Scientific question:

Can we decode fMRI activations from the visual cortex to extract features that allow us to identify the category of presented visual stimuli?

Brief Scientific background:

Humans are able to reliably detect and identify familiar visual stimuli, even if they are experienced in different contexts. This has been previously investigated with fMRI experiments, where different kinds of visual stimuli showed different patterns of activations in the brain visual areas.

However, further investigation needs to be made to assess whether we can identify features of the visual stimuli from the measured fMRI pattern.

Proposed analysis:

For fMRI responses, dimensionality reduction to group the data into similar categories. Train a classifier, and apply clustering algorithms. Evaluate the model with cross-validation. Finally, apply machine learning techniques to predict visual stimuli features from fMRI responses.

Predictions:

Trained with human neural data, a classifier will identify the category to which images belong, reflecting an invariant representation of image categories in the brain.

Data set: Kay natural images