COL864 Assignment 2: Liver segmentation of CT scans

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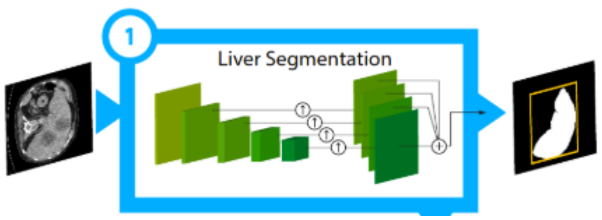

Figure 1. Model architecture

1. Introduction

In this assignment we apply instance segmentation to detect and segment the liver from Computed Tomography (CT) scans. We use a fully convolutional network (FCN) for image segmentation, using feature maps of different resolutions to obtain the mask. We have used the implementation of **Detection-aided liver lesion segmentation using deep learning** [2] based on **DRIU** [1] as a starting point for this assignment.

2. Model Architecture

Figure 1 shows the model architecture. The architecture is inspired from DRIU [1](Figure 2) DRIU start from the VGG network and remove the fully connected layers at the end of the network, such that it mainly consists of convolutional layers with Rectified Linear Unit (ReLU) activations.

3. Experiments

Our training data consists of a set of 200 CT scans with ground truth segmentations. Each CT scan has between 40 to 1000 slices/images. We split the data with 80:20 ratio for training and valid set.

3.1. Training

We train the model for 50k steps keeping batch size = 1 Figure 3 shows the variation of total loss and 4 variation of dice coefficients with no. of steps.

Training Loss	1891.9055
Validation Loss	790.4076
Training Dice	0.9360
Validation Dice	0.9438

Table 1. Training results

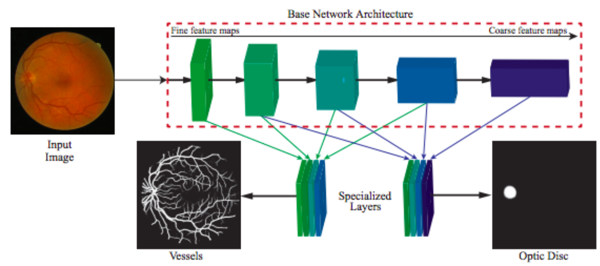

Figure 2. DRIU architecture: Given a base CNN, side feature maps and design specialized are extracted to perform blood vessel segmentation (left) and optic disc segmentation (right).

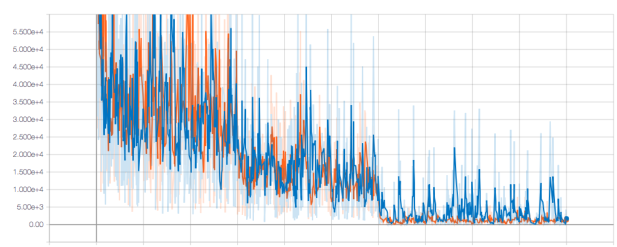

Figure 3. Variation of total loss with steps. Blue represents train and orange represents valid dataset.

3.2. Training Results

We save the model after 50k steps. The table below shows the training stats of the model which will be used for evaluation. Figure 5 shows a sample prediction result.

References

[1] J. P.-T. e. a. Kevis-Kokitsi Maninis. Deep retinal image understanding. *arXiv:1609.01103*. 1

[2] K.-K. M. e. a. Mriam Bellver. Detection-aided liver lesion segmentation using deep learning. *arXiv:1711.11069*. 1

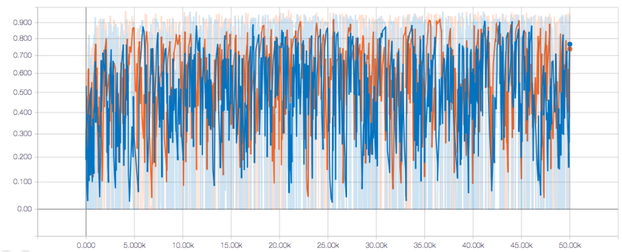

Figure 4. Variation of dice coefficient with steps. Blue represents train and orange represents valid dataset.

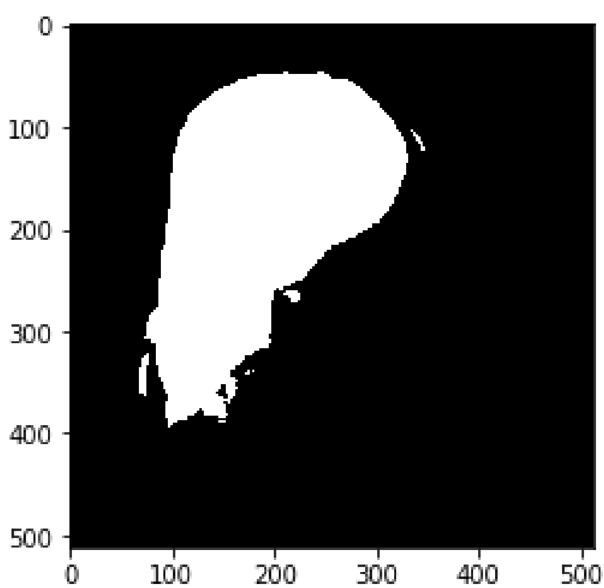

Figure 5. A sample segmentation result using the trained model.