Fully Convolutional and Residual Network for Brain Structure Segmentation

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ABSTRACT

The automated segmentation of multiple brain structures is a challenging task and there were many algorithms proposed. Among these methods, we adopted modern deep convolutional building blocks which has already shown to perform well for brain segmentation with large amounts of MRI [1]. To implement this approach on the small size of multi-modal datasets, we proposed a transfer learning from pre-trained network with structural MR images and its segmentation of 116 brain structures obtained by freesurfer image analysis suite, which is documented and freely available for download online (http://surfer.nmr.mgh.harvard.edu/) and IXI dataset [2]. Since the presented training data was scanned with less axial slices (240 x 240 x 48), we trained our network with 3 channels of MR modality including T1, T1 Inversion Recovery, FLAIR concatenated as 128 x 128 x 8-voxel patches uniformly sampled from the original images. In practice, we padded the volume images with 8 zeros in each dimension, removed the same amounts of borders in the segmentation output and used fully-connected dense Conditional Random Field [3] for post-processing to consider spatial information in the segmentation output and the original image.

REFERENCES

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