

# An Approach of Image Processing for Lung Cancer Detection using CT Scan Images

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**Abstract:** The cancer is the most dangerous disease since its survival rate is very low. Out of different cancer diseases, the lung cancer is very threatening and danger, since the survival is very less and the early detection is not that easy. Although the medical science is continuously taking this challenge and finding rigorously the accurate and affordable treatment for this disease, but still, this is tough at this moment. But the image processing is contributing to it for the early detection of lung tumors, and classifying them cancerous and non-cancerous. The CT images are useful for detecting the tumor and the track can be made for its growth. This motivated to make research in this field. In this paper, we have collected the dataset and applied several operations such as segmentation and feature extraction and also the classification. This gives considerable accuracy for identifying cancerous and non-cancerous lung nodule.

**Keywords:** CT, Lung cancer, Region of interest, SVM.

## I. Introduction

The Lung cancer detection is the crucial medical application, since the human life survivor is concerned. The worldwide research is continuously going on the mentioned disease. As the early detection of lung cancer can save the life, here the use of image processing is made which contribute a lot in the detection of tumors and classifying them cancerous and non-cancerous. There are many approaches available. Some of them are showcased in the state of art mentioned in section II. S. R. Jena, T. George, and N. Ponraj[8], et al, presented several figures with which the severity of this disease can be well understood. The survey made in [8] was 225,000 people were suffered with lung diseases and, 150,000 deaths were counted, \$12 billion cost yearly. It is as well one of the deadliest diseases; just 17% of individuals determined to have lung tumor survive 5 years after identification, survival rate is bringing down in developing nations[8]. The use of LBP in image processing were made [8] which helped to have detection of the tumors.

## II. State of Art

Considering the severity of this deadly disease, the early detection is the major factor that consider for the accurate as we I as early treatment. K. Kancherla and S. Mukkamala[5], et al suggested the use of Tetrakis Carboxy Phenyl Porphine (TCPP) and the machine learning techniques. TCCP is a porphyrin that is able to label cancer cells due to the increased numbers of low density lipoproteins coating the surface of cancer cells and the porous nature of the cancer cell membrane. Along with it the use of SVM enhanced the accuracy to 87.5% that claimed by the author. W. J. Sori, J. Feng, A. W. Godana, S. Liu, and D. J. Gelmecha [1], et al, presented a deep learning approach on denoised CT scan images for the said research. Here in preprocessing stage the images has to be denoised and then it gets through DR-Net and taken as input for further detection procedure. P. Nanglia, S. Kumar, D. Rathi, and P. Singh[2], et al, made the comparative analysis and study of different feature extraction techniques, which includes various imaging sources such as, Computer Tomography (CT) images, magnetics

resonance images (MRI) and X-ray images, and through them the features can be extracted using SIFT, SURF and PCA. For these mentioned techniques the detail comparison is showcased. The texture feature also used for the said research objective [3], use of CLAHE and statistical features were made. The classification made using Fuzzy C means clustering for detecting the abnormality. Further a review was made on lung cancer detection with different approaches and methods of image processing[4], where, the performance of different image enhancement techniques were compared. In addition the study of different classification methods also showcased.

Use of median filtering which followed by segmentation of ROI of lung for detection [6] using morphological operations also claimed the satisfactory result in cancer detection . The SVM was preferred to classify the regions. B. Muthazhagan, T. Ravi, and D. Rajiniginirath [9], et al, presented an approach of detection using CBIR and data mining techniques where the use of adaptive thresholding segmentation and SVM was made, this claimed the improved prediction results. J. Alam, S. Alam, and A. Hossan[11], et al, presented an approach where the separate classification of image enhancement and segmentation done on every stage, since the prediction is to expected to maximum correctness. The classification done using well known SVM classifiers. This claimed the high degree of lung cancer detection and prediction. The detail comparative study presented in [12], this was in respect of various segmentation techniques such as, Thresholding methods, Marker Controlled watershed Segmentation, Edge detection and PDE based segmentation techniques. Another method of detection of lung cancer using lung CT image processing [13] presented as an approach where, the mathematical morphological operations were performed for segmentation of ROI of lung and using the extracted Haralick features and ANN classification for the said purpose have been achieved. Another method of detection using fuzzy auto seed cluster means for morphological segmentation and SVM [14] is proposed. The author claimed high accuracy and sensitivity for the achieved results. K. Li, Y. Chen, R. Sun, B. Yu, G. Li, and X. Jiang [16], et al, suggested and implemented the use of X- ray imaging techniques for the detection of lung cancer. The detail comparison also studies here and presented the performance parameters on the basis of absorption-contrast imaging and phase-contrast imaging.

### III. Proposed Methodology

The proposed methodology consist of some basic steps. The literature reviewed here consist of many approaches, but the initial task is to collect the authenticate dataset. The dataset collected for the said research contains lot many CT scan images which are the combination of cancerous and non cancerous images. The below figure 1 shows the flow chart of the detection procedure,

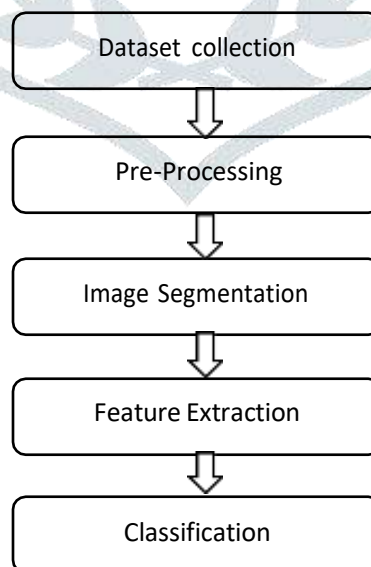


Figure 1. Steps for the Lung Cancer Detection

**Data collection:** The dataset plays an important role in the detection of Lung Cancer from the CT images. The larger the dataset, the greater the training and testing can be done. The Cancer Imaging Achieve database is the important source, and from where the images can be downloaded. Both the cancerous and non-cancerous images are available in the dataset.

**Preprocessing:** The Preprocessing is very useful to suppress the noise which is present in the raw image available in the dataset. The same can be reduced and also the desired features can be made enhanced for the future use.

The use of median filtering offers the benefit of reducing the noise, since the CT images mostly containing the salt and pepper noise. The image enhancement offers the considerable benefit, along with it contrast adjustment also prefer for enhancing the quality of image.

**Image Segmentation:** The segmentation is referred to separate out the desired or needed region of interest from the input image. The morphological operations can perform the necessary action for the same. The grey scale images will be used for the further functioning, where the segmented tumor region can be obtained by further procedures.

**Feature Extraction:** The feature extraction is the important step for accurate recognizing the tumor and its severity can be commented. Here, three important features are to be considered, they are Area, Perimeter and Eccentricity. For the cancerous lung nodule above three features plays a vital role. The accurate detection can also be depending on them.

**Classification:** The classification plays a vital role, since the decision making for cancerous and non-cancerous lung nodule is depending on the accurate classification method. The SVM is well known and most preferred technique for the same. The SVM classifiers are the supervised learning models, that helps for analyzing the data and classifying on the basis of patterns.

#### IV. Results

The implementation of proposed system was done using Python 3.0. The Google Collab and the Jupyter Notebook are found preferred for the programming. The Google Collab is freely available open source and available on the user drive, this can be compatible for the different machines also.

The below is the input image selected from the dataset.



Figure 2. Input image from the dataset Dataset

images are shown in Figure 3, which contains both the category of images.



Figure 3.a. Images from dataset



Figure 3.b. Images from dataset

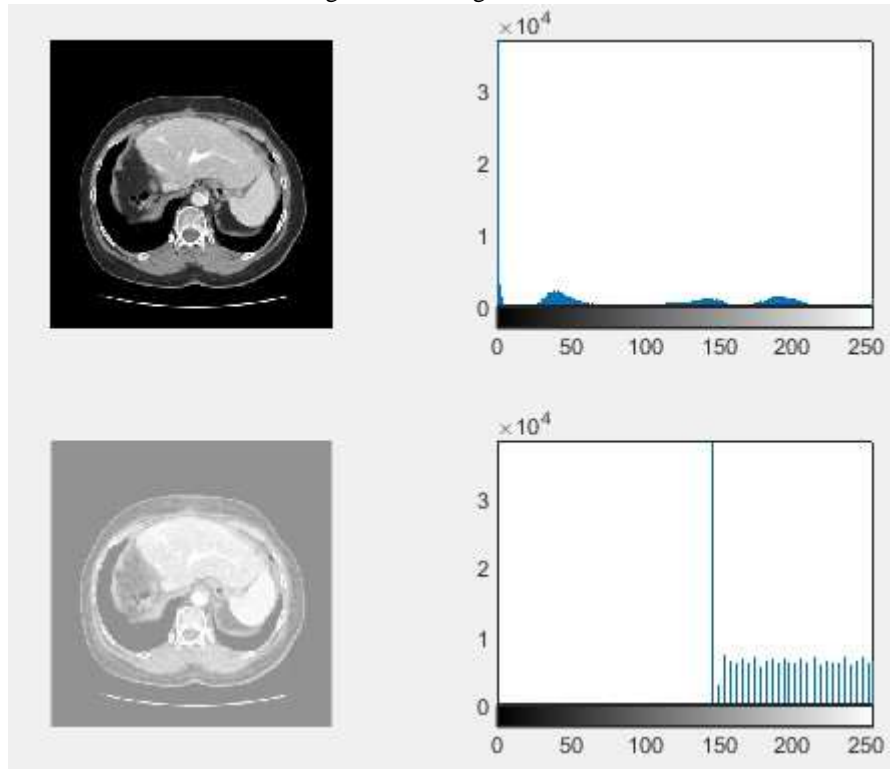


Figure 4. Histogram of input image

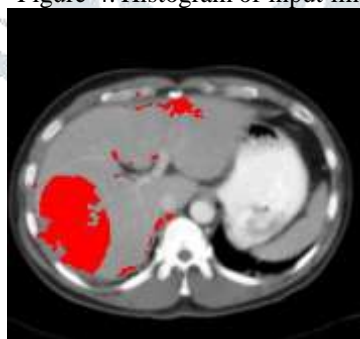


Figure 5. Tumor detected output

### VI. Conclusion

The lung cancer detection technique is introduced and implemented in this paper using CT scan images. This has given the appropriate detection of tumors or the infected area in the lungs. The classification technique is well implemented to classify them in cancerous and non-cancerous categories. The early noise removal method helps in improved segmentation and enhanced feature extraction. The system gives well response for the prediction of the lung nodule present in the CT images.



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