Graph Cuts Segmentation Approach Using a Patch-Based Similarity Measure Applied for Interactive CT Lung Image Segmentation

Authors : Aicha Majda, Abdelhamid El Hassani

Abstract : Lung CT image segmentation is a prerequisite in lung CT image analysis. Most of the conventional methods need a post-processing to deal with the abnormal lung CT scans such as lung nodules or other lesions. The simplest similarity measure in the standard Graph Cuts Algorithm consists of directly comparing the pixel values of the two neighboring regions, which is not accurate because this kind of metrics is extremely sensitive to minor transformations such as noise or other artifacts problems. In this work, we propose an improved version of the standard graph cuts algorithm based on the Patch-Based similarity metric. The boundary penalty term in the graph cut algorithm is defined Based on Patch-Based similarity measurement instead of the simple intensity measurement in the standard method. The weights between each pixel and its neighboring pixels are Based on the obtained new term. The graph is then created using theses weights between its nodes. Finally, the segmentation is completed with the minimum cut/Max-Flow algorithm. Experimental results show that the proposed method is very accurate and efficient, and can directly provide explicit lung regions without any post-processing operations compared to the standard method.