

To develop a well-performing supervised method, particularly deep learning based models, annotated data is required. Therefore, NuClick was used to generate labeled data (segmentations) from manual centroids in LYON19 patches. We transformed the centroid detection problem into a nuclei instance segmentation task, where for each image in the released data set, we randomly sampled a 256×256 patches to collect a subset of 441 training members. Then, a non-expert user reviewed all the patches and clicked on the positive lymphocytes based on his imperfect assumptions, which did not exceed 3 hours to be done completely. Image patches and their corresponding clicked positions are then fed into the NuClick framework to construct the instance segmentation map. After constructing a synthesized ground truth for each image, we developed an instance segmentation model on the extracted patches from LYON19. The instance segmentation model was a CNN based on encoder-decoder architecture paradigm. Using the trained model, prediction maps of lymphocyte instances for all WSI ROIs from LYON19 were generated. Each segmentation prediction map was then converted to a binary mask using a threshold of 0.4 and objects with area smaller than 80 pixels were removed to obtain the final instance segmentation map. Finally, centroid of each instance was considered as a detected nuclei position and the average of pixel intensities of that instance region in the prediction map was considered as its corresponding prediction score.

Full NuClick method description in:

<https://arxiv.org/abs/1909.03253>