

## DLFA Spring 2022

### Assignment - 1

### Semantic Segmentation

Build a U-net model for semantically segmentation of regions corresponding to different object classes implemented on the **Semantic Segmentation of Underwater Imagery (SUIM)** dataset. The dataset is uploaded on MS Teams under “**Files** → **General Assignment 1 - Semantic Segmentation - Dataset**”.

- Use Pytorch only (not Tensorflow)
- We do accept submission in the python Jupyter notebook (.ipynb) file.
- The maximum mark is 10.

Steps to follow:

1. Load and visualize the data (show some examples of images and corresponding masks). **[1 mark]**
2. Data Processing **[2.5 marks]**
  - a. Convert to 572×572 spatial size, if larger then center crop, if smaller then pad with zeros as the background class.
  - b. Convert the RGB **masks** into 8 different grayscale masks (each mask having “white” values for a particular class and “black” values for the rest of the classes).
3. Splitting to train and validation data in the ratio 8:2. **[0.5 marks]**
4. Build a U-Net model identical in architecture to the one in the original paper (<https://arxiv.org/abs/1505.04597>). **[3 marks]**
5. Train the model for 50 epochs (calculate training loss, training accuracy, validation loss, and validation accuracy). **[1 mark]**
6. Plot two curves (one for loss and the other for accuracy). Put both the training loss and validation loss in the loss plot, and put both the training accuracy and validation accuracy in the accuracy plot. **[1 mark]**
7. Write the interesting points you observe (in the Jupyter notebook). **[1 mark]**