

Brain Tissue Segmentation Using 3D CNN with a Cross-modality Channel Attention Scheme

Liyan Sun, Wenao Ma, and Xinghao Ding(✉)

Fujian Key Laboratory of Sensing and Computing for Smart City, Xiamen University,
Fujian, China
dxh@xmu.edu.cn

Abstract. We proposed a cross-modality channel attention 3D convolutional neural network (CMCA-3DCNN) to address the MRI brain tissue segmentation task. In this work, parallel 3D deep convolutional neural networks are applied on each MRI modality including T1, T1-IR and T2-FLAIR. The 3D CNN architecture of the U-shape is consisted of encoder part and decoder part with skip connections. The under-sampling (max-pooling) and un-sampling (deconvolution) is adopted to increase the receptive fields. We proposed a cross-modality channel attention layer. Before the resize of the feature maps, we concatenate the features maps of each parallel network and apply global average pooling on it, then fully connected layers are used to obtain channel attention vector of each modality to recalibrate the features. We also adopted the deep supervision technique to further boost the model performance. The proposed CMCA-3DCNN achieved good performance on the brain tissue segmentation task. The detailed work is now in preparation.

Keywords: Brain Tissue Segmentation · Convolutional Neural Network · Multi-modality MRI · Attention Scheme.