Brain-wide organizations of neuronal activity in larval zebrafish

Yu Hu

The Hong Kong University of Science and Technology
E-mail: mahy@ust.hk

Abstract: Simultaneous recordings of large populations of neurons in behaving animals allow detailed observation of high-dimensional, complex brain activity. Here we focus on a dataset where calcium activity signals of individual neurons are recorded near-simultaneously across the whole-brain in larval zebrafish. At the same time, multiple visual stimuli are presented to the animal to induces a variety of behaviors. By comparing neurons' activity with stimuli and behaviors, we identified a group of neurons coding for multiple stimulus features that elicit similar behavioral responses. To study brain-wide activity beyond explicit sensorimotor processing, we used an unsupervised clustering technique that organizes neurons into groups with similar activity. The analysis recovers known brain nuclei as well as complexity of functional clusters in terms of unclustered neurons, heterogeneity, and anatomical structures. Recent works on towards identifying stable clusters across multiple conditions will also be discussed.