Iterated LASSO reveals highly distributed and variable representations of faces, places, and objects.

Zihan Li
University of Wisconsin-Madison, Madison, Wisconsin, United States

Y. Ivette Colón
University of Wisconsin - Madison, Madison, Wisconsin, United States

Kushin Mukherjee
University of Wisconsin-Madison, Madison, Wisconsin, United States

Timothy Rogers
University of Wisconsin- Madison, Madison, Wisconsin, United States

Abstract

Recent studies have used complex regularization procedures for whole-cortex neural decoding, with results suggesting that neural representations may be much more widely distributed and variable than previously suspected. Such work typically requires extensive parallel compute infrastructure, bespoke regularizers, and complicated workflows. We considered whether comparable results can be obtained from the iterated LASSO, a simple algorithm using standard L1 regularization to conduct an iterative voxel-selection scheme. We applied the procedure to decode stimulus class (face, place, or object) from whole-brain 3T-fMRI data individually in each of 8 participants, achieving a remarkable 98% classification accuracy on held-out images. The algorithm found signals in about 8% of voxels across cortex, many appearing outside the traditional occipito-temporal regions thought to support visual object representation. Moreover, the model weights revealed wide variation across participants in how and where stimulus information is neurally encoded—results consistent with prior work that deployed much more complex workflows.

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