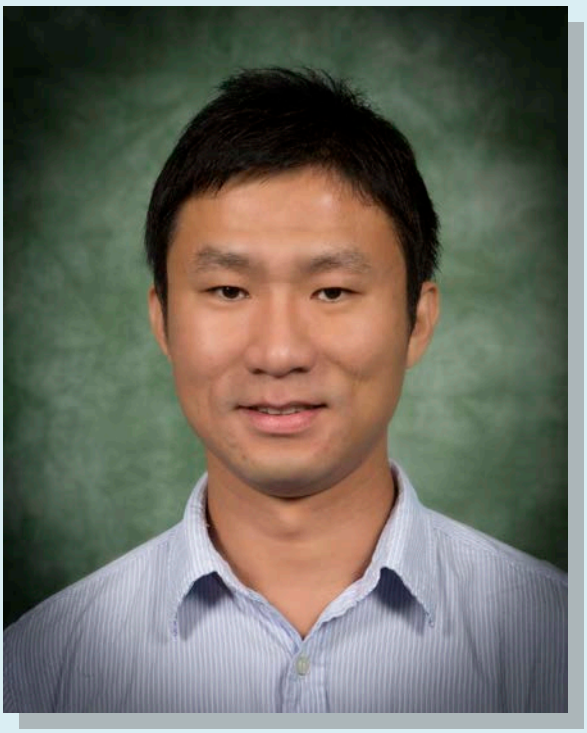
CoCo Seminar Series
Fall 2013

Pattern Analysis of Cognitive Representations with fMRI Data



Dr. Chun-An (Joe) Chou
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Thursday December 5th, 2013
10:00-11:00am
ITC Engineering Science Bldg. 2008W

Multi-voxel pattern analysis (MVPA) of functional magnetic resonance imaging (fMRI) data is an emerging approach for probing the neural correlates of cognition. MVPA allows cognitive states to be modeled as distributed patterns of neural activity and classified according to stimulus conditions. In practice, building a robust, generalizable classification model can be challenging in machine learning because the number of voxels (features) far exceeds the number of stimulus instances/data observations. To avoid model overfitting, feature selection is a key step to select informative voxels before building a classification model. In this study, we present an embedded feature selection framework using information theory and sparse optimization techniques, applied to various cognitive fMRI datasets. Assessment metrics are introduced to quantify the consistency of cognitive structure and demonstrate their utility in evaluating feature selection approaches. The experimental results suggest that highly informative voxels may provide meaningful insights into the functional-anatomic relationship of neural activity and stimulus conditions.

Dr. Chou is An Assistant Professor in Systems Science and Industrial Engineering. His research interests include mathematical optimization modeling and computation, data mining/machine learning, medical applications, computational biology, and engineering systems management.

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