

Dealing with Data Scarcity in Brain Imaging: Classical and GAN-based Pre-training*

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Abstract

The huge lack of data is now acting as a barrier for the use of machine learning to medical imaging. In this work, we investigate the effects that a wide variety of practical solutions to the issue of insufficient data can have on the rate at which training can be completed and the quality of the models that can be generated. Transfer learning in its more traditional form is the focus of the first strategy. We demonstrate that transfer learning can have a significant impact on the overall performance of a model when it is utilized in the context of the problem of cell instance segmentation. Particularly helpful for improving the effectiveness of neuronal cell segmentation is pre-training on generic cell datasets. The second method, known as GAN-Based Preliminary Training, is an approach to training that is founded on the GAN. As part of this strategy, a generative adversarial network, also known as a GAN, is built, and the discriminator is used as a pre-trained model for the first task. Even though no additional data was provided during the GAN pre-training stage, our findings demonstrate that the use of GAN pre-training has a significant positive impact on the classification of brain cancers using MRI images