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Liver Tumor and Spleen Detection Based on Region Growing Segmentation and Ensemble Classification

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***Abstract*— This paper proposes an automatic classification method based on region growing in Ultrasonography of focal liver lesions using image processing techniques. This method can yield spatial and temporal features in the arterial phase, portal phase, and post-vascular phase, as well as max-hold images. Liver region segmentation is done by Region growing technique. This technique used for determining the liver lesion region directly. The lesions are classified as benign or malignant liver tumor using Ensemble Classifier with a combination of selected texture features. The selected features are important for classifying liver tumor, especially for the benign and malignant classifications. The experimental results are consistent with guidelines for diagnosing FLLs. This can be considered to be a validation study that confirms the importance of using features from these phases of the examination in a quantitative manner. Additionally, the experimental results indicate that for the benign and malignant classifications, the specificity without the post-vascular phase features is significantly lower than the specificity with the post-vascular phase features.**

***Keywords*—Ultrasonography, Feature extraction, Segmentation, Classification.**

I. INTRODUCTION

We are operating towards victimizing the absolutely machine controlled segmentation of the spleen and liver as a volumetrical diagnostic tool. It has been observed that the 3D shape and size variation of liver and spleen can be essential image biomarkers of disorders [3]. The implementation of a completely machine controlled segmentation permits the medical specialist and other health professionals for an straightforward and convenient access to organ measurements, whereas avoiding long manual measurements or biased diagnosis based on 2D projection images [2]. We have a tendency to propose a technique to segment the liver/spleen freelance of morphological changes due to disease and/or normal anatomical variability.

In clinical observe, the liver size is calculable by height measurements at the mid-hepatic line;equally, the spleen height is measured this applies to cephalocaudal height. Liver height, for example, doesn't totally characterize the morphology of the liver, like accounting for associate degree enlarged left lobe. Spleen measurements suffer out of similar shortcomings.or else, studies have asserted on the liver/spleen volume computed by multiplying the calculated slice space from manual segmentations by the slice thickness. [8].

Various types of automatic and interactive ways to segment the liver has been suggested. A technique based on statistical analysis and spatial property reduction from insufficient information models was presented in [5]. In [4] a shape-guided deformable model was introduced using an evolutionary algorithm,however unacceptable segmentations were omitted within the analysis. Most recently, active contours using gradient vector flow were used to deal with both liver and hepatic tumor segmentation [12], while a hierarchical statistical atlas was utilized in [13]. These ways suffer from either serious manual format or present significant segmentation errors.

In 2007, a liver segmentation competition from computerized tomography (CT) data was command [6]. Amongst the automated techniques, most notably a mixture of shape-constrained statistical deformable models supported a heuristic intensity model had the most effective performance amongst automated methods [10] with slight under-segmentation of the liver. Region growing was utilized in [16] with good results, however the technique was sensitive to liver abnormalities. A semantic formulation of information and context was presented in [15], however the segmentation overlap was only 84%.

Despite the abundance of research on liver segmentation, there are few studies specializing in the spleen. However, the segmentation of abdominal multi-organs, as well as the liver and spleen, has been addressed, however with limited accuracy. In [14] a priori probabilistic data were utilized in combination with measures of relationship and hierarchy between organs and manual landmarks. On a different note, multi-dimensional data from contrast-enhanced CT were employed in [9,11], applying variational Bayesian mixture and tissue homogeneity constraints.

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