

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 trajectory-based 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:

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