# 4. Exercise 2: Chest-Xray Segmentation

### Overview

In this assignment, you will explore segmentation of medical images, specifically, segmention of pneumothorax in chest x-ray scans.

### What to hand in for this assignment:

Submit your notebook solutions (code) + written results/ images/ explanations/ descriptions in word/pdf.

### References

<https://medium.com/swlh/image-segmentation-using-deep-learning-a-survey-e37e0f0a1489>

+ list of references in moodle

### Steps :

Step 1: Utilize a Unet baseline solution on the Kaggle data -

<https://www.kaggle.com/c/siim-acr-pneumothorax-segmentation/overview>

This step must include a description of data exploration: data distribution, visualization, thorough evaluation, visualization of results, demonstration of good and bad results.

Step 2: Apply a modification or improvement to the available code on Kaggle. Modifications may include:

* Data preprocessing ( e.g. cropping lung ROI/ intensity normalization),
* Data augmentations
* Different Losses
* Different architectures (e.g. Xception , Efficient Net, …)
* Hyperparameter tuning (e.g. mini batche, learning rate, …)
* Pretraining on medical data instead of imagenet: (e.g. pre-trained weights from a past medical imaging competition on pneumonia identification: <https://www.kaggle.com/hmendonca/mask-rcnn-and-coco-transfer-learning-lb-0-155>)
* Ensemble models, mask-RCNN,
* Curriculum learning
* Utilization of additional Chest X-rays data such as:
  + [The MIMIC-CXR Database](https://archive.physionet.org/physiobank/database/mimiccxr/)
  + [CheXpert](https://stanfordmlgroup.github.io/competitions/chexpert/)
  + [Open-i service of the National Library of Medicine](https://openi.nlm.nih.gov/faq)

This Step must include the visualization and evaluation of the results and an analysis of the comparison of the baseline and extended results.

Extra Step 3: How good does this work for COVID data? (\*please make sure to add any additional data you use)

Good luck on Exercise 2!