# COMP 448/548 – Medical Image Analysis
# Homework #4

**Due: 23:55, May 28, 2021**

For dense prediction networks, the choice of a loss function is quite critical. In class, we studied different loss functions for training of these networks. In this homework, you will study more on this topic.

**What to submit**: Submit the following via blackboard.

- A maximum of 2-pages report (follow the instructions separately given for each question). Similar to the previous assignments, you are expected to write your report neatly and properly. The format, structure, and writing style of your report will be a part of your grade. Use reasonable font sizes, spacing, margin sizes, etc. You may submit either a one-column or a double-column document. The filename of your report should be ***Lastname_FirstName_HW4.pdf***

1. Survey the use of shape-aware loss functions, which aim to preserve objects' shapes in segmentation maps. Select one of these loss functions and examine it further. Also compare your selected loss function with the standard mean square error (or the cross-entropy).

   *What to submit:*

   - Half to one-page report: Briefly explain the motivation of using a shape-aware loss function. Give the details of your selected loss function, giving its formula and explaining how and why it works. Explain the similarities and differences between your selected loss function and the standard mean square error (or the cross-entropy).
   - All of your explanations should reflect your understanding, and thus, should be in your own wording. Partially or entirely copying-and-pasting explanations from other sources will be considered as cheating.
   - Correctness and clarity of your explanations will affect your grade.

2. We studied the minimax loss function for training a generative adversarial network (GAN). Study an alternative loss function, called the Wasserstein loss, which was used by Arjovsky *et al.*, 2017, for training a GAN (https://arxiv.org/pdf/1701.07875.pdf).

   *What to submit:*

   - Half to one-page report: Briefly explain the motivation of using the Wasserstein loss for GAN training. Explain the similarities and differences between the minimax loss function and the Wasserstein loss.
   - All of your explanations should reflect your understanding, and thus, should be in your own wording. Partially or entirely copying-and-pasting explanations from other sources will be considered as cheating.
   - Correctness and clarity of your explanations will affect your grade.