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3D Liver Segmentation from CT Images Using a Level Set Method Based on a Shape and Intensity Distribution Prior

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Abstract : Liver segmentation from medical images poses more challenges than analogous segmentations of other organs. This contribution introduces a liver segmentation method from a series of computer tomography images. Overall, we present a novel method for segmenting liver by coupling density matching with shape priors. Density matching signifies a tracking method which operates via maximizing the Bhattacharyya similarity measure between the photometric distribution from an estimated image region and a model photometric distribution. Density matching controls the direction of the evolution process and slows down the evolving contour in regions with weak edges. The shape prior improves the robustness of density matching and discourages the evolving contour from exceeding liver's boundaries at regions with weak boundaries. The model is implemented using a modified distance regularized level set (DRLS) model. The experimental results show that the method achieves a satisfactory result. By comparing with the original DRLS model, it is evident that the proposed model herein is more effective in addressing the over segmentation problem. Finally, we gauge our performance of our model against matrices comprising of accuracy, sensitivity and specificity.

Keywords : Bhattacharyya distance, distance regularized level set (DRLS) model, liver segmentation, level set method
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