A Contemporary Approach for CT Image Segmentation

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Obtaining detailed, segmented organs from CT, or CAT Scan, images is critical in the investigation of computer-assisted analysis. In our study, we propose a contemporary approach that considers the similarities of the shape, location, and intensity distribution between nearby CT slices as a priori knowledge to advise the segmentation of a capacity of an image sequence, where the primary classification is performed using Support Vector Machines (SVM).

To begin the process of our strategy, we manually draw the region of interest from the first CT slice image and select the training data for SVM training. To enhance the contrast of the CT image, we extract statistical intensity information from the training data and model the object intensity distributions using a Gaussian function. After the pre-processing of applying the Gaussian model to the image pixels, we obtain the organ segmentation result of the first slice using SVM.

Due to the similarities of organ shape and location between adjacent slices, the segmentation result of the first CT slice in the volume can be used as a priori knowledge of the organ in the adjacent slice. According to this a priori knowledge, the background and object training data of the adjacent slice can be automatically obtained by enlarging and shrinking the identified boundary in the first slice. Following a similar pre-processing method, we use this training data for the SVM learning process and finally classify the organ from other tissues in this adjacent slice. This process can be repeated over the image sequence using the new segmentation results as a priori knowledge for the next slice. Experiments have been conducted of extracting the liver from the clinic images. This method yielded accurate segmentation results, comparable to ground truths. Our future research would be to explore the application of other classification methods for CT images.