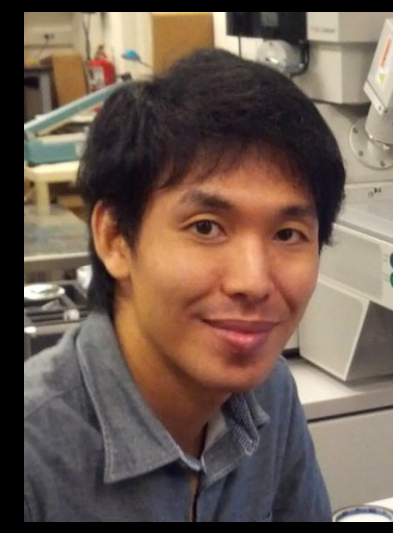
Yamate Evening Seminar

June 10th, 2016, 16:00-17:00

Large meeting room, 2nd floor, Yamate 3rd Bldg.

Dr. Haruo Mizutani

(Harvard University)



Outsourcing Opportunity for Connectomics

In our previous studies, the EM connectomic technology depicted the finest neural network architecture in a mouse cerebral cortex by using the serial section technique called Automatic Tape-collecting Ultra-Microtome (ATUM) [1, 2]. It could display all cellular and sub-cellular structures, such as small neural fibers, synapses (synaptic vesicles and post synaptic densities), mitochondria and blood vessels. It took a half year to acquire EM image stack for 0.13 mm3 sample size, thus we have installed 61 barrel beam SEM (MultiSEM) to increase the data acquisition speed for ~1mm3 region of the cerebral cortex.

In a perilous side, connectomic studies include overwhelming tedious works in sample preparation, image data acquisition and computational alignment/segmentation processes in a series of the whole procedure. This process takes months of work for a small tissue sample as described above. Although this entire workflow is practically essential to reconstruct the neural network structure, typical biologists hope to avoid those scientifically non-essential methodological procedures. It is also certain to maintain various kinds of experts, such as EM operators, mechanical engineers, computer scientists, and medical doctors for the research. However, it would not be realistic to hire all professionals in one laboratory.

To satisfy the demand to keep away the high expense and the labors for 3D EM, we will leverage the expertise and equipment of Harvard to provide outsourced connectomics as a service for academic researchers. We will give users a detailed model of a particular brain region they're interested in, just by sending us a small sample. The users can simply get results and focus on their own biological interests to avoid all the tedious works that we can contribute to do. This idea also implies that it would be unnecessary for the users to purchase expensive equipment such as MultiSEM and devices on connectomics.

[1] J. Morgan et al., Cell 165, 192-206 (2016)
[2] N. Kasthuri et al., Cell 162, 648-661 (2015).

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