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Entropy Guided Unsupervised Domain Adaptation for Cross-Center Hip Cartilage Segmentation from MRI

DS algorithms with a view towards Machine Learning and Artificial Intelligence

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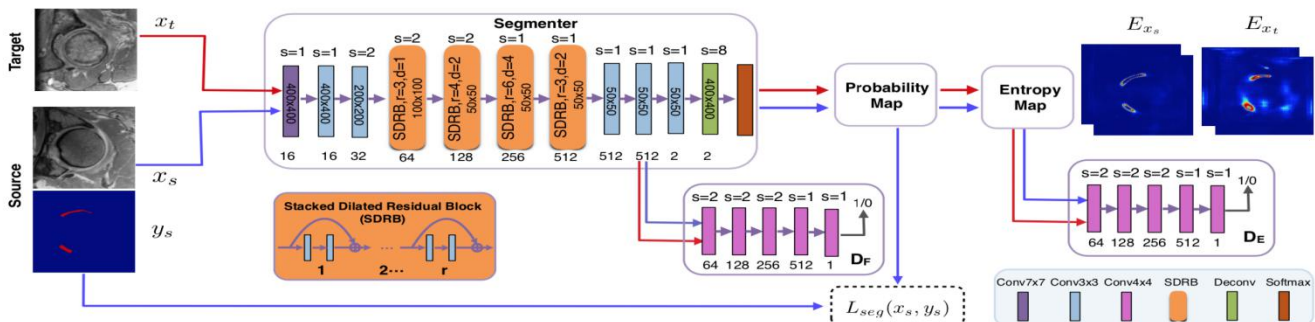
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Abstract

Deep Convolutional Neural Networks have shown great success in various automatic medical image segmentation tasks, but testing on domain-shifted datasets (e.g. images obtained from different centers) can lead to severe performance losses. Our aim is to train a network which can realise cross-center hip MRI cartilage segmentation, without the need for additional time-consuming annotations on the target domain.

In this abstract, we propose an entropy-guided unsupervised domain adaptation method and successfully demonstrate its application in the task of cross-center segmentation of the MRI hip cartilage, which is shown in below figure. Specifically, we first trained our model with supervised loss on the source domain, which enables low-entropy predictions on source-like images. Two discriminators were then used to minimize the gap between source and target domain with respect to the alignment of feature and entropy distribution. Compared to the results without adaptation with an average Dice of 46.46%, our method reports an average Dice value of 72.82%, which is quite close to the upper bound of 81.3% when the target annotations are directly included for training.



[1] Zeng, Guodong, et al. "Entropy Guided Unsupervised Domain Adaptation for Cross-Center Hip Cartilage Segmentation from MRI." MICCAI, 2020.