

4D time lapse visualization and analysis tools –cell tracking, segmentation and visualization–

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Tuesday, January 11, 2010

13:30 ~ 14:30

A7F Seminar Room

Abstract

2D or 3D structural analyses with fixed samples were used to be the most widely used method for biologists in developmental study. However, with improvement of computer performance, we can add one more dimension to traditional 3D study, which we called 4D analysis. In a typical 4D developmental study, we need 3D plus time sequence. Unfortunately, there are only limited methods for biological researchers to analyze or visualize 4D datasets. Although there are quite a lot reports about particles or cell-tracking, they are mainly focus on explaining algorithms but not for providing applicable software. There are many questions that the biologists hope to answer through 4D analysis. For example, such as cell speed, shape of trajectory, cell shape, cell position inside tissue etc. A cell fatemap will be generated from the 4D study at the end.

Thereby, we're developing two different tools specifically for the analysis we mention above. One is called FluoRender. This is software for 3D/4D visualization. The other is called LongTracker, which is for semiautomatic/manual cell tracking and exporting the results as 4D. We are also developing new visualization methods for studying developmental feature in 4D. Here we will show several examples of 4D studies about zebrafish lens development using our self-developed new tools.

Note

This is a technical seminar of time-lapse image analysis of complex biological samples. Dr. Otsuna studies neurobiology in zebrafish and is the second-place winner of 2010 Nikon's Small World Photomicrography Competition. Everyone interested in confocal microscopy is encouraged to attend.

Reference

IEEE Trans Vis Comput Graph. 2009 Nov-Dec;15(6):1489-96.

An interactive visualization tool for multi-channel confocal microscopy data in neurobiology research.

Wan Y, Otsuna H, Chien CB, Hansen C. <http://www.computer.org/portal/web/csdl/doi/10.1109/TVCG.2009.118>

http://jfly.iam.u-tokyo.ac.jp/3D/design2_1.html

<http://www.nikonsmallworld.com/gallery/year/2010/2>

Host: Shigeo Hayashi