

## Recent Trends and Challenges in CAD of Liver Cancer on CT Images

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Liver cancer has become a major health issue in the world over the past 30 years. Early detection is necessary to cure liver cancer without much complication. Computer Aided Diagnosis (CAD) system plays a vital role in the early detection of liver cancer and hence reduces death rate. It assists the radiologists in better interpretation of medical images and hence improves diagnostic accuracy and image analysis time. The main objective of this paper is to provide an overview of recent advances and challenges in the development of CAD systems for analysis of liver cancer using Computed Tomography (CT) images.

**Keywords :** Computer Aided diagnosis, Computed Tomography, Image Retrieval, Liver Cancer.

### 1. INTRODUCTION

For years, cancer has been one of the biggest threats to human life. It is expected to become the leading cause of death over the next few decades. Based on statistics from World Health Organization (WHO), cancer accounted for 7.6 million deaths which are around 13% of all deaths worldwide in the year 2010. Deaths caused by cancer are projected to increase in the future, with an estimated 11 million people dying from cancer in the year 2030 [1].

A tumor is a growth of tissue in which the tissue cells multiply in an uncontrolled fashion. Tumors can be either benign (non cancerous) or malignant (cancerous) [2]. Liver cancer is the fifth most common cause of cancer death among men and ninth most common death among women [3]. According to the statistics published by American Society of Clinical Oncology, The five year relative survival rate of people with liver cancer is 11%. Hence detection of this cancer in early stages becomes important to cure deadly disease [4]. Treatment for the liver cancer can be surgery, chemotherapy and radiation therapy [5]. Se-

lecting the best treatment for liver cancer depends on the physician being able to precisely identify the type, location, size and borders of the tumor. By matching that information to a variety of treatment possibilities and considering the benefits and limitations of each, the physician can select the best course of action.

Currently, the only confirm diagnosis for the liver cancer is the needle biopsy. The needle biopsy however is an invasive technique and generally not recommended. Various imaging techniques like Computed Tomography (CT), Magnetic Resonance Imaging (MRI) and Ultra-Sonography (US) exist for acquiring the images of the liver[6]. Among all these techniques CT has been identified as accurate non-invasive imaging modality in the diagnosis of liver cancer. The medical images obtained are interpreted by radiologists. However, visual analysis has several drawbacks like it is tedious, time consuming and subjective.

Thus the direct analysis of the medical images by the physician provides only about 75% of diagnostic accuracy [7]. Computer aided diagnosis (CAD) defined as a diagnosis made by

## 7. CONCLUSIONS

CAD has now become a vital and powerful method for diagnosis. The use of quantitative image analysis tools, in conjunction with the experience of the physician, can improve diagnostic sensitivity and specificity and reduce interpretation time. This paper has provided extensive survey on CAD systems that have been proposed and developed in the recent years. The techniques employed in each stage of CAD for detection, diagnosis, image retrieval and 3D reconstruction of liver tumor on CT image were discussed. Although significant progress has been made over the recent years, the performance of the CAD systems still needs improvements to fully meet the requirements of routine clinical applications. This paper also highlights the research challenges to develop more effective and efficient CAD systems that help in early diagnosis of liver cancer on CT images.

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