# Lung Cancer Detection Using Image Processing Technique

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*Abstract*— Lung cancer is considered to be the main cause of cancer death worldwide. There is significant evidence indicating that the early detection of lung cancer will decrease the mortality rate. This research deals with the early detection of cancer-affected region of the lung by image processing technique. MRI images are used for the detection of lung cancer. Magnetic Resonance Imaging (MRI) has become a widely used method of high quality medical imaging, especially in lung imaging. MRI provides an unparalleled view inside the human body. The work carried out involves processing of MRI images that are affected by cancer for detection and providing medicines for cure. The image processing techniques such as image enhancement, image segmentation, image filtering, morphological structuring elements and feature extraction are used. These features are normalized in the range -1 to 1 and given as an input to the artificial neural network for detection. Artificial neural networks are biologically inspired classification algorithms that consist of an input layer, one or more hidden layers and an output layer. Feed forward back propogation algorithm is used for detection.

***Key words:*** MATLAB

***Problem Statement:-*** To identify whether the person is effected by lung cancer or not by using image processing techniques. Lung cancer detection using image processing techniques like image pre-processing, image segmentation, image enhancement, feature extraction and then comparison with the data stored in the knowledge base.

## I. INTRODUCTION

Some discoveries such as X-rays, ultrasound, radioactivity, magnetic resonance imaging (MRI) or computed tomography (CT) and the development of tools that can generate medical images. Using the physical principles of such phenomena has facilitated the development of some of the most efficient exploration tools in medicine. These tools are capable of exploring the structure, the Function and the diseases that affect the human lung. This research deals with the cancer-affected region of the lung.

Magnetic Resonance Imaging (MRI) has become a widely used method of high quality medical imaging, especially in lung imaging where MRI's soft tissue contrast and noninvasiveness is a clear advantage. MRI provides an unparalleled view inside the human body.

Reliable and fast detection and based on classification of lung cancer is of major technical and economic importance for the doctors. Common practices specialized technicians are slow, have low responsibility and possess a degree of subjectivity which is hard to quantify. Knowledge Base which helps in successful classification of unknown Images. These features are normalized in the range -1 to 1 and given as an input.

The work carried out involves processing of MRI images that are affected by cancer for detection and Classification on different types of tumors. The image processing techniques like histogram equalization, image segmentation, image enhancement and then extracting the Extracted feature are stored in the knowledge base. Images used are MRI images obtained from Tata Memorial hospital. The designed and developed system works in two phases namely Learning & Training Phase and Recognition & Testing Phase. In Learning/Training Phase the ANN is trained for recognition of different types of cancer. The known MRI images are first processed through various image processing steps such as Histogram Equalization, median filter, and neural network etc. and the features extracted are used in the Artificial Neural Network Based Classifier.

## II. NEED AND SCOPE OF PROJECT

Cancer is one of the most serious health problems in the world field. The mortality rate of lung cancer is the highest among all other types of cancer. Lung cancer is one of the most serious cancers in the world, with the smallest survival rate after the diagnosis, with a gradual increase in the number of deaths every year. Survival from lung cancer is directly related to its growth at its detection time. The earlier the detection is, the higher the chances of successful treatment are. An estimated 85% of lung Cancer cases in males and 75% in females are caused by cigarette smoking.

The objective is to identify textural features useful in distinguishing tumor from normal tissue. Lung Cancer Detection System is implemented using Artificial Neural Network. The design is based on Image processing Techniques. We are Using MRI images. MRI provides us an unparalleled view of internal parts of the human body. The MRI images of patients affected by Cancer are used during Recognition and Testing phase.

The project solves one of the great challenges of lung cancer which the world is facing currently. The project detects the tumor in its early stages, by which the mortality rate can be reduce to a great extent. The project also helps peoples in rural areas where there are no specialized doctors and facilities are available to get proper treatment according to the kind situation the person is suffering from. More features can be further extracted to make the system more precise and accurate.

Different stages of lung cancer can also be added by feeding more samples in the database of neural network. The project also prescribes the medicines according to the condition of the patient, which will make the treatment affordable for poor people.

 

## III. GOAL OF PROPOSED WORK

Cancer detection in magnetic resonance images (MRI) is important in medical diagnosis because it provides information associated to anatomical structures as well as potential abnormal tissues necessary to treatment planning and patient follow-up. Cancer Detection and Classification System has been designed and developed. The system uses computer based procedures to detect tumor blocks or lesions and classify the type of tumor using Artificial Neural Network in MRI images of different patients with Astrocytoma type of tumors.

The image processing techniques such as histogram equalization, image segmentation, image enhancement, morphological operations and feature extraction have been developed for detection of the head neck tumor in the MRI images of the cancer affected patients. The objective is to identify textural features useful in distinguishing tumor from normal tissue. Lung Cancer Detection System is implemented using Artificial Neural Network.

The design is based on Image processing Techniques. We are Using MRI images. MRI provides us an unparalleled view of internal parts of the human body. The MRI images of patients affected by Cancer are used during Recognition and Testing phase. Artificial neural networks are biologically inspired classification algorithms that consist of an input layer, one or more hidden layers and an output layer. Feed forward back propagation algorithm is used for detection.

## IV. DESIGN PROCEDURE

### A. *Block Diagram:*

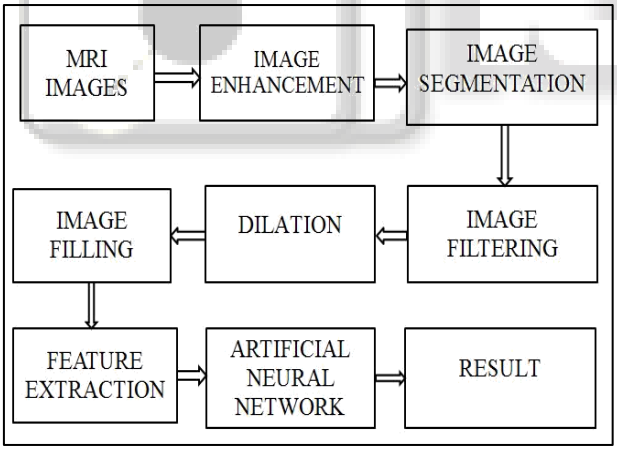


Fig. 1: Block Diagram

### B. *MRI Images:*

MRI stands for Magnetic resonance imaging. It is a medical imaging technique used to investigate the anatomy of the body. It uses strong magnetic fields and radio waves to form images of the body. Magnetic resonance imaging is preferable because they do not involve ionizing radiation.

### C. *Image Enhancement*

The fundamental enhancement is needed to increase the contrast between the whole lung and the tumor. Contrast between the lung and the tumor region may be present but below the threshold of human perception. Thus, to enhance the contrast between the normal lung and tumor region, a sharpening filter is applied to the digitized MRI resulting in noticeable enhancement in image contrast. Image enhancement is the process of adjusting digital images so that the results are more suitable for display or further image analysis. For example, you can remove noise, sharpen, or brighten an image, making it easier to identify key features.

### D. *Images Segmentation:*

Image segmentation is an important part in image processing. There are various applications of image segmentation like locate tumors or other pathologies, measure tissue volume. Segmentation subdivides an image into its constituent region or object. Thresholding is important technique in image segmentation applications. The basic idea of thresholding is to select an optimal gray-level threshold value for separating objects of interest in an image from the background based on their gray-level distribution.

Thresholding creates binary images from grey-level ones by turning all pixels below some threshold to zero and all pixels about that threshold to one. Segmentation subdivides an image into its constituent parts or objects. The level to which this subdivision is carried depends on the problem being solved, that is, the segmentation should stop when the edge of the tumor is able to be detected, and the main interest is to isolate the tumor from its background. Thresholding has been used for segmentation as it is most suitable for the present application in order to obtain a binary image.

### E. *Image Filtering*

The Sobel Filter is used in image processing, particularly within edge detection algorithms, and creates an image which emphasizes edges and transitions. A 3-by-3 mask of sobel filters to emphasize horizontal edges. If you need to emphasize vertical edges, transpose the filter h'.

### F. *Image Dilation*

Dilation is one of the two basic operators in the area of mathematical morphology, the other being erosion. It is typically applied to binary images. The dilation operator takes two pieces of data as inputs. The first is the image which is to be dilated. The second is a (usually small) set of coordinate points known as a structuring element. It is the structuring element that determines the precise effect of the dilation on the input image.

### G. *Image Filling*

It fills holes in the binary image. A hole is a set of background pixels that cannot be reached by filling in the background from the edge of the image.

### H. *Feature Extraction*

The work involves extraction of the important features for image recognition. The features extracted give the property of the texture, color, and shape. The following are the features to be extracted:-

Entropy is the average amount of information contained in each message received It gives a scalar value representing the entropy of grayscale image Contrast function enhances the contrast of an image.

It creates a new gray color map, cmap, that has an approximately equal intensity distribution.

 

ENERGY Returns the sum of squared elements in the GLCM.

### *I. Neuro Fuzzy Classifier*

A Neuro-Fuzzy Classifier is used to detect candidate circumscribed tumor. ANN'S are networks of interconnected computational units, usually called nodes. The input of a specific node is the weighted sum of the output of all the nodes to which it is connected. The output value of a node is, in general, a non-linear function (referred to as the activation function) of its input value. The multiplicative weighing factor between the input of node j and the output of node i is called the weight.an Artificial Neural Network is an adaptive, most often nonlinear system that learns to perform a function (an input/output map) from data. Adaptive means that the system parameters are changed during operation, normally called the Learning/Training phase. After the training phase the Artificial Neural Network parameters are fixed and the system is deployed to solve the problem at hand (The Recognition/Testing phase). Back-propagation ANN's used in this study consist of one input layer, one or two hidden layers, and one output layer. With back-propagation, the input data (Extracted Features) is repeatedly presented to the Artificial Neural Network, with each presentation the output of the neural network is compared to the desired output (Grade of Tumor) and an error is computed.

## V. RESULTS

### *A. Simulation Results:*

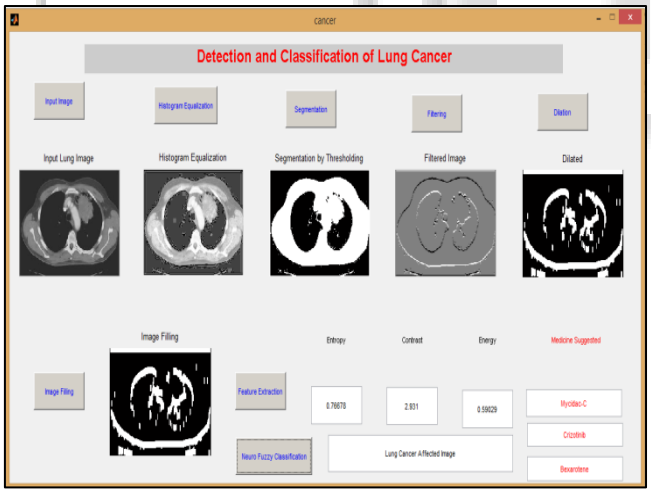


Fig. 2: Simulation Result

## VI. APPLICATIONS

The system can be used in medical diagnosis of lung cancer. In hospitals to detect tumor which is independent of medical reports.

## VII. CONCLUSION

Many cancer forms can only be diagnosed after a sample of suspicious tissue has been removed and tested .Pathologists view pathologic tissues, typically with brig field Microscopes, to determine the degree of normalcy versus disease. This process is time consuming, and fatiguing. The induced exhaustion created by this process may contribute to diagnostic errors. The system described in this project Identifies pathological tissues in an automated fashion. The designed and implemented system provides precision detection and real time tracking by classifying the unknown sample Image into appropriate Astrocytoma type of Cancer, thus do not involve any pathological testing.

## REFERENCES

[1] Gonzalez, R.C. Richard, E.W; "Digital Image Processing," (2004), II Indian Edition, Pearson Education, New Delhi, India.
[2] Dr. P.S. Hiremath, Dr. B.V. Dhandra, Dr. Mallikarjun Hangarge; "Recent Trends in Image Processing and Pattern Recognition", (2010), Excel India Publishers, New Delhi, India.
[3] Phooi-Yee LAU and Shinji OZAWA, "A Simple Method for Detecting Tumor in T2-Weighted MRI Brain Images: An Image-Based Analysis," Department of Information and Computer Science, Keio University, Yokohama-shi, Japan
[4] Cline HE, Lorensen E, Kikinis R, Jolesz, "Three-dimensional segmentation of MR images of the head using probability and connectivity" F. J Computer Assist Tomography 1990.

 