ND-US (2)

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Platform: Linux

Prerequisites: Pythyn 3, MATLAB 2021a (x64)

ND-US (2): SUMMARY

We use DCAN [1] to get semantic segmentation results and apply a temporal consistency based post-processing method to generate final instance segmentation results from them.

ND-US (2): PREPROCESSING

We also normalized all images to have zero mean and standard deviation of 1.

ND-US (2): SEGMENTATION

We use the DCAN architecture [1] for a three-class semantic segmentation task: background, cell, and border. Our models are trained for 60000 iterations with the batch size of 8 and the window size of 192 using the inherent segmentation ground truth for **Fluo-N2DH-SIM+** and the silver truth segmentation annotations for **Fluo-N2DL-HeLa**, **PhC-C2DH-U373**, and **PhC-C2DL-PSC**. The optimizer is Adam with the initial learning rate of 0.0005. The learning rate is changed to 0.00005 after 20000 iterations. We also apply mirroring and rotation augmentation. The border class is represented by three-pixel-wide dilated cell regions.

ND-US (2): POST-PROCESSING

After obtaining the probability maps from the DCAN model, we apply a post-processing method on the cell semantic mask to obtain the final instance segmentation mask. First, we generate many possible instance candidates from the probability map, then we select the instances from instance candidates according to the temporal consistency. Specifically, we apply different threshold values on probability maps, and take connected components as instance candidates. For these instance candidates, we first identify high-confidence candidates and select them as instances directly. These selected instances can be propagated to the neighboring frames to select more instance candidates. This step is repeated *N* times to select more instances. Finally, all the selected instances are taken as final instance segmentation results.

REFERENCES

1. Liang P, Zhang Y, Ding Y, Chen J, Madukoma CS, Weninger T, Shrout JD, Chen DZ. H-EMD: A hierarchical Earth mover's distance method for instance segmentation. IEEE Transactions on Medical Imaging **41**, 2582-2597 (2022).