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Automated Liver Cancer Diagnosis: A Convolutional Neural Network Approach on CT Imaging

In recent years, deep neural networks (DNNs) have shown remarkable potential in medical image analysis, particularly in the field of computed tomography (CT) imaging. The use of DNNs to analyze medical images, especially in the context of detecting cancer, is becoming a promising area of research. In this study a novel approach to detect liver cancer using deep neural networks (DNNs) based on computed tomography (CT) images was explored. Convolutional neural networks (CNNs), a specialized class of DNNs tailored for spatial data processing tasks, prove highly effective in image analysis. Methodology of this study involves the preprocessing of a diverse imaging dataset of CT scans of the liver created in collaboration with seven hospitals and research institutions and training of several different convolutional neural networks CNNs with various architectures. The whole dataset was divided into three sets. The training set consisted of 70% of the data. The validation set was created from 15% of the data and the remaining 15% was used for testing. In order to evaluate the effectiveness of several convolutional neural networks, multiple measures such as accuracy, precision, recall, F1-score and confusion matrix were used. The results of this study showcase significant improvements in accuracy and efficiency compared to traditional methods, paving the way for early and accurate diagnosis without the help of specialists.

Keywords:
convolutional neural networks, computed tomography, liver cancer detection, CT image segmentation, deep learning

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