**RUTG-US**

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Platform: Linux (tested on Ubuntu 18.04 LTS)

Prerequisites: Python 3.6

*RUTG-US: SUMMARY*

We used an end-to-end deep learning model to train and test the cell images for instance segmentation. We used silver segmentation truth to train the **Fluo-N2DL-HeLa** (230 images), **PhC-C2DH-U373** (184 images), and **PhC-C2DL-PSC** (202 images) datasets separately for 80 epochs. As **PhC-C2DL-PSC** needs more details, we fine-tune the model on this dataset with the incomplete gold segmentation truth (4 images) for 10 epochs.

*RUTG-US: PREPROCESSING*

In the training process, we augment the images with random crop and random flip. We do not use any other augmentation strategies. The input images are resized to 608 $\times$ 608 in both training and testing process.

*RUTG-US: SEGMENTATION*

Our end-to-end deep learning model can be found in [1] where we additionally add an auxiliary feature refine module. In particular, our object-guided instance segmentation comprises two branches: object detection and object-guided segmentation. The object detection branch aims to provide the bounding boxes of instances. The detected bounding boxes are then employed to crop the ROI patches from the input feature maps of the segmentation branch. Instance segmentation is subsequently performed on these ROI patches. We locate the object bounding boxes from their center points. The object features are subsequently reused in the segmentation branch as a guide to separate the clustered instances within an ROI patch. Along with the instance normalization, the model is able to recover the target object distribution and suppress the distribution of neighboring attached objects.

*RUTG-US: POST-PROCESSING*

We extract the center points of the objects from the center heatmap to decode the object bounding boxes, with which we perform the segmentation within the bounding boxes. We binarize the output segmentation map with a threshold of 0.5. No other post-processing strategies are used.

**REFERENCES**


1. Yi J, Tang H, Wu P, Liu B, Hoeppner DJ, Metaxas DN, Han L, Fan W. Object-guided instance segmentation for biological images. In *Proceedings of the AAAI Conference on Artificial Intelligence*, 12677-12684 (2020).