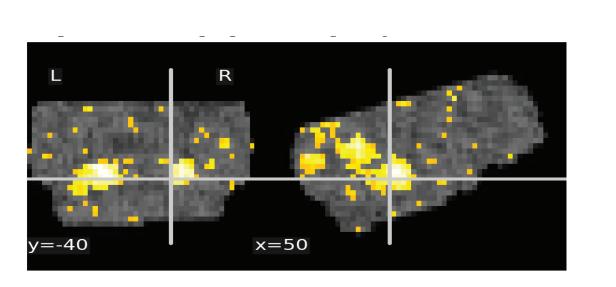
Compare pattern similarity for human and non-human data



Item-level correlation, clustering into item category

Searchlights

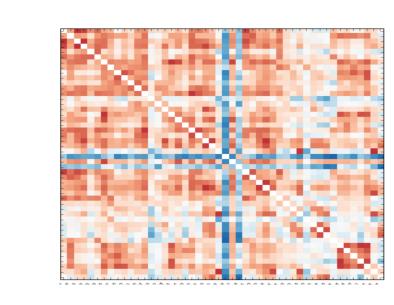
Setup and run a parallelized



Thresholded searchlight of face vs scene

Seed-based Connectivity

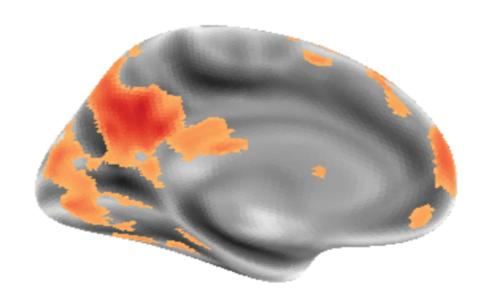
Define seeds and compute functional connectivity



Whole-brain parcellation correlation matrix

Inter-Subject Correlation

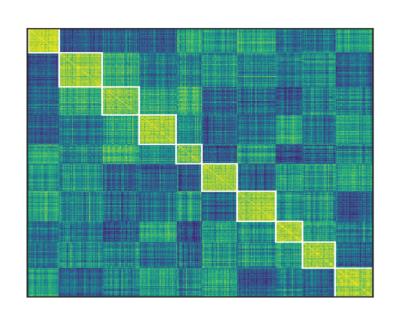
Calculate correlations between subjects to estimate task-specific signal



Inter-subject correlation during movie watching

Event Segmentation

Find latent event states in continuous, naturalistic stimuli

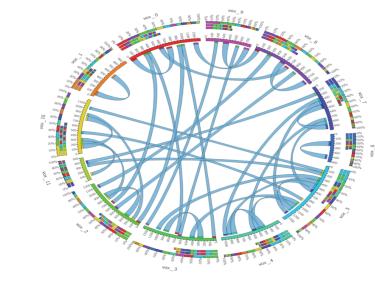


TR to TR correlation with event boundaries overlaid

searchlight analysis

Full Correlation Matrix analysis

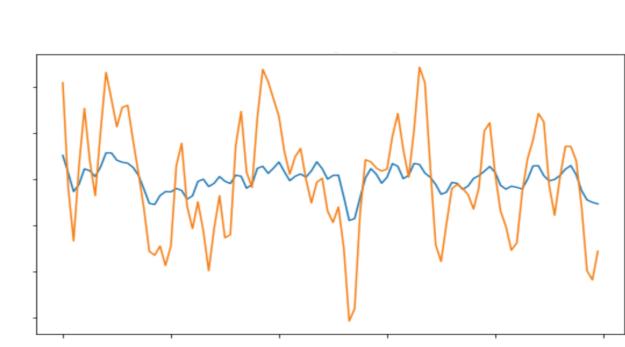
Perform an unbiased, seedless, full brain correlation analysis



Circos plot of every voxel in the brain's correlation with all others

Shared Response Modeling

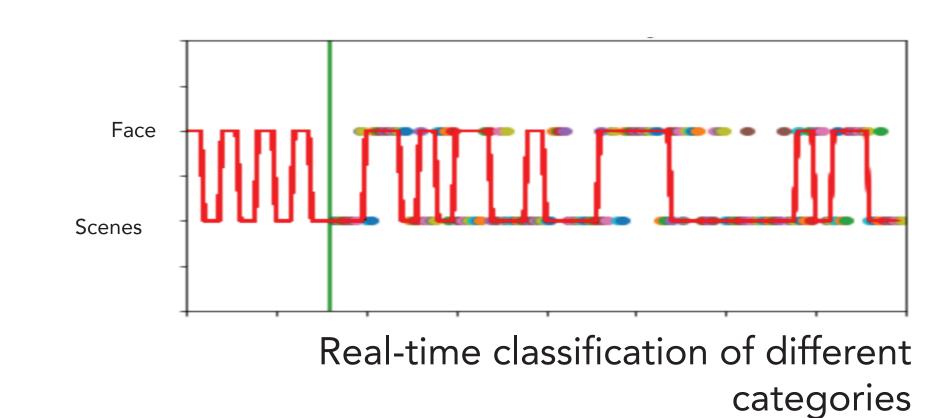
Use a common stimulus to project subjects into a shared functional space



Raw and SRM-based reconstructed voxel activity

Real-time

Handle and classify fMRI data generated in real-time



Tools

Integrates numerous free resources













Installation

Several installation options: Cloud for running on mobiles/laptops Docker and Conda for local installation on Mac, Windows and Linux Server and cluster installation for job



submission





Data

Uses publicly available datasets, including block, event-related and movie designs

Preprocessing has been completed to minimize startup

Can be adapted to your datasets easily

Contribute



We welcome contributions to the BrainIAK methods and tutorials.

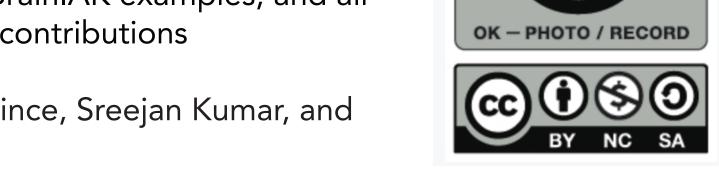
Completely free and open-source. The tutorials, data, and preprint are avialable here: https://brainiak.org/tutorials

Chat with us on Gitter

Acknowledgements

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Plot Credit: Clara Colombatto, Jacob Prince, Sreejan Kumar, and Paula J. Brooks