NSI seminar　アドバンス生命理学特論

Automated behavior analysis
using machine learning

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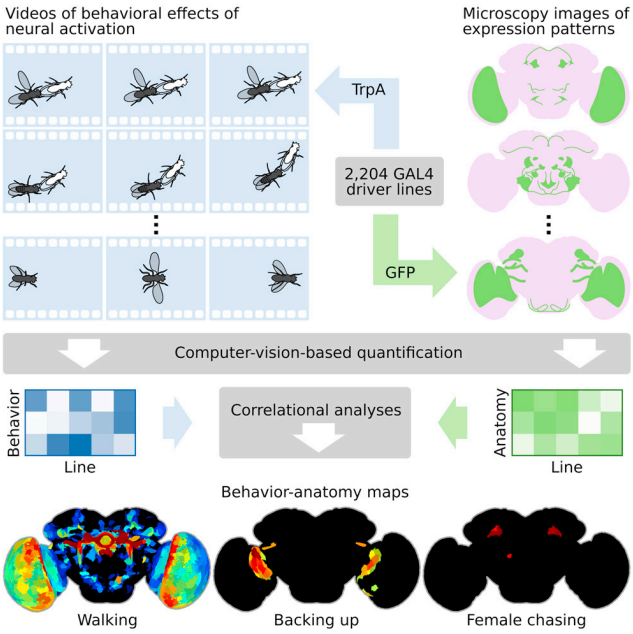
Modern biology has a data problem, not too little data but too much data. Our work is focused on developing tools to analyze video-based animal behavior using computer-vision and machine-learning techniques. We have applied these tools to quantify the behavioral effects of a large-scale neural-activation screen in Drosophila melanogaster. This resulted in the automated quantification of the locomotor and social behavior of 400,000 flies. We have shared this database of fly behavior in browsable web pages. To discover the neural substrates of these behaviors, we created a novel quantification of fly brain anatomy based on expression pattern correlations.



We combined this anatomical data with our behavioral analysis to create 3D brain-behavioral correlation maps. This work was based on simply tracking the animal's position and body size. In order to study behaviors based on limb movement, we have developed automated video-based software to tracking individual parts of animals like limbs (part-tracking). A main goal of this software is to make modern machine-learning algorithms accessible to the biological research community.
We have made a labeling frontend GUI for creating training data and a modular backend interface that allows the user to train part-trackers using multiple different machine-learning algorithms. This software is generalizable, and has been used to track animal body parts of free-walking flies and mice, crawling fly larvae, as well as tethered mice and flies.

July 24th, 14:00-15:30

Science South Building, 1st floor (理学南館 1 階)

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