10th Anniversary Light Sheet Fluorescence Microscopy Conference

Contribution ID : 58

Type : Poster

Interactive Analysis of Cell Tracks in Light Sheet Microscopy Images using EmbryoMiner

Light sheet microscopy imaging allows recording entire embryos in 3D and over time (3D+t) for many hours. Fluorescently labeled structures can be tracked automatically in these 3D+t images [1-4]. Analyzing the resulting cell migration trajectories can provide detailed insights in large-scale tissue reorganization and morphological changes in early developmental stages at the cellular level. With the open-source framework EmbryoMiner in-depth analyses and comparisons of entire embryos in unprecedented detail are possible [5]. Iteratively focusing on a region of interest within the embryo allows investigating and testing specific trajectorybased hypotheses. After a selection process, quantitative features can be computed from isolated trajectories. All steps can be interactively refined to cope with different data sets. A study with unexperienced users indicated that even complex analysis tasks can be done in a time range less than 5 minutes. In future works, deep learning approaches for 3D+t microscopy data will be applied in order to improve the segmentation accuracy and to yield more valid cell trajectories for the subsequent analysis with EmbryoMiner.

References:

- 1. Ulman et al., 2017, Nat. Meth., 14, 1141-1152
- 2. Bartschat et al., 2016, Bioinformatics, 32, 315-317
- 3. Stegmaier et al., 2016, Dev. Cell., 36, 225-240
- 4. Amat et al., 2014, Nat. Meth., 11, 951-958
- 5. Schott et al., 2018, PLoS Comput Biol, 14(4)

Affiliation

Karlsruhe Institute of Technology / RWTH Aachen University

Terms and Conditions

Yes

Primary author(s): Mr SCHERR, Tim (Karlsruhe Institute of Technology); Mr SCHOTT, Benjamin (Karlsruhe Institute of Technology); Mr TRAUB, Manuel (Karlsruhe Institute of Technology); Mr TAKAMIYA, Masanari (Karlsruhe Institute of Technology); Mr BARTSCHAT, Andreas (Karlsruhe Institute of Technology); Mr KOBITSKI, Andrei Y. (Karlsruhe Institute of Technology); Mr NIENHAUS, G. Ulrich (Karlsruhe Institute of Technology); Mr STRÄHLE, Uwe (Karlsruhe Institute of Technology); Mr STEGMAIER, Johannes (RWTH Aachen University); Mr MIKUT, Ralf (Karlsruhe Institute of Technology)

Presenter(s) : Mr SCHERR, Tim (Karlsruhe Institute of Technology); Mr MIKUT, Ralf (Karlsruhe Institute of Technology)

Session Classification : Posters