

A Review: An effective approach for Lung cancer detection using Various Algorithm

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ABSTRACT

One of the major causes of deaths by cancer is due to lung cancer. Detection of cancer in the early phase can provide more treatment options, less invasive surgery and increases the survival rate. For lung cancer, if the disease is detected in time, the survival rate of patient increases from 14-49% in recent 5 years. It is the most dangerous and widespread disease in the world. The cancer cells present in lung causes lung cancer disease. This cells detection is very important issue for medical researchers. The chances of an effective treatment will significantly increases with early detection. The Computed Tomography (CT) images are used which are more efficient than X-ray. MATLAB is widely used software for the study of lung cancer detection from CT scan images. The process includes image pre-processing, image segmentation, feature extraction and classification technique.

Keywords — Computed Tomography, principal component analysis.

I. INTRODUCTION

Image Processing

Image processing is a technique for converting an image into digital form and performing operations, in order to get some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them. Image processing basically include three steps, first is to Importing the image, second to analyzing and manipulating the image including compression, enhancement and spot patterns and last is to analyze the image to get required output.

Lung Cancer

Lung cancer is a type of cancer that begins in the lungs. Your lungs are two spongy organs in your chest that take in oxygen when you inhale and release carbon dioxide when you exhale.

Lung cancer is the leading cause of cancer deaths in the United States, among both men and women. Lung cancer claims more lives each year than do colon, prostate, ovarian and breast cancers combined.

People who smoke have the greatest risk of lung cancer. The risk of lung cancer increases with the length of time and number of cigarettes you've smoked. If you quit smoking, even after smoking for many years, you can significantly reduce your chances of developing lung cancer.

Image segmentation

To humans, an image is not just a random collection of pixels; it is a meaningful arrangement of regions and objects. There also exists a variety of images: natural scenes, paintings, etc. Despite the large variations of these images, humans have no problem to interpret them. Considering the large databases on the WWW, in our personal photograph folders, a strong and automatic image analysis would be welcome.

Image segmentation is the first step in image analysis and pattern recognition. It is a critical and essential component of image analysis system, is one of the most difficult tasks in image processing, and determines the quality of the final result of analysis. Image segmentation is the process of dividing an image into different regions such that each region is homogeneous.

II. TECHNIQUES USED

A. Watershed Algorithm

In this, available lung CT scan images are passed through the system which is having following stages: pre-processing stage, segmentation stage, feature Extraction stage and classification. The Gaussian filter is used to smooth the input image in the preprocessing stage. As well as, in the pre-processing stage, Gabor filter is used for enhancement and thresholding and Marker-Controlled watershed transform is used for the segmentation purpose. After image segmentation, the features

such as average intensity, perimeter, area and eccentricity are extracted from the detected tumour. Binarization process is done to decide whether it is cancerous tumour or not. Also, if there is cancerous tumour, the cancer stage is identified.

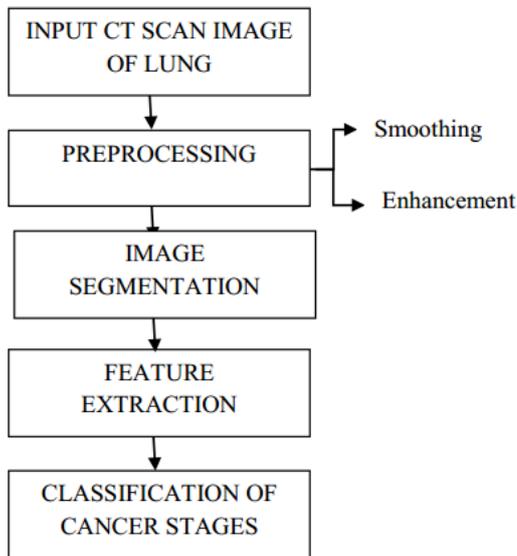


Fig. 1 Block Diagram of System

B. PCA Algorithm

PCA is Principal Component Analysis Algorithm. PCA is to standardize the data in image. Real-world data sets usually exhibit relationships among their variables. These relationships are often linear, or at least approximately so, making them amenable to common analysis techniques. One such technique is principal component analysis ("PCA"), which rotates the original data to new coordinates, making the data as "flat" as possible. The features extracted are passed through the PCA data mining for better classification. The following steps takes place in PCA:-

- i. Calculate the mean and standard deviation of the features in the image.
- ii. Subtract the sample mean from each observation, then dividing by the sample standard deviation. This centers and scales the data.
- iii. Calculating the coefficients of the principal components and their respective variances is done by finding the Eigen functions of the sample covariance matrix.
- iv. The matrix contains the coefficients for the principal components. The diagonal elements store the variance of the respective principal components. We can extract the diagonal.
- v. The maximum variance in data results in maximum information content which is required for better classification.

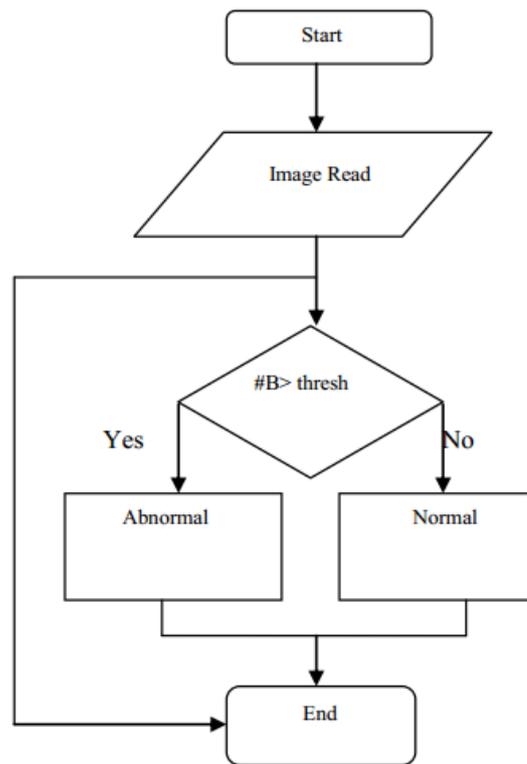


Fig. 2 Binarization Check Method A.

C. Neural Networks

The proposed Lung Cancer Detection System can identify the appropriate cancerous effected regions by applying the following steps shown in Figure below . In lung X-Ray, pulmonary nodule appears as a spherically shaped mass . It can be distorted by adjacent anatomical formation. There are no boundaries on size or spreading in lung tissue. The pulmonary nodule is categorized into a few groups; nodule is associated to pleural surface and connected to neighboring vessels by thin structure . Pre-diagnosis approaches help to locate the risk of lung cancer disease in very early stage.

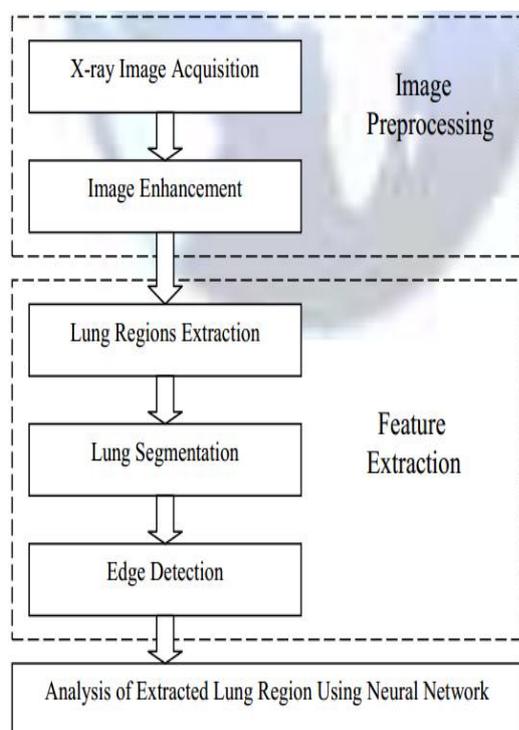


Fig. 3 Lung Cancer Detection System

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