

Cell instance segmentation with deep learning using sparse annotations

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Abstract

Cell image segmentation is an essential step in many bioimage analyses and a number of deep learning-based algorithms have been developed. These algorithms perform well when a suitable model is selected and trained with a sufficient amount of data. However, collecting large amounts of annotated data remains a major challenge. Here, we demonstrate that training on a few sparsely annotated data can yield effective deep learning models. We further illustrate that the selection of cells to be annotated has a substantial impact on performance. In this work, StarDist [1] and Cellpose [2], which are widely used tools in cell instance segmentation, were adapted to sparsely annotated data and evaluated in conjunction with ELEPHANT [3], a cell tracking algorithm that internally uses the cell segmentation algorithm. Our results suggest that deep learning with sparse annotation is a commonly effective strategy for cell instance segmentation.

References

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