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Computed Tomography Images for Computer Aided Diagnosis of Lungs Cancer Feature Extraction

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Abstract: The main goal of our proposed algorithm is to obtain edges that the result is suitable for further application such as boundary detection, image segmentation and object identification. We propose a new approach based on edge detection method using Computed Tomography images. In this paper we introduce the Artificial Neural Network features the shape, edge characteristics, darkness of nodules and tested our results signs of Lungs cancer and investigate whether they are benign or malignant.

Keywords: Computed Tomography, Lungs, Segmentation, Malignant, Benign.

I. INTRODUCTION

Cancer is one of the most health problems in the world. The humanity rate of lung cancer is the highest among all other types of cancer. Lung cancer is one of the most common cancers in present days. Due to the lifestyle of people, there is a steady increase in cancer patient.

Pain, breathlessness, cough and weight loss are the general symptoms of cancer. Survival from the disease is not easy if it is not identified at the early stage. Only 15% of lung cancer is recognized at the early stage.

Cancer cases in males and 75% in females are caused by cigarette smoking in 2005, approximately 1,372,910 new cancer cases are expected and about 570,280 cancer deaths are expected to occur in the United States[2]. The purpose of this paper is to develop a CAD system for early detection of lung cancer based on an automatic diagnosis of the lungs regions included in chest CT(Computed Tomography) images.

II. RELATED WORK

In the history, several methods have been proposed to detect and classify lung cancer in CT images using different algorithms. For example, Camarlinghi et al. [6] have used three different computer aided detection techniques for identifying pulmonary nodules in CT scans. Abdulla and Shaharum[7] used feed forward neural networks to classify lung nodules in X-Ray images even if with only a small number of features such as area, perimeter and shape. Kuruvilla et al. [11] have taken six distinct parameters including skewness and fifth & sixth central moments extracted from segmented single slices containing two lungs along with the features mentioned in [7] and have trained a feed forward back propagation neural network with them to estimate accuracy for different features separately. In Bellotti et al. [4], the authors have projected a new computer-aided detection system for nodule detection using active contour based model in CT images.

III. METHODOLOGY

The image is preprocessed before feature extraction to find the edge of the lungs nodule. The region of Interest(ROI) of the tumor area was first segmented out manually by Radiologist. This ROI was processed to extract the following features. Speculation, Ellipsoid shape, Branch pattern, Relative Brightness of Nodule and Lobulations.

A. Neural Network Approach:
Artificial Neural Network features the shape, edge characteristics, darkness of nodules and tested our results

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signs of cancer and investigate whether they are benign or malignant. The CAD (Computer Aided Diagnosis) system consist of image acquisition, preprocessing, Segmentation, Feature extraction and Classification [1].

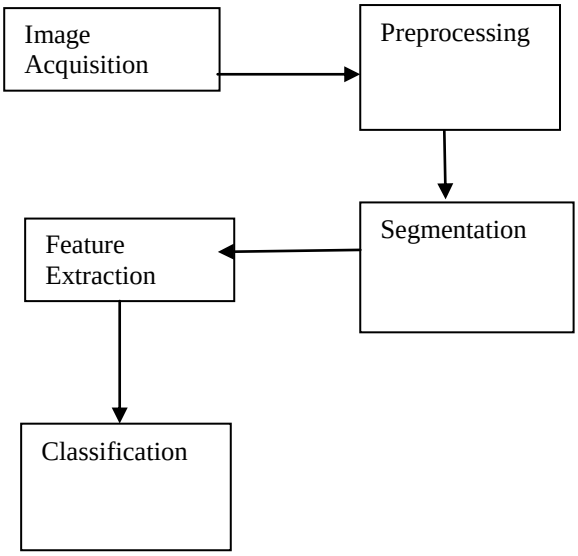

Figure 1: CAD System

CAD System have the following objectives:

- Improve accuracy in diagnosis;
- Assist in early detection of cancer;
- Reduce the time of the radiologist in exam evaluation.

Important factors should be investigated in designing any CAD system for detecting lung nodules including the automation level, the speed, the ability of the detection scheme to detect nodules of different shapes, for example, irregular-shape nodules and spherical, and the ability of the CAD system to detect cavity nodules, nodules contacted to the lung borders, and small nodules.

B. COMPUTED TOMOGRAPHY

A common way for radiologists to describe CT(Computed Tomography) findings based on the Lung Image Database Consortium (LIDC) and Image Database Resource Initiative (IDRI). LIDC along with various characteristics, such as mass shape, obtained from a CT.

Fig. 2 The lung CT image

Figure 3: Infected CT Image

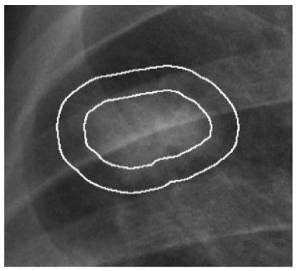

Figure 4: Malignant image

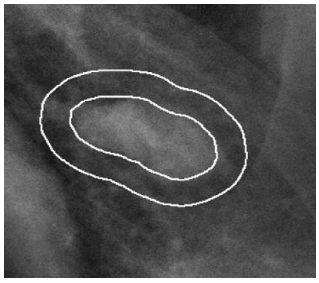

Figure 5: Benign image

The original ultra-sound images, CT images, MRI images and Mammography image should be of size 600x300,we can load BMP images.

Algorithm:

Load the image and detect the edge using algorithm in MATLAB.

Check whether the edge-detected image is of size 600*300.

If it is more, print the error message

To load the image, use the fields height, width, color and pixel and skip the remaining fields.

Find the Center Point of the image using the formula.

X-mid=(x-min +x-max)/2,

Y-mid=(y-min+y-max)/2

Extract the features.

Calculate the normalized input1.

To extract the ellipsoidal features:

Calculate:

Width=x-max-x-min

Height=y-max-y-min,

Then calculate height/Width

Calculate normalized input2

To extract the lobulations.

Repeat the above steps for different images.

If the calculated value is less than or equal 0.50, then it is Benign else it is Malignant.

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IV. RESULTS

TABLE 1 The table shows the values for Malignant tumor in the Neural Systems.

Neural Network Analysis			
Threshold	Benign Value	Malignant Value	Test Value
0.50	<=0.50	>0.50	1.01
			Result: Malignant
0.50	<=0.50	>0.50	1.03
			Result: Malignant

V. CONCLUSION

This paper mainly works presented a CAD system which can help radiologists in identifying whether the lungs nodule is malignant or benign. The objective of this work diagnosis is faster than the present system and biopsies can be avoided.

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