

# Chapter 8

## Identification of Hepatocellular Carcinoma From CT Liver Image for CAD Systems

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### ABSTRACT

*Liver cancer is the sixth most common cancer. Liver cancer is frequently analyzed with Computed Tomography (CT) scan. Early diagnosis by CT could lead to high recovery rate, however going through all the CT slices for thousands or even millions of patients manually by professionals is hard, expensive, inefficient and prone to errors. The proposed method mainly focuses on precision of liver lesion segmentation and to improve performance of the CAD systems. The goal is to create a reliable Res-UNet model that can segment the liver, identify Regions of Interest (RoI) from nearby organs, and use that information to identify liver lesions using a different Res-UNet. The contributions of this chapter are identifying whether liver is healthy or affected by the disease (hepatocellular carcinoma), segmenting lesions from the*

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*extracted liver image using Res-UNet and to evaluate the accuracy of segmentation. The developed models have been tested using LiTS dataset. The accuracy of liver segmentation and lesion segmentation achieved using ResUNet are 0.9918 and 0.99, respectively.*

## **1. INTRODUCTION**

According to World Cancer Research Fund International (2020), liver cancer is the sixth most common cancer worldwide. There are two main forms of liver cancer: primary and secondary. Hepatocellular carcinoma (HCC) makes up 80% of cases of primary liver malignancies. Primary liver malignancies can be caused by hepatitis B and C viruses, obesity-related fatty liver disease, and alcohol-induced cirrhosis. Computed tomography (CT) scans can be used for diagnosis, and the ResUNet method, a combination of U-Net and ResNet model, can be used to segment the liver. The same technique can be used to isolate the lesions after the liver has been segmented. This method improves the ability to distinguish between the liver and the lesions, which helps doctors identify and diagnose liver lesions and create treatment regimens. For patients, it rises patient's chance of getting better treatment and decreases risk of lives owed to liver cancer.

### **1.1 Challenges**

Usually, manual or semi-manual techniques are used to interpret liver CT scans; these approaches are labor-intensive, expensive, ineffective, and prone to a great deal of inaccuracy. In order to tackle these obstacles and enhance the accuracy of liver lesion identification, multiple computer-aided techniques have been created. However, due to a number of issues, including low contrast between the liver and surrounding organs, different contrast levels within lesions, varying lesion sizes and numbers, tissue abnormalities, and inconsistent lesion progression in response to treatment, these methods frequently have trouble segmenting the liver and lesions. These are formidable obstacles that must be surmounted.

### **1.2 Objective**

The main objective is to use the ResUNet approach to improve the accuracy of liver and lesion segmentation. To capitalize on the advantages of both techniques, ResUNet combines the conventional U-Net and ResNet models by substituting residual blocks for convolution blocks. CNN training is made easier by the residual unit, and information transmission is prevented from degrading due to skip connections

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