A general measure of effect size for neuroimaging analysis

Abstract

The classical approach for testing statistical images using spatial extent inference (SEI) thresholds the statistical image based on a probability threshold (the p-value). This approach has an unfortunate consequence on the replicability of neuroimaging because the target set of the image is affected by the sample size -- larger studies have more power to detect smaller effects. Here, we present a general robust measure of effect size -- not just applicable for neuroimaging. We use this robust effect size index with the preprocessed (ABIDE) data set, interactive visualizations, and a fully reproducible analysis pipeline to argue for thresholding statistical images by effect sizes instead of probability values. Using a constant effect size threshold means that the p-value threshold naturally scales with the sample size to ensure that the target set is similar across repetitions of the study that use different sample sizes. Because the statistical threshold depends on the sample size, inference procedures must be used that maintain accurate error rates at an arbitrary p-value cluster forming threshold. Future work may investigate how effect size thresholding affects SEI power in small sample sizes and meta-analytic results.

Dr. Simon Vandekar is available to meet with faculty, postdocs, and students over Zoom. Please reach out to razieh.nabi@emory.edu or benjamin.risk@emory.edu, interested by Wednesday, October 6th.