

Prediction of Left and Right Breasts' Contours in CT images for Radiotherapy Planning

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Most breast cancer patients have a lesion on only one side. Accordingly, physicians only annotate the breast on the side of the lesion for RT planning. From a supervised learning perspective, if a breast segmentation model is trained using these clinical data, the model does not know the annotation criterion because it is impossible to detect breast cancer using CT images alone. As a result, it degrades the model performance. In this paper, we propose a new training technique for breast segmentation, Partial Gradient Backpropagation, to prevent this phenomenon. During the training phase, half of the target and output images are cropped based on the x-axis so that only the area with cancer is selected. Then only cropped parts are used to calculate the loss and its gradient. This simple trick will train the model to try segmenting both breasts regardless of the cancer location. This is because, from the model's point of view that cannot distinguish the cancer location, every breast area is labeled. Physicians can select the area with the lesion based on diagnostic results among both segmented breasts in the inference stage. The number of whole CT volumes used to construct a model is 400, and we split it into 360, 40 for training and test, respectively. The result includes both models with and without partial gradient backpropagation for a comparison test. Based on the Dice Coefficient Score(DSC), the proposed method outperforms the baseline model. The DCS of the proposed model is 0.8961, and the baseline model is 0.5329.

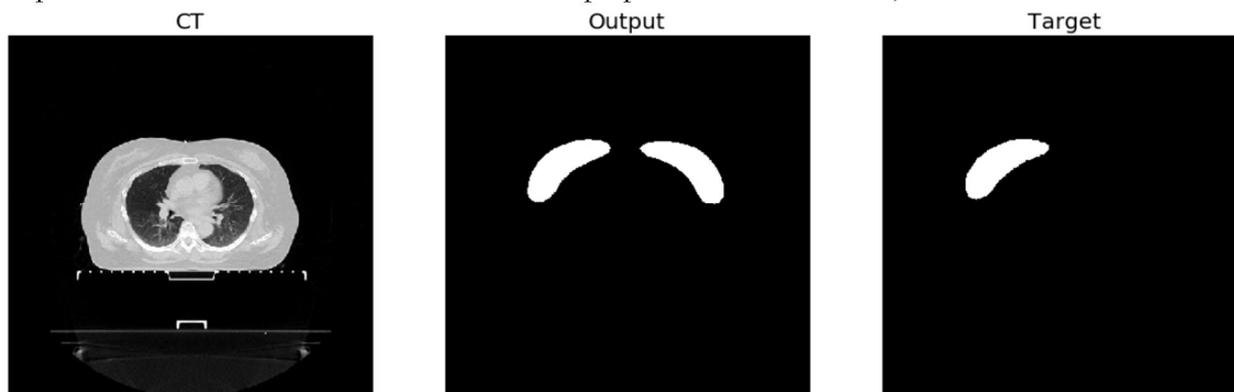


Fig. 1. An example of model prediction result.

