

Research on image processing techniques applied to liver tumor detection

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Abstract: This study presents a novel image processing framework for the automated detection of liver tumors in medical imaging. Leveraging a combination of adaptive histogram equalization, morphological filtering, and region-based segmentation, the proposed method enhances tumor visibility while suppressing noise from surrounding hepatic tissue. A multi-stage pipeline was developed to isolate the liver parenchyma, identify suspicious regions, and classify them as benign or malignant using a support vector machine trained on texture and shape features. The algorithm was evaluated on a dataset of 500 CT scans, achieving a detection sensitivity of 94.2% and a specificity of 91.8%, outperforming conventional thresholding techniques. The results demonstrate that the integration of advanced preprocessing with machine learning significantly reduces false positives and improves diagnostic accuracy. This approach offers a reliable, cost-effective tool for radiologists, facilitating early intervention and treatment planning for liver cancer patients. Future work will focus on real-time implementation and validation on larger, multi-center datasets.

Keywords: Image processing, tumor detection, liver cancer, medical technology