Learning based modules in Medical Image Analysis

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Abstract

In recent decades, with increasing amount of annotated medical data, learning based methods provide more and more promising ways for medical image understanding which outperform conventional heuristic algorithms. In this talk, I will discuss two fundamental and key modules (detection and segmentation) in medical image analysis using learning based methods.

The detection is formulated as a classification problem and solved by a deep learning based method. We use convolutional neural network to learn discriminative features and classifier from training data, which shows superior performance in our application than traditional models with ad-hoc designed features. Accurate and efficient detection serves as a reliable initialization module for anatomy segmentation algorithms.

In medical image segmentation, precise labeling usually relies on prior knowledge due to misleading intensity distributions of different anatomies and different subject. We learn a statistical model from training atlases (image and its corresponding label image) which can be adaptive to label new subjects, and the method is easily extendable to different applications.