Contribution ID : 49   Type : **Poster**

Simulator of Benchmarking Image Datasets for Time-Lapse Lightsheet Microscopy

In fluorescence microscopy image analysis, cell segmentation and tracking algorithms are indispensable tools to, e.g. reconstruct lineages or for time-resolved analysis of cell characteristics or events. Although there are such algorithms in everyday use, most of them are not properly validated and their accuracy limits are not well understood. Provided testing data together with expected results (so called ground-truth annotations, GT) and suitable metrics would exist, much of the questions above could be addressed.

Lightsheet microscopy images come obviously without GT. Acquired datasets are displaying often time-lapse embryonic development in high-resolution, and easily reach 1 TB per one experiment. The number of displayed cells can be in thousands per single frame. In this setting, it is extremely difficult to manually annotate real datasets to obtain GT.

Here, I present the current status of my work on a generic simulator of many-cells biological systems. In particular, the simulator produces GT annotated, time-lapse image sequences with artificial yet realistically looking and developing populations of nuclei-stained (simulation) cells. The development includes division and mutual interaction of cells, and known motion patterns for respective embryos. The GT will be useful for benchmarking segmentation, tracking and multi-view registration algorithms. Free benchmarking datasets will be published as well as the simulator itself.

The recently published results of the Cell Tracking Challenge indicated a gap in all embryonic development datasets used in the challenge. The gap is both in the number of submitted segmentation and tracking algorithms, and in the overall scores achieved. The field, for now more the algorithm developers than algorithm users, could benefit from freely available challenging data with GT. The developers could examine their solutions to discover and analyze much easier where and why their algorithms are not performing well.

Affiliation

MPI-CBG

Terms and Conditions

Yes

Primary author(s) : ULMAN, Vladimir

Presenter(s) : ULMAN, Vladimir

Session Classification : Posters