

# Weakly Supervised Image Segmentation

## Exercise 2.4

### Introduction to Deep Learning in Computer Vision

October 2025



Figure 1: Full supervision vs weak (point) supervision for image segmentation.

This exercise forms the second part of what you will present in your project for Segmentation. In this exercise, you will be working with the skin lesion segmentation dataset PH2 that you used in the first part.

Your task is to train a segmentation architecture with different weak supervision types, such as point clicks (i.e., no full segmentation masks during training), and validate your results for segmentation performance.

#### Your tasks are as follows:

1. Create your weak annotations (point clicks) which you will use to train a weakly supervised segmentation model. We do not provide you the weak annotations for the training set. You do not have to click on the images yourself manually but you should simulate this by using the provided full segmentation masks. You have to think about a sampling strategy that simulates a user annotator behavior that clicks on the object of interest (positive clicks) and on the background (negative clicks).
2. Use the same architecture as the first part, implement a loss function for point-level supervision, and modify your dataloader accordingly.
3. Make sure that the train/val/test splits and other hyperparameters are as close as possible to the models that you trained in the first part. This will allow you to validate the segmentation performance and compare the results with the fully supervised counterparts of the first part.
4. Perform an ablation study where you change the number of clicks (positive and negative). Report how the different numbers of clicks affect the segmentation performance.

How many clicks do you need to achieve a comparable performance with the fully supervised models? Also, experiment with different sampling strategies for the user clicks (i.e., random sampling inside and outside the segmentation mask) since this may affect your performance.

5. **Optional:** Experiment with other types of weak annotations, such as bounding boxes. For this, you can follow the iterative approach we discussed during the previous lecture, where you iteratively (a) use current segmentation as labels to train a segmentation network and (b) use the segmentation network to predict a new set of segmentation.
6. Did you use ChatGPT or similar tools? If yes, please briefly describe how you used it and how they were useful.

Your process, performance evaluation, and results should be documented and discussed in project report to be uploaded on DTU Learn. The deadline is on Sunday 16th of November at 20h.