

Question 5 (25 points): 14:05-14:35 (should submit by 14:40)

Suppose that you are asked to train a dense prediction network (e.g., a U-net model) for segmenting nodules in MR scans of chest. For this application, you do not have nodule annotations on MR scans. On the other hand, you are also provided with annotations on PET scans of the same patients. Suppose that the MR and PET scans were taken on the same day such that the nodule annotations on the PET scans reflected the approximate nodule locations in the MR scans. On the other hand, there are following differences between these two scans:

- An MR scan contains 128 slices whereas a PET scan contains 32 slices.
- The image resolution of each MR slice is 512×512 whereas the image resolution of each PET slice is 384×384 .
- Although the MR and PET scans were taken on the same day, they were not exactly taken at the same time. Thus, the patient positioning might be different, and hence, the locations of the organs with respect to the image origin might show slight differences between an MR and a PET scan. Likewise, there could be slight differences in the shape of the lungs in these two scans since the patient may have held his/her breath for different amounts when these two scans were acquired.

Propose a design pipeline **based on deep learning** to use the PET scan annotations for training your network to segment nodules in the MR scans.

The quality of your proposal and its technical soundness will affect the points that you will get from this question.