International Research Journal of Computer Science (IRJCS)
Issue 06, Volume 6 (June 2019)

ISSN: 2393-9842
www.irjcs.com

A COMPUTER AIDED DIAGNOSIS FRAMEWORK FOR DETECTION OF LUNG CANCER USING NEURAL CLASSIFICATION

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Manuscript History
Number: **IRJCS/RS/Vol.06/Issue06/JNCS10082**
Received: 20, May 2019
Final Correction: 06, June 2019
Final Accepted: 23, June 2019
Published: June 2019
Citation: Rekha, Vaibha, Poonam & Dr.Vijiyant (2019). A Computer Aided Dianosis Framework for Detection of Lung Cancer Using Neural Classification. IRJCS:: International Research Journal of Computer Science, Volume VI, 632-638. **doi://10.26562/IRJCS.2019.JNCS10082**
Editor: Dr.A.Arul L.S, Chief Editor, IRJCS, AM Publications, India
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Abstract: The Computer Aided Diagnosing (CAD) framework is proposed in this undertaking for classification of lung disease structure the examination of computed tomography (CT) images of chest. To create an effective Computer Aided Diagnosis framework, a few issues must be settled. Segmentation is the principal issue to be viewed as which helps in age of applicant area for recognizing disease knobs. The second issue is distinguishing proof of influenced knobs from all the applicant knobs. At first, the fundamental image preparing strategies, for example, histogram equalization, Filtering, Dilation, Lung Border Extraction and Flood-Fill calculations will be connected to the CT examine image so as to distinguish the lung locale. In this paper we have combined segmentation approach with the Artificial Neural Network method to show the proposed method efficiently detects the lung cancer.

Keywords: Lung Cancer; Aritficial Neural Network; Lung Border Extraction; Segmentation;

I. INTRODUCTION

Lung cancer is a standout amongst the most well-known cancers, representing more than 225,000 cases, 150,000 deaths, and $12 billion in health care costs yearly in the U.S. [1]. It is moreover one of the deadliest cancers; by and large, just 17% of people in the U.S. diagnosed with lung cancer survive five years after the diagnosis, and the survival rate is lower in developing countries [1]. The phase of a cancer alludes to how broadly it has metastasized. Stages 1 and 2 allude to cancers localized to the lungs and last stages allude to cancers that have spread to different organs.

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Current analytic techniques incorporate biopsies and imaging, for example, CT scans [2]. Early detection of lung cancer (detection amid the prior stages) fundamentally improves the odds for survival; however it is likewise progressively hard to detect beginning times of lung cancer as there are fewer symptoms. Our errand is a parallel classification problem to detect the nearness of lung cancer in patient CT scans of lungs with and without beginning period lung cancer. We mean to utilize use strategies from PC vision and deep learning, especially 2D and 3D convolutional neural systems, to construct an exact classifier. An exact lung cancer classifier could accelerate and lessen costs of lung cancer screening, taking into consideration increasingly broad early detection and improved survival. The objective is to develop a PC helped diagnosis (CAD) framework that takes as information tolerant chest CT scans and outputs whether the patient has lung cancer. In spite of the fact that this assignment appears to be clear, it is really a needle in the haystack problem. So as to decide if a patient has beginning time cancer, the CAD framework would need to detect the nearness of a little nodule (< 10 mm in distance across for beginning time cancers) from a substantial 3D lung CT scan (commonly around 200 mm × 400 mm × 400 mm). A case of a beginning period lung cancer nodule appeared inside a 2D cut of a CT scan is given in Figure 1. Besides, a CT scan is loaded up with noise from surrounding tissues, bone, air, so for the CAD frameworks search to be pre-processed, this noise would initially must be preprocessed.

Fig 1: 2D CT scan slice containing a small (5mm) early stage lung cancer nodule [3].

II. LITERATURE REVIEW

A. Agrawal et al. [4], the ensemble voting of five decision tree based classifiers and meta-classifiers was found to result in the best expectation performance as far as accuracy and territory under the ROC curve. Further, we have built up an on-line lung cancer result calculator for assessing risk of mortality following 6 months, 9 months, 1 year, 2 year, and 5 years of conclusion, for which a smaller non-redundant subset of 13 attributes was cautiously chosen utilizing attribute selection techniques, while attempting to hold the prescient power of the original set of characteristics.

Bhola A.et al. [5], Author presents a review of different cancer classification techniques and assess these proposed strategies based on their classification accuracy, computational time and capacity to uncover gene information. Creator have additionally assessed and presented different proposed gene selection strategy. In this paper, a few issues identified with cancer classification have additionally been examined.

V. Kirubha et al. [6], this paper utilize 'Tobacco use' data, so as to classify the risk factor level of Lung Cancer based on the tobacco use percentage of individuals. It likewise looks at data mining classification algorithms, for example, Naïve Bayes, Random Forest, Random Tree and REP Tree for performance analysis. The REP tree algorithm furnishes better outcomes when contrasted and different algorithms.

K. Jayasurya et al. [7], BN model structure and parameter learning distinguished gross tumor volume size, performance status, and number of positive lymph nodes on a PET as prognostic factors for two-year survival. At the point when approved in the full validation set of Ghent, Leuven, and Toronto, the BN show had an AUC of 0.77, 0.72, and 0.70, individually. A SVM demonstrate based on similar factors had a general more regrettable performance AUC 0.71, 0.68, and 0.69 particularly in the Ghent set, which had the most elevated percentage of missing the essential GTV size data.

Ada et al. [8], In this paper Histogram Equalization is utilized for preprocessing of the images and highlight extraction process and neural system classifier to check the condition of a patient in its beginning period whether it is normal or abnormal. After that we anticipate the survival rate of a patient by extracted features. Experimental analysis is made with dataset to assess the performance of the diverse classifiers. The performance is based on the right and wrong classification of the classifier. All experiments are directed in WEKA data mining device.

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A.Priyanga et al. [9], Author has proposed the cancer prediction system based on data mining. This framework gauges the risk of the bosom, skin, and lung cancers. This framework is approved by contrasting its anticipated outcomes and patient's earlier medical information and it was examined by utilizing weka framework. The primary point of this model is to give the prior warning to the users, and it is additionally cost efficient to the user.

Thangaraju et al. [10], Lung cancer is the main source of cancer death in the United States, among the two men and women. The two fundamental sorts are little cell lung cancer and non-little cell lung cancer. Individuals who smoke have the most serious risk of lung cancer. The risk of lung cancer increments with the time span and number of cigarettes they have smoked. On the off chance that they quit smoking, even subsequent to smoking for a long time, they can fundamentally decrease his/her chances of creating lung cancer. In this work, author applies classification procedures on a dataset of lung cancer patients based on smoking and non-smoking individuals.

III. METHODOLOGY

In this section we present our proposed framework in detail. Fig. 2 shows the proposed system architecture.

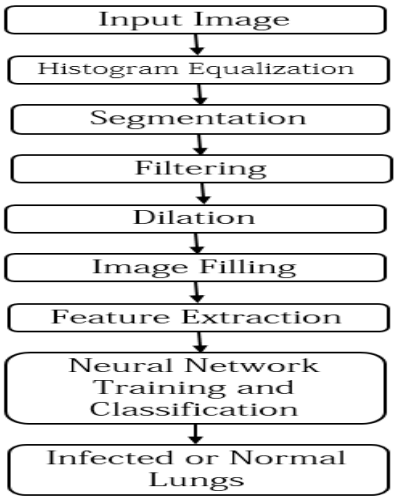

Fig. 2. Shows the proposed system architecture

A. Input Image

Input image is the CT image of chest taken from the online source. The CT image can clearly suggest the infected part of chest. The sample CT images of lungs are shown in result section.

B. Histogram Equilization

This process enhances the contrast of the images. In simple word it makes images brighter so that the minute marks are visible.

C. Segmentation

Segmentation is the method for dividing the source image into different region. These regions contain similar intensities images. The goal of image segmentation is to identify the image with similar pixel information so that the infected region can be collected in one region. The main issue in segmentation is to identify the cancer part.

D. Filtering

To remove the noises from the images so that the classifier can predict the cancer part effectively we have used filtering technique. The median filtering techniques are deployed for process of removal of noises.

E. Dilation

Dilation is image morphological operation which adds pixel to the CT image of lung. It is done so to improve the boundary of lung so that it can classify the cancerous part effectively.

F. Image Filling and Feature Extraction

Various features are extracted from the CT image such as,

a. Contrast
b. Correlation
c. Homogeneity
d. Energy , These are each pixel information of the CT image. These have standard formula for calculations.

G. NN Training and Classification

In this paper, neural systems are utilized as a part of the programmed discovery of lung cancer. Neural system is picked as a grouping instrument because of its notable strategy as an effective classifier for some genuine applications. The preparation and approval procedures are among the vital strides in building up a precise procedure show utilizing NNs. The dataset for preparing and approval forms comprises of two sections; the preparation feature set which are utilized to prepare the NN strategy model; while a testing features sets are utilized to check the exactness of the prepared NN results.

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IV. RESULTS

This section presents results obtained from the framework. The framework is capable of predicting the cancerous part of lungs effectively. The sample dataset is shown below.

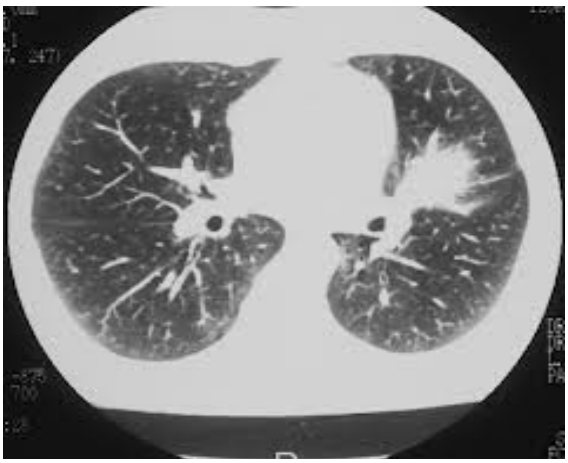

Fig. 3. Normal Lung CT Image

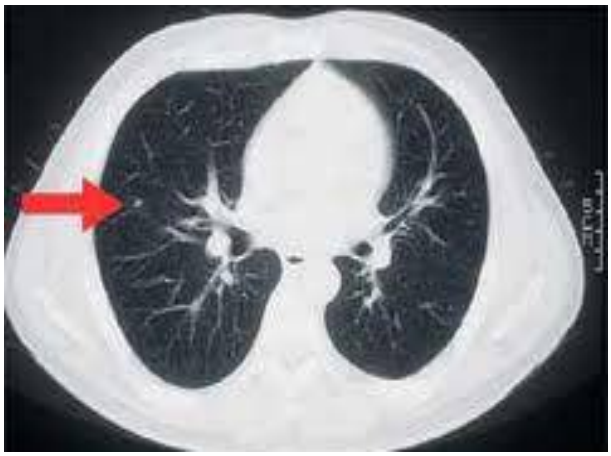

Fig. 4. Cancerous Lung CT Image

The output obtained from the framework are shown below.

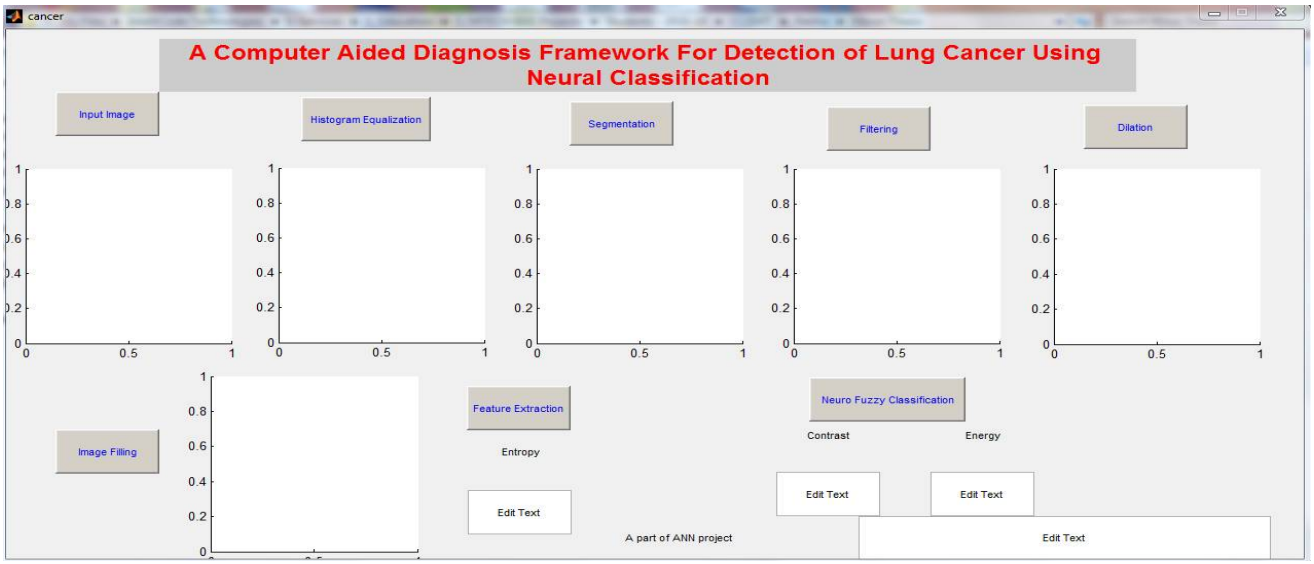

Fig. 5. Proposed system layout

STEP 01: Input CT Image

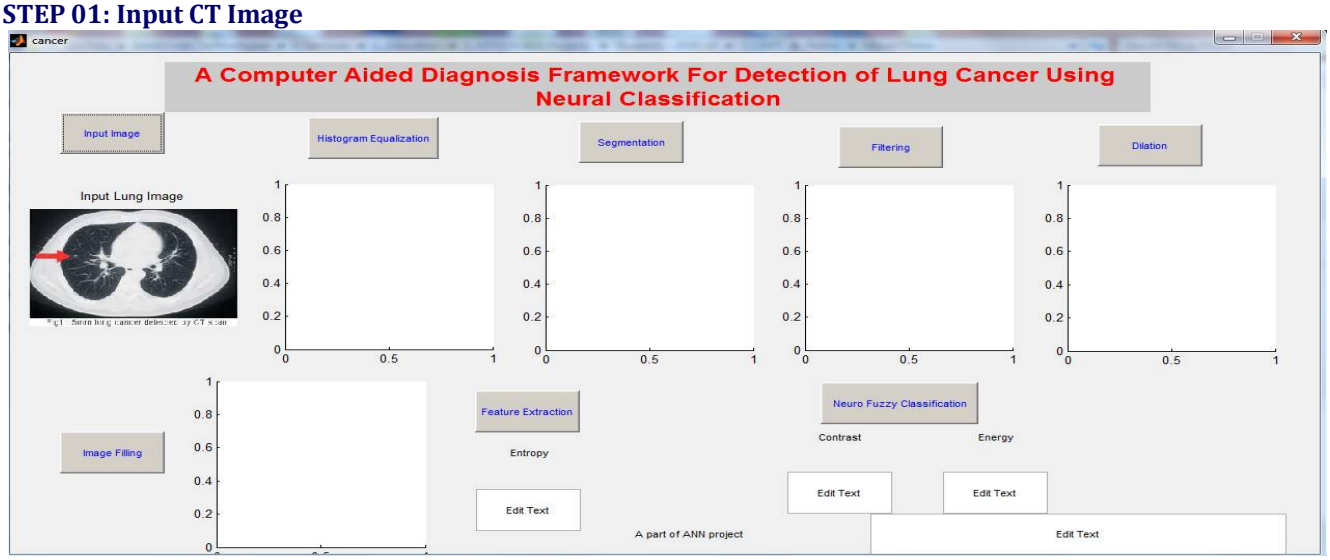

Fig. 6. Input CT Image

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STEP 02: Histogram Equalization

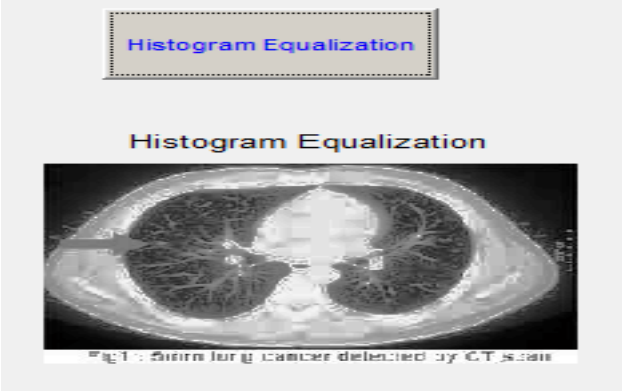

Fig. 7. Histogram Equalization

STEP 03: Segmentation

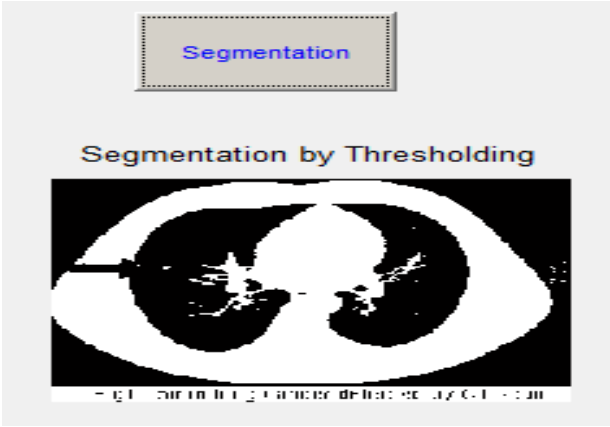

Fig. 8. Segmentation

STEP 04: Filtering

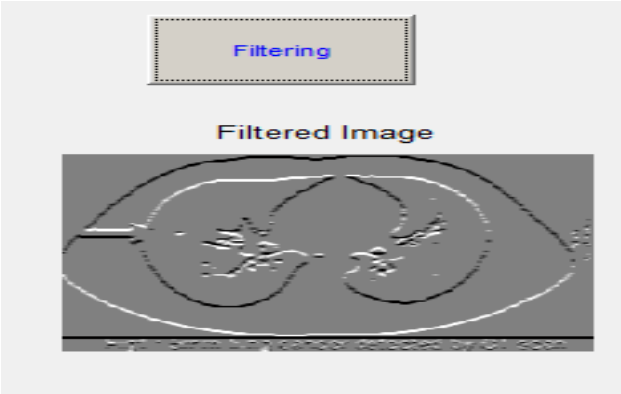

Fig. 9. Filtering

STEP 05: Dilation

Fig. 10. Dilation

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STEP 06: Image Filling

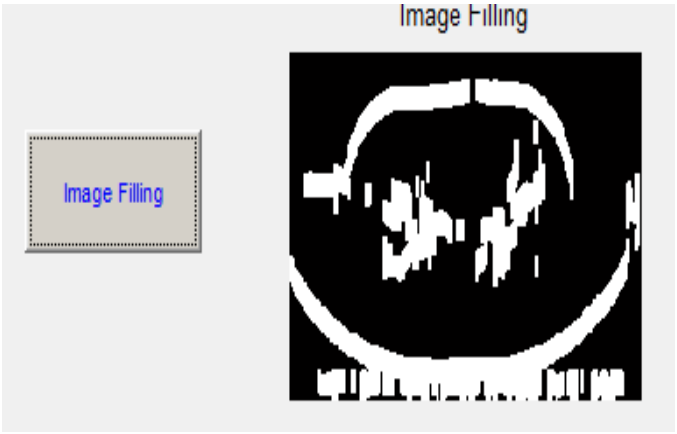

Fig. 11. Filling

STEP 07: Feature Extraction

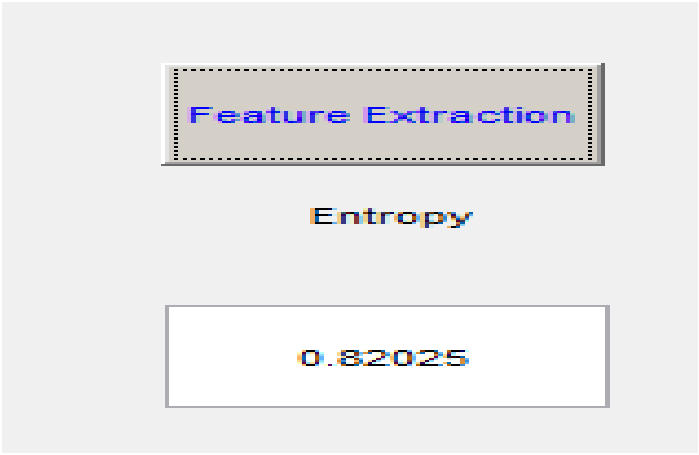

Fig. 12. Feature Extraction

STEP 08: NN Training and Classification

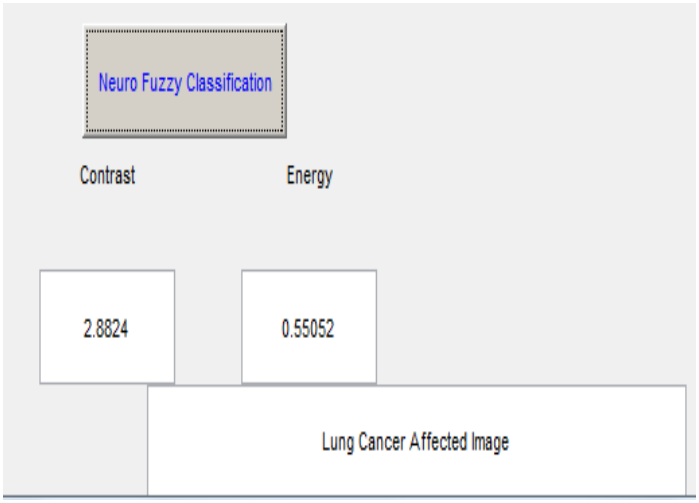

Fig. 13. NN Training and Classification

Finally the output produced by the classifier is whether the CT image affected or not.

V. CONCLUSION

In this paper we have utilized various segmentation, filtering and normalization techniques for improvement in the CT images. We have also removed noises present in CT images by median filtering technique. We have utilized neural network training method to train our classifier and predict output.

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