

Computer-Aided Detection of Liver and Spleen from CT Scans using Watershed Algorithm

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Abstract : In the recent years a great deal of research work has been devoted to the development of semi-automatic and automatic techniques for the analysis of abdominal CT images. The first and fundamental step in all these studies is the semi-automatic liver and spleen segmentation that is still an open problem. In this paper, a semi-automatic liver and spleen segmentation method by the mathematical morphology based on watershed algorithm has been proposed. Our algorithm is currency in two parts. In the first, we seek to determine the region of interest by applying the morphological to extract the liver and spleen. The second step consists to improve the quality of the image gradient. In this step, we propose a method for improving the image gradient to reduce the over-segmentation problem by applying the spatial filters followed by the morphological filters. Thereafter we proceed to the segmentation of the liver, spleen. The aim of this work is to develop a method for semi-automatic segmentation liver and spleen based on watershed algorithm, improve the accuracy and the robustness of the liver and spleen segmentation and evaluate a new semi-automatic approach with the manual for liver segmentation. To validate the segmentation technique proposed, we have tested it on several images. Our segmentation approach is evaluated by comparing our results with the manual segmentation performed by an expert. The experimental results are described in the last part of this work. The system has been evaluated by computing the sensitivity and specificity between the semi-automatically segmented (liver and spleen) contour and the manually contour traced by radiological experts. Liver segmentation has achieved the sensitivity and specificity; sens Liver=96% and specif Liver=99% respectively. Spleen segmentation achieves similar, promising results sens Spleen=95% and specif Spleen=99%.

Keywords : CT images, liver and spleen segmentation, anisotropic diffusion filter, morphological filters, watershed algorithm

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