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RESEARCH ARTICLE

LIVER TUMOUR DETECTION FOR CT IMAGES USING IMAGE PROCESSING TECHNIQUES

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ABSTRACT

The liver is the largest organ in the abdomen. Liver cancer is one of the major death factors in the world. Most of the peoples who have liver tumour were died due to the fact of inaccurate detection. Medical image segmentation is difficult to detect the accurate results of tumour in liver. Tumour segmentation in liver CT images is a challenging task. This paper consists of various image processing techniques like image pre-processing and image enhancement which is used to improve the quality of the liver image. This helps to detect and segment the tumour in liver effectively. The automated segmentation of liver is addressed first and then filtering is used to remove unwanted noise finally The clustering algorithm helps to detect the tumour in liver CT image. In this work aids to improve the better classification performance. Early detection helps to save the people from liver cancer

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INTRODUCTION

Liver cancer is the cancer that begins in the liver. It is the sixth most common cancer in the world. Liver cancer can be life-threatening condition. However it may be cured if found early. CT has been identified as accurate and non-invasive imaging modalities in the diagnosis of hepatic lesions. Manual segmentation of CT scans are tedious and prohibitively time consuming for clinical setting. Hence there is the need for the automatic system for the detection of tumour. Image processing is used to examine different medical and CT images to get the abnormality in the images. A CT scan may be done to take a series of detailed pictures of liver and other organs and blood vessels in an abdomen. An addition of contrast material is also given so the liver is clearer in the pictures. So analysis involves CT scan provides accurate results (http://m.kaahe.org/fx/index_en.html#en_t629.json). The tumour may be originated elsewhere in the body but latter it travels towards the liver and makes severe damage to it. Tumour denotes abnormal growthin the liver. Tumours can be cancerous or non-cancerous. Benign tumours are not considered as cancer. This tumour do not spread into or nearby tissues. It can be quite large. Once removed it don't grow back. But malignant tumour differs from benign tumour. Malignant tumours are considered ascancer. It can spread into or nearby tissues (Ramaraju *et al*., 2015). In this proposed system the input image of the liver is taken either from the available database or the real time image by using the scanner. Various pre-processing and enhancement techniques are used to reduce the image size as we want and also reduce the unwanted noise in the input image for further use. Finally the segmentation is carried out using clustering algorithm for better performance. This enhances the tumour boundary more clearly. To detect and analyse the tumour will helps the doctors to give better treatment for peoples and to avoid death rates.

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Review of Literatures

Park *et al*. (2005), proposed a method for liver segmentation using intensity histogram transformation and to obtain binary mask using posteriori classification. After morphological processing is applied to the mask, the tumours are located within the mask area. Seo (2005), proposed a method for liver segmentation using the optimal threshold value. Here the hepatic tumour is segmented with minimum total probability error. This approach yields varies false positives, but promising results are obtained. Sinduja and Suruliandi (2015) has presented a paper for automatic segmentation of tumour which

plays a vital role in diagnosis and surgical planning. Here the performance analysis is considered for liver tumour detection using various techniques Knowledge Based Constraints, Graph Cut Method and Gradient Vector Flow active contour techniques are examined using sensitivity, specificity and accuracy. From the evaluated result, knowledge based constraints method is better than others. The proposed method described an interactive method for liver tumour segmentation from CT scans (Zhang *et al*., 2011). After pre-processing the image is partitioned into a large number of catchment basins using watershed transform. To extract tumours from liver image using SVM classifier. The corresponding feature vector for training and prediction is computed depends on each small region in watershed transform. The method was tested and evaluated on MICCAI 2008. Liver tumour segmentation is a challenging task.

Rajagopal and Subbaiah (2015) has presented the survey on liver tumour detection and segmentation. Various processing techniques were developed for the detection of liver tumour using abnormal lesion size and shape. This paper analyse various algorithms and methods for liver tumour detection. The novel methodology for the detection and diagnosis of liver tumour is also presented in this paper. Finally experimental results are compared with various methodologies for the detection and analysis of liver tumour. Akanksha Sharma and Parminder Kaur (2013) has suggested the review of CAD techniques for liver tumour detection. In this paper an effort has been made to review the existing CAD techniques to find out the technique which is best based on computational time, sensitivity, specificity, and accuracy. So that is required some changes can be made or suggested for further impose the result. This paper concludes the reviews on medical image segmentation, optimization algorithms and neural network for classification process.

Proposed work

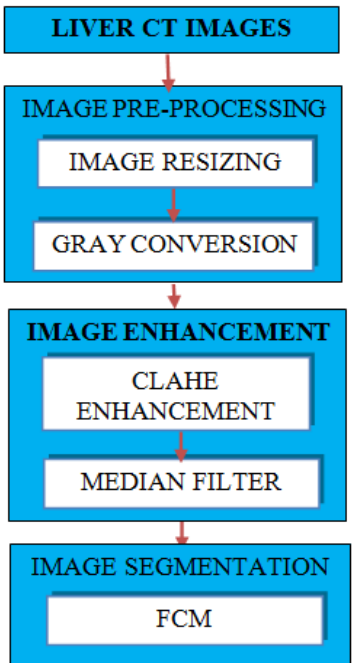


Fig. 1. Block Diagram

This method involves various processing techniques for the detection of liver tumour from CT scan images. The proposed work involves three stages that is image pre-processing, image enhancement and image segmentation. After collecting the image from scanner, pre-processing should take place for reducing unwanted noise in an image. FCM clustering algorithm is used to detect the tumour in liver CT image

Input image

Data collection is essential for image processing. In this proposed system the input image of the liver is taken either from the available database or the real time image by using the scanner. Here grayscale image is used as input image.

Image preprocessing

Pre-processing is the first step in image processing techniques. Thepre-processing step converts the image which is suitable for further operations. It performs filtering of noise. In this step the source image is transformed into new image which is similar to the source image but differ in certain aspects (Sindhuja and Suruliandi, 2015). e.g. improved contrast. The brightness of individual pixels is changed in this process. image resizing and gray conversion is mainly used in this process for better result

A. Image resizing

Image resizing is important for doing further operations in image processing. Is a special form which is used to reduce the size of the original image. When the input is too large to process then this technique is used (Ramaraju *et al*., 2015). The input image size is converted into special form which is suitable for processing and to provide accurate result. Here the input image is resized into 256X256.

B. Grayconversion

In Grayscale digital image the value of each pixel is a single sample. That is it carries only intensity information. Grayscale images are separate from one-bit bitonal black and white images. In grayscale image gray levels denote the interval number of quantization processing, At present the most commonly used storage method is 8-bit storage.8-bit gray scale image contains 256 gray levels. The intensity of each pixel range from 0 to255, 0 for black and 255 for white. 1-bit storage contains two gray levels with 0 as black and 1 as white which is frequently used in medical images (http://en.m.wikiedia.org/wiki/grayscale) When converting an RGB image to grayscale, first take the RGB values for each pixel and make as output a single value which reflects the brightness of that pixel. Another approach for conversion is to take the average from each channel by using this formula (R+G+B)/3. Observed brightness is often dominated by the green component. “human-oriented” method is to take a weighted average from these three channels, eg:((0.3R+0.59G+0.11B) the weights in our averaging be dependent on the actual image that want to convert, i.e. be adaptive. So that the resulting image has pixels that have most variance which is linked to the contrast of the image (http://www.imageprocessingbasics.com/rgb-to-grayscale).

Fig.2. Grayscale liver CT image

Image enhancement

Image enhancement is among the simple and most appealing areas of digital image processing. Basically the idea behind enhancement technique is to highlight certain features of interest in an image. Image enhancement is an important process in image processing which is used to increase the contrast of an image which can provide better result. Image enhancement is the process of enhancing the image to improve the visual quality.

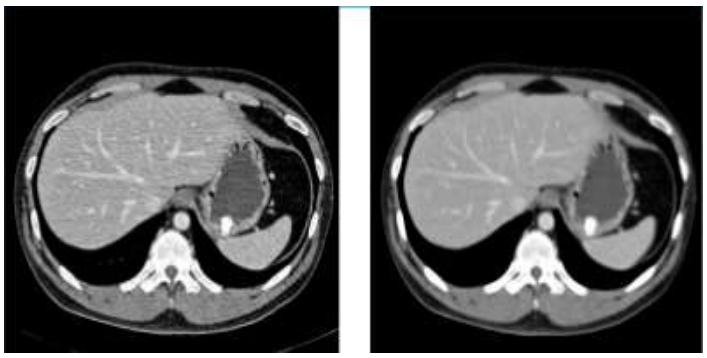
A. Clahe method

Image processing technology has been used to assists physician for identifying cancer in liver. The intensity of tumour can be lower or higher than the liver. The main problem of liver tumour detection is due to low contrast difference between tumour and liver intensity values. Tumours sometimes present in a very small region which is difficult to identify. To overcome this the proposed work take CLAHE method which is used to enhance the contrast of an image. The intensity value of each pixel in the original image is transformed using transfer function to form a contrast-adjusted image.This proposed method can successfully enhance the contrast of liver tumour in CT images so that the tumour can be easily identified in an input image, and result in more precise manual segmentation (http://www.academia.edu/2894598/contrast_enhancement_for _liver_tumour_identification). Early detection of tumour can be advantageous as prevention of liver cancer

B. Filtering

Filtering process comes under image restoration technique. Image restoration is the operation of taking a noisy image and estimating the clean, original image. Filtering technique is used to reduce unwanted noise in an image and to rectify the motion blur image using median filter. The objective of this techniques is to reduce noise and to provide clear liver image. Removal of noise from the medical images is very challenging in image processing. median filter is used to improve the contrast of the tumours in the liver and to reduce specular noise. The median filter plays an important role in digital image processing and vision.

In this median filter the pixel value of a point p is replaced by the median value of 8-bit neighbourhood of a point 'p'. The operations of this filter can be expressed as: G(p)=median{f(p), where p € N $d_{8,1}$ (p)} (Gnanambal ilango *et al*., 2012)



(a)Original CT image **(b) noise removed image**

Fig. 3. Noise removed using smoothing median filter

FCM segmentation

Segmentation is the process of partition an input image into multiple parts. Image segmentation is typically used to locate objects and boundaries in images (Ramaraju *et al*., 2015). Various automatic and semi-automatic techniques for liver tumour segmentation have been developed based on clustering techniques. After getting the CT image, it has to be clustered by using spatial fuzzy c means algorithm to get better details. In this work, fuzzy c-means (FCM) is used to detect the liver tumour from CT scan images.FCM is a data clustering technique wherein each point belongs to a cluster to some degree that is specified by a membership grade. The professor Jim Bezdek introduced this technique in 1981. After segmentation, we get the segmented image of liver with tumour and tumour alone. This technique is used to give good accuracy in liver segmentation.

RESULTS

PSNR and MSE values are evaluated from the result of segmented liver image. When segmenting, FCM technique helps to provide good accuracy. The results shows the segmented liver image with tumour.

Conclusion

In this paper discussed about various image processing techniques. These techniques are used to detect and liver tumor in CT image. After data collection, pre-processing starts which can be used to reduce the noise and to increase the contrast of the image using CLAHE method. Median filter is used for noise removal. The enhanced image is used for segmentation of liver image. FCM is used to detect the tumour from the segmented liver image. Automatic identification of liver tumour helps doctors for better treatment.

REFERENCES

Akanksha Sharma, P Arminder Kaur, 2013. "Review of CAD Techniques for Liver Tumour Detection" Sharma *et al*. *International Journal of Advanced Research in Computer Science and Software Engineering*, 3(10), pp.857-860 ISSN:2277 128X

Dr. P. V. Ramaraju, G. Nagaraju, V.D.V.N.S. Prasanth, B. Tripura Sankar, P. Krishna, V. Venkat 2015. "Feature Based Detection Of Liver Tumour Using K-Means Clustering And Classifying Using Probabilistic Neural Networks" *International Journal Of Engineering And Computer Science*, ISSN:2319-7242, Volume 4 Issue 5.

Gnanambal ilango, B, Shanthi Gowri 2012. "Neighbourhood Median Filters to Remove Speckle Noise from CT-Images (*IJAIS*) Vol 4 No.10, ISSN2249-0868

http://en.m.wikiedia.org/wiki/grayscale

http://en.m.wikipedia.org/wiki/Image_restoration

http://m.kaahe.org/fx/index_en.html#en_t629.json

http://www.academia.edu/2894598/contrast_enhancement_for_liver_tumour_identification

http://www.imageprocessingbasics.com/rgb-to-grayscale/

http://www.slideshare.net/mobile/footfiM/fuzzy-image-processing

Kyung-Sik Seo and Tae-Woong Chung 2005. "Automatic Boundary Tumour Segmentation of a Liver" In ICCSA pages 836-842.

Rajagopal R. and P. Subbaiah. 2015. "A survey on liver Tumour detection and segmentation methods". *ARPN Journal of Engineering and Applied Sciences,* Vol.10. No.6.

Seung-Jin Park, Kyung-Sik Seo and Jong-An Park, 2005. "Automatic Hepatic Tumour Segmentation Using Statistical Optimal Threshold" *In ICCS*, pages 934-940

Sindhuja A. and Dr. A. Suruliandi, 2015. "Performance Evaluation of Tumour Detection Techniques" *International Journal on Computational Science & Applications (IJCSA)*, Vol.5,No.3.

Zhang, X., Tian, J., Xiang, D., Li, X. and Deng, K. 2011. "Interactive liver tumour segmentation from CT scans using support vector classification with watershed," *IEEE Conf. Eng Med Biol Soc*., Vol. 2011, pp.6005-6008.

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