An Accurate Brain Tumor Segmentation for High Graded Glioma Using Deep Learning

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Abstract : Gliomas are most challenging and aggressive type of tumors which appear in different sizes, locations, and scattered boundaries. CNN is most efficient deep learning approach with outstanding capability of solving image analysis problems. A fully automatic deep learning based 2D-CNN model for brain tumor segmentation is presented in this paper. We used small convolution filters (3 x 3) to make architecture deeper. We increased convolutional layers for efficient learning of complex features from large dataset. We achieved better results by pushing convolutional layers up to 16 layers for HGG model. We achieved reliable and accurate results through fine-tuning among dataset and hyper-parameters. Pre-processing of this model includes generation of brain pipeline, intensity normalization, bias correction and data augmentation. We used the BRATS-2015, and Dice Similarity Coefficient (DSC) is used as performance measure for the evaluation of the proposed method. Our method achieved DSC score of 0.81 for complete, 0.79 for core, 0.80 for enhanced tumor regions. However, these results are comparable with methods already implemented 2D CNN architecture.

Keywords : brain tumor segmentation, convolutional neural networks, deep learning, HGG
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