Homogeneity-based Region Growing Algorithm for Organ Segmentation

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Extended Abstract

Accurate segmentation of organs from medical images is a key step in diagnosis, clinical studies and treatment planning. Region growing (RG) is a common interactive approach to segment the organs in an abdominal CT image. However, the RG algorithm requires the user to provide an initial seed pixel and a suitable threshold value for the region membership criterion. Having a more precise representation of the target organ within the image is imperative for accuracy in computer-aided segmentation.

In our study, an adaptive threshold setting mechanism (AdaptRG) is proposed for organ segmentation in Computed topography (CT). We applied a homogeneous discriminative model to confine the growing within a relatively homogenous area and prevent pixels in the region from crossing boundaries, smaller homogeneity value of a pixel indicates a greater possibility that the pixel is on a boundary. We begin by thresholding a range calculated from a small number of user-defined seeds. Next the AdaptRG algorithm examines the neighborhoods of pixels currently in the region. The neighboring pixels that have intensities within the thresholding range and homogeneity values greater than a predefined parameter are added to the growing region. The process is iterated in the same manner for the whole image until no other pixels satisfy the condition for expansion. The thresholding value is adjusted according to the pixels in the growing region.

We applied our AdaptRG algorithm to segment a liver from abdominal CT scans. The experimental results show an accurate image of the segmented liver. This method can also be applied to segment other organs such as the kidneys, spleen, or heart.

Keywords

Adaptive Region Growing; Image segmentation; Medical Image; Organ Segmentation;

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