

UD-Net: Enhancing 3D U-Net for Volumetric Segmentation of Brain MRI with Deep Supervision

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- Our algorithm is automatic. Input size is 48x64x64 and the average time spent per scan is around 4min for automatic algorithm.
- We used the combination from start-of-the-art model and achieved good performance results. We scanned all 3 modality T1, T1_IR, T2_FLAIR.
- Accurate brain tissue segmentation in magnetic resonance imaging is of great meaning for brain disease diagnosis, as well as progression assessment and monitoring of neurologic conditions. Automatic brain tissue segmentation is one of challenging issues because brain magnetic resonance images are consisted of thin sheet structure, intensity inhomogeneity, and low contrast between intensity and saturation. To address these problems, we introduce an accurate segmentation method for MRBrains13 dataset and built upon taking advantages of U-Net models such as combination of Unet with deep supervision that achieves state-of-the-art accuracy. Specifically, we carefully design a 3D U-Net connected densely at decoder path that information from different levels can be directly combined to achieve highly accurate segmentation results. The proposed network, called 3D-Unet-deep supervision (D U-Net), it is trained with deep supervision loss that significantly suppresses the drawbacks of the skip connections in U-net models to acquire more powerful discrimination capability.
- Experimental results demonstrate significant advantages of the proposed method over existing method, in terms of both segmentation accuracy and parameter efficiency in MRBrainS13 dataset.
- The average runtime for my algorithm is around 2 minutes for every subject in TestData of MBrainS13.
- Our model achieved 89.31% about DSC performance on validation.

The end

