Department of Psychology
The University of Hong Kong
香港大學心理學系

Brown Bag Lunchtime Seminar (Via Zoom)

(Theme: Cognition and Neuroscience)

Decoding Representations of Common Objects using fMRI

12:30 p.m. – 1:30 p.m. | October 4, 2021 (Monday)

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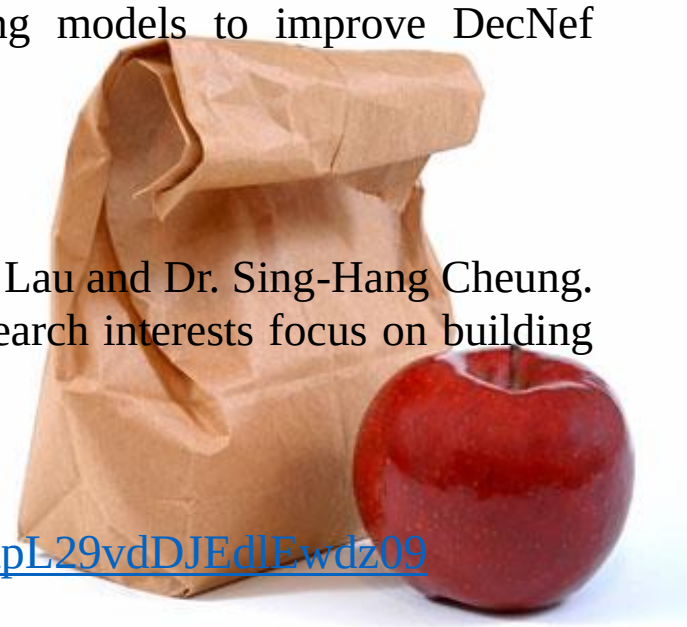
Abstract

Decoding object-specific representations in functional magnetic resonance imaging (fMRI) can support numerous applications, including clinical treatments of specific phobias and post-traumatic stress disorder (PTSD). For example, through decoded neurofeedback (DecNef), pairing representations of commonly feared animals with monetary rewards can reduce physiological fear responses. To maximize the effectiveness of treatment, one must have a good decoder to classify fMRI signals. The current research presents the methods to improve the fMRI decoding performance of common objects by improving the between-subject alignment, feature selection, and classification methods. The main dataset used here consists of fMRI images of 30 Japanese subjects viewing images of 40 common objects from a previous study. The notion of a unary classifier based on cosine similarity, which is a common measure of neural similarity, was introduced. The unary classification method increased the average area under the receiver operating characteristic curve (ROC AUC) from 0.801 (SD=0.138) in a state-of-the-art (SOTA) model to 0.812 (SD=0.135) for fMRI decoding in the ventral temporal cortex (VT). The unary decoder also achieved above-chance performance for the dorsolateral prefrontal cortex (DLPFC; ROC AUC=0.570, SD=0.113, $t(77)=5.471$, $p<.001$), which is known to be difficult to decode given its underlying physiological properties. This study lays the foundation of unary fMRI decoding and transfer learning from SOTA machine learning models to improve DecNef performances in the future.

About the speaker

Cathie is a final year Ph.D. student, working with Prof. Hakwan Lau and Dr. Sing-Hang Cheung. Her background is in physics and quantum computing. Her research interests focus on building machine learning algorithms for fMRI data analysis.



Zoom

https://hku.zoom.us/j/3951550048?pwd=SncvL3RYakEycUtpL29vdDJEdlEwdz09
Meeting ID: 395 155 0048 | Password: psyc

~All are Welcome~

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