An efficient brain tumor image segmentation based on deep residual networks (ResNets)

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Abstract

Automatic segmentation of brain tumor from Magnetic Resonance Images (MRI) is one of the challenging tasks in computer vision. Many proposals investigate the use of Deep Neural Networks (DNN) in image segmentation as they have a high performance in automatic segmentation of brain tumors images. Due to the gradient diffusion problem and complexity, it generally takes a lot of time and extra computational power for training deeper neural networks. In this paper, we present an automatic technique for brain tumor segmentation depending on Deep Residual Learning Network (ResNet) to get over the gradient problem of DNN. ResNets accomplish more accuracy and can make the training process faster compared to their equivalent DNN. To achieve this enhancement, ResNets add a shortcut skip connection parallel to convolutional neural networks layers. Simulation examples have been carried out on dataset BRATS 2015 to verify the superiority of the proposed technique. Results verify that the proposed technique has an improved accuracy of 83%, 90%, and 85% for the complete, core, and enhancing regions, respectively. Moreover, it has an average computation time (3 times) faster than other DNN techniques.

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