

Figure 1: Cloud Deployment and Local Deployment Workflow

Caption: FNGS deployment schematic. The FNGS pipeline enables users to easily scale their analyses on local or cloud infrastructure using the BIDs specification. Single dataset analysis locally takes a local directory, and an optional number of threads to launch in parallel. Cloud analysis takes a path to a directory in an S3 bucket and an optional parameter for participant or group level analysis, and launches the pipeline in parallel on the cloud by leveraging AWS Batch, enabling the large scale deployment of multiple datasets in the cloud simultaneously. Outputs are then returned to S3 for downstream analysis. The cloud-level analysis can be launched optionally from the FNGS web service, which provides a GUI-based deployment platform and automates the deployment process for AWS Batch.

Figure 2: Comparison of Connectome Definition

Idea: Show the discriminability as a function of the connectome choice, where the connectomes are defined by raw correlation, thresholding/binarizing, kurtosis, the KL-divergence of the power spectrum, the KL-divergence of the amplitude spectrum, the ranked versions of each, and the z-scored versions of each. There are a lot of definitions of connectomes that people use, and no literature on which to pick, so this could be a “unique contribution” that we make.

Caption: Impact of Functional Connectome Definition on test-retest robustness. In (A), we can see that the ranked-correlation connectome offers the highest level of robustness, showing a mean discriminability score of $##$. Using a two-sample hypothesis test shows this score to be significantly greater than the second best pipeline, ranked-frequency with a p-value of $##$. In (B), we can see that ranking the pipelines offers higher test-retest robustness, as the mean discriminability score for ranking exceeds the non-ranked score by $##$. A two-sample permutation test shows this score to be significant with a p-value of $##$.

Figure 3: Batch Effects

Caption: Batch Effects present in functional connectomes using most-reliable connectome. Using the ranked-correlation approach as our definition of the functional connectome, discriminability is computed by using the dataset-id as the label. A discriminability score of $##$ is significantly different from the random chance score of $##$ with a one-sample p-value of $##$, indicating that connectomes are differentiable by connectome site. This suggests that there is site-specific bias present in connectomes collected.

Figure 4: Comparison of Performance of FNGS vs CPAC

Caption: FNGS performance schematic. (A) The FNGS pipeline offers quality performance at a low computational cost, running faster and more computationally efficiently than the top-performing non-GSR pipeline from CPAC (cite discriminability). (B) The FNGS pipeline offers a level of robustness comparable to state-of-the-art software provided by the CPAC pipeline, a popular choice GUI-based pipeline for fMRI analyses.

Table:

Show performance of FNGS on a variety of datasets and scanners.