Segmentation of liver and vessels from CT images and classification of liver segments for preoperative liver surgical planning in living donor liver transplantation

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Highlights

- The present study developed an effective surgical planning method consisting of a liver extraction stage, a vessel extraction stage, and a liver segment classification stage based on abdominal computerized tomography (CT) images.
- An automatic seed point identification method, customized level set methods, and an automated thresholding method were applied in this study to extraction of the liver, portal vein (PV), and hepatic vein (HV) from CT images.
- A local searching method was proposed for identification of PV branches and the nearest neighbor approximation method was applied to classifying liver segments.
- Onsite evaluation of liver segmentation provided by the SLIVER07 website showed that the liver segmentation method achieved an average volumetric overlap accuracy of 95.2%.
- An expert radiologist evaluation of vessel segmentation showed no false positive errors or misconnections between PV and HV in the extracted vessel trees.
- Clinical evaluation of liver segment classification showed that the intraoperative surgical cutting boundaries agreed with the classified segment boundaries.