

# PREDICTIVE MODEL FOR LUNG CANCER DETECTION

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**ABSTRACT**— Lung cancer is the result of cells that develop widely in one or both of the lungs. Lung cancer is diagnosed in two ways non-small cell lung cancer and small cell lung cancer. Too late, lung cancer has been the main cause of death worldwide. If detected successfully in the early stages lung cancer allows for many treatment options, decrease the risk of aggressive surgery an increased rate of survival. So the early diagnosis of lung cancer is very important. Our aims and objectives to develop this system is to detect the lung cancer in an input image and shows that image of lung is normal or abnormal. Here we proposed a system where radiologist login with system by entering his/her email and password. Radiologist fill patient form with coordination of patient and upload CT scan image of lungs in predictive model for lung cancer detection and get output and print report. Several image processing techniques that we have used to design this system, Image Pre-processing, Image Segmentation, Image Filtering, Dilation, Image Filling, Feature Extraction Neural Network and Neuro Fuzzy classification algorithm is used for image classification. MATLAB is used to designed detection part of system.

**Keywords**—Feature extraction, image pre-processing, lung cancer, segmentation, and neural network.

## I. INTRODUCTION

An excessive deal of work has been showed over the past decade to diagnose cancer using image processing techniques. There are numerous papers that summarize the work by image processing techniques in the area of lung cancer diagnosis. Past researchers have been used number of methods to find lung cancer detection. This is hard to explain because it displays symptoms in the final stage. Lung cancer is a tumour that grows rapidly and spreads or attacks the other organ in the body ([1],[2],[3]). There are two primary types of lung tumor: small-cell lung cancer (SCLC) and non-small cell lung cancer (NSCLC). Proper staging of lung cancer is mainly for treatment optimization process and diagnosis evaluation. The stage of melanoma depends on the size or severity of the chief tumor and whether it has an unfold to local lymphatic nodes or other physical areas [4]. A more dominant form of lung cancer is as non-small cell lung cancer. The main source of lung cancer, carcinogenic agents such as environment waste or air pollution, cigarette smoking. Furthermore, genetic factors also cause cancer of the lung. Human radiologists typically use CT scan to assess the risk of lung cancer in a person [5]. A prevalent cancer predict tissue development, or “nodules lor is growing. The already available systems used many methods to identify malignant cancer nodules. Other systems have been developed to identify lung cancer using various image processing technique. However these system does not produce

optimum efficiency. Here we proposed a system where patient come to the doctor clinic and tells his/her symptoms to doctor. Doctor tell the patient go to radiologist and bring report from radiologist. Radiologist login with system by entering his/her email and password. Radiologist fill patient form with coordination of patient and upload CT scan image of lungs in lung cancer detection and classification system and get output images and result. Here we try to implement some image processing techniques for lung cancer Identification and classification using MATLAB. Several image processing step that we are used to design this detection system, histogram equalization used for image pre-processing, Thresholding are used for Image Segmentation, Image Filtering is an image modification or enhancement technique[6]. You can filter an image to highlight or erase other features and other characteristics. Dilation adds pixels in an image to object borders, while erosion destroys pixels at object boundaries. Image Filling is a morphological algorithm in image processing. It deals simply with filling the region of an image [7]. Features extraction relates to the reduction of the dimensionality and the use of the neural network for image classification [8]. After the extraction step of the object, these features are conceded through the neural network to train the system for purposes of classification or detection. The neural network

contains of three main layers i.e. layer of input, layer secret and layer of output. First, the finest neural organised network is obtained by differentiating various parameters of hidden network nodes. Patient take report from radiologist and go to the doctor, doctor view report and tells the patient whether the lungs is affected by cancer or not. If lungs is affected by cancer then doctor suggest medicine.

## II. LITERATURE REVIEW

### Overview

One of the usual and severe type of cancer is lung cancer. There are generally no signs or indications in the primary stage of lung cancer, although many people with the condition finally show symptoms including:

A prolonged cough

Coughing up the blood

Breathing difficulty

Unreported exhaustion and weight loss [9]

### Types of Lung Cancer

There are 2 types of lung cancer. Those are assigned to the form of cells the cancer starts to develop in non small cell the most common form of lung cancer, affecting more than 87 per cent of patients. .

### Symptoms-Lung Cancer

A cough that didn't leave after 2 to 3 weeks

A chronic cough that becomes worse

Chest infection which tend to replicate

Coughing up the blood

The nausea or ache when you inhale or cough

A chronic fatigue or a power failure

And unaccountable weight loss

Swelling on face or lip

### Causes-Lung Cancer

#### Smoking

Using cigarette is the danger factor for pulmonary tumor. Tobacco smoke comprises more than 60 different toxic mix- tures which are acknowledged to cause cancer. If any person smoke more than 25 cigarettes a day, then he/ she are 25 times more chance to develop lung cancer than a non

smoker. The probability of lung tumor or other forms of cancer including oesophageal cancer and mouth cancer. These things contains:

Smoking tobacco

Tobacco Tub

Chewing Nicotine [10]

### Radon

Radon is a ordinary harmful gas that contains small amount of uranium in both rocks and soils. It can be seen in homes, When you breathe in radon it can damage your lungs, particularly if you're a smoker.

### Carbon Emissions and Industrial Pollution

Exposure to firm compounds and elements that are used in different occupations and construction that increase the risk of rising lung cancer. Such elements and substances shall include: Arsenic, Nickel.

### Diagnosis-Lung Cancer

#### Chest X-ray

The first way of detecting lung cancer is typically a lung X-ray. Most lung tumors show as a white grey mass on X-rays. X-rays in the chest can not have a conclusive finding, Since they often do not distinguish between tumor and other diseases, such as lung abscess.

#### CT Scan

Typically a CT scan is the next test you'll get after you get an X-ray into your chest. A CT scan uses X-rays and a Machine produce complete images of body inside. You will be subject- ted to a special dye injection called contrast medium carrying out a CT scan which helps to enhance image quality. The scan is painless, and completion takes 10-30 minutes [11].

#### PET-CT Scan

A PET - CT scan can be performed when the early cancer arising from a CT scan is detected. The PET-CT scan (which stands for positron-emitted tomography- computerized tomography) will show where active cancer cells are. It can be effective when proper diagnosis is diagnosed and sought. This takes 30 to 60 minutes to scan.

#### Bronchoscopy and Biopsy

If a CT scan indicate cancer in your chest region, you will need bronchoscopy. Bronchoscopy is a procedure that make a

physician search into the airways and take a small sample of cells (biopsy). A tiny tube passed through your mouth or nose in a bronchoscopy, down your throat and with a camera into your airways at the end. The surgery can be painful, so you'll get a sedative that helps you relax and a local anesthetic that will numb your throat before it starts. The process is complete in 30 to 40 minutes.

### **Other Types of Biopsy**

Different types of biopsy are surgical biopsy, like a thoracoscopy, a mediastinoscopy, or an biopsy performed using a needle (percutaneous) injected through the skin.

### **Thoracoscopy**

A thoracoscopy is a process that lets a physician analyze and sample a specific chest region with tissue and blood. You will need general anesthetic before thoracoscopy. Two or three small cuts are made into the throat to insert a tube into the lungs. A doctor uses the tube to look into your chest, and take your tissue samples. They would then send the samples to a testing laboratory.

### **Mediastinoscopy**

Mediastinoscopy lets a doctor examine the area in the middle of the chest, between the lungs (mediastinum). You will need a general anesthetic for this operation and you will stay in hospital for a couple of days. In order to insert a thin tube into your chest the doctor has to make a tiny cut at the bottom of your neck. The tube at the end has camera that lets physician see inside of the chest. During the process they will also be able to collect cell samples from the lymph nodes.

### **Percutaneous Needle Biopsy**

For numbing muscles a local narcotic is used. A doctor then uses a CT scanner to direct a needle through the skin to the site of the presumed lung tumor. The needle is used to extract a slight quantity of tissue from a suspected tumour to enable laboratory examination[12].

### **Staging**

After tests have been completed, doctors will be able to assess the stage at which the cancer is what it means for the disease and whether the cancer can be completely cured.

### **Non-small-Cell Lung Cancer Staging**

System use for treating lung malignancy called TNM, where: T defines the tumour scale (cancer tissue)

N explains how cancer spreads to lymph nodes

M explains how the tumor has extent to a certain region of the body like the liver (metastasis).

### **Small-Cell Lung Cancer**

It is less common in tumor of the small-cell lungs than in lung tumor. Lung cancer in small cells has only 2 potential stages. Limited disease-Malignancy has not spread outside the lung Extensive cancer Malignancy has spread outside the lung[13].

### **Use of Different Classification Algorithms for Diagnosis of Lung Tumor in CT images using Image Processing Techniques**

Lung cancer is a ailment that multiplies abnormal cells and develops into a tumour. Cancer cells can be transported in the blood from the lungs, or lymph fluid covering the lung tissue. We have been developed a system that uses different image processing techniques for lung cancer detection and provide result in efficient way[14]. Jia Tong et al.[2007] acknowledged that many measures have been taken to detect cancer such as lung segmentation identification of suspicious nodule candidates, isolation and classification of the element. Patil et al.[2009] Reports that segmentation of images is critical to medical imaging. This helps identify in an image the absence or presence of chronic illnesses. The Gray Level Cooccurrence Matrix (GLCM) is the method use to measure the characteristics of the textures[15]. In 2010 M.Gomathi and Dr.P.Thangaraj used the conception of basic image processing techniques to be applied to the CT scan image to define the lung area, including Bit Plane Slicing, Erosion, Median Filter, Dilation, Outlining, Lung Boundary Extraction and Flood Fill algorithms. Because of its accuracy the Segmentation algorithm is used to identify cancer nodules from the extracted image of the lung and proposed the name of the segmentation algorithm Fuzzy Possibility C Mean [16]. Vijai Anad et al.,(2010) proposed a system that effectively predicts computed lung tumors tomography using image processing techniques combined with neural networks that are either labelled as benign or malignant. The system for neural back propagation classifies a set of textured characteristics derived from derived ROIs as cancerous or not cancerous[17]. Disha

Sharma et.al(2011)established an integrated CAD for primary detection of lung cancer using several measures to check the lung CT image. First the lung regions are extracted from the CT image by using various image processing techniques including bit layer slicing, versioning and weiner filtration.In the first step of the extraction process,the bit plane slicing technique is used to translate the CT image into a binary image [18].Fatma Taher et .al , (2012) provided an early diagnosis for the sputum cells using a Bayesian classification and an algorithm for the Hopfield Neural Network. The HNN segmentation algorithm out , performs the Fuzzy C-Mean clustering , which enables nuclei and cytoplasm regions to be efficiently extracted.Morphological processing on segmented image improved efficiency of the HNN algorithm [19]. S. Sivakumar and others. (2013) Proposed an successful method of separating lung nodules by segregating the nodules. Weighted fuzzy probabilistic based clustering for nodule segmentation was performed for images of lung cancer.SVM has been used for diagnostic purposes.Miah et. al (2015)suggested a method for identify- ng lung cancer. This system comprises many steps such as image acquisition , preprocessing , binarization , thres- holding , segmentation , extraction of features , and detection of neural networks. Roy,Sirohi and Patle developed a system for the identification of lung cancer nodules using the fuzzy effective contour model and interference system.This system uses gray conversion to enhance contrasting image. Image are segmented using pattern of activeoutline. Tumor classification is conducted using the Fuzzy inference process. Features such as field,mean,entropy, correlation,longer axis, smaller axis length are collected to,train the classifier [20].Abdulla et al.used area , perimeter and shape to train ac- curacy of an artificial neural network for classifying lung cancer. Ada and Kaur have performed a computational method to sort positive image by similarity into the group . Neuro-fuzzy systems are approaches via the use of derived learning algorithms through the neural theory networks to understand data strctures which loop.Neural network learning capabilities make them a prime target for a range of question able systems to simplify or support the design process for a questionable frame work task unique.The first so called neuro fuzzy methods were

considered specifically in control area (Neuro) fuzzy but more general approach today. Neuro fuzzy system are also used in many different areas, such as command, data processing, support for decision making etc.We usually define modem neuro fuzy system including a multi- layer neural feedforward network.The weights of the relation and the propagation and activation neuro fuzzy models have different function than regular neural network.A neuro-fuzzy system is a fluid system taught by transferring the following algorithm (generally) from neural network theory.

The learning process operates limited information that causes the primary fuzzy process only to differ[21].

Techniques	Application	Refrences
Gabor Filter	Optical character reconition	Al-Tarawneh
Image Processing and Classification	Remove Gussian white noise	Malik et.al.
Weiner Filter	Noise reduction, Signal detection	Sharma and jindal [22]
Layer Separation	Used to dispersed layer of image	Rani[13]
Gray Scale Image	Used to change color in gray	Gajdhaneand Deshpande

**TABLE I TECHNIQUES AND CLASSIFIER USED FOR LUNG NODULE DETECTION**

### III. METHODOLOGY

**TABLE2. SEGMENTATION AND CLASSIFICATION ALGORITHM FOR LUNG CANCER DETECTION**

Enhancement	Used to sharpen the image	Patiland Jain
Gabor filter	Feature extraction	Onizawa et. al.
Gabor Filters, Discrete Wavelet Transform and Auto Enhancement Algorithm	Identify Tumorous Cells	Avinashet. al.
Fast Fourier Transform	Image reconstruction	Gauthier et. al.
Sparsity-based image modeling	Image Layer Separation	Gu et. al.
Edge detection-based methods	Lane edge detection	Yan and Li[23]
	Canny algorithm	
Matching	Local matching	Nagao et. al.
	3D Elastic matching	
Classification	Cellular dependency	Shao et. al.
Support Vector Machine, Fuzzy C-Mean, Conventional Neural Network and Computer Aided Design	Segmentation	Al-Zubaidi et.al.
Wiener filter	Image Restoration	Zubair
Gray conversion	Histogram equalization	Li et. al.
Image segmentation	Labeling	Berahim et. al.
Thresholding	Deep learning algorithms and convolutional Networks	Talukdar et. al.
Region-based segmentation	Area growing	Jain and Laxmi
	Area splitting and merging	
Clustering techniques	Seed Point Selection Algorithm	Chowdhury et. al.
Morphological segmentation	Watershed algorithm	Wang et. al.
	Cell nuclei	
Weibull multiplicative model	Image Segmentation	Chouhan et. a
Marker-controller segmentation	Magnetic Resonance Imaging	Vesal et. a
	Watershed	
Classification	Support Vector Machine	Chandra et.
Classification	Supervised and Unsupervised Tumor Characterization	Hussein et. al.
Classification	Multi-label Classification	Read et. al. [24]

Author	Images	Technique	Year	Accuracy	
		<b>Segmentation Algorithm</b>	<b>Classifier</b>		
Aparna kanatte	PET	Standard Uptake Values	KNN, SVM	2008	97%
Danshen son	CT	Entropy Threshold	SVM	2000	85
Yongbum Lee	CT	GATM	Classification	2001	72%
Atiyeh Hashemi	CT	Region Growing	ANN	2013	95%
Basavann	CT	Max- Min cluster Algorithm	KNN, DT	2016	85%
Fatma Taher[25]	Sputum	Hopfield Neural Network(HNN)	Bayesian	2012	88.62%

The proposed system consists of many steps where patient come to the doctor clinic and tells his/her symptoms to doctor..Doctor tell the patient go to radiologist and bring report from radiologist. Radiologist login with system by entering his/her user email and password. Radiologist fill patient information form with coordination of patient and upload CT scan image of lungs in lung cancer identification and classification system and get output images and result. Here we try to implement some image processing methods for lung cancer detection and classification using MATLAB. Several image processing step that we are used to design this detection system , histogram equalization used for image preprocessing, Thresholding are used for image segmentation, Image filtering, Dilation, Image Filling, Feature Extraction and Neural Network used for image classification. Radiologist take print out of report and give it to the patient, Patient take report from radiologist and go to the doctor, doctor view report and tells the patient whether the lungs is affected by cancer or not. If lungs is affected by cancer then doctor suggest medicine. This system facilitate the radiologist and tells us that how to detect lung cancer from input image. Different radiologist/ doctor can use this system to detect that

the input image of lung is affected by cancer or not. Process involved to developed this system is given below in figure.

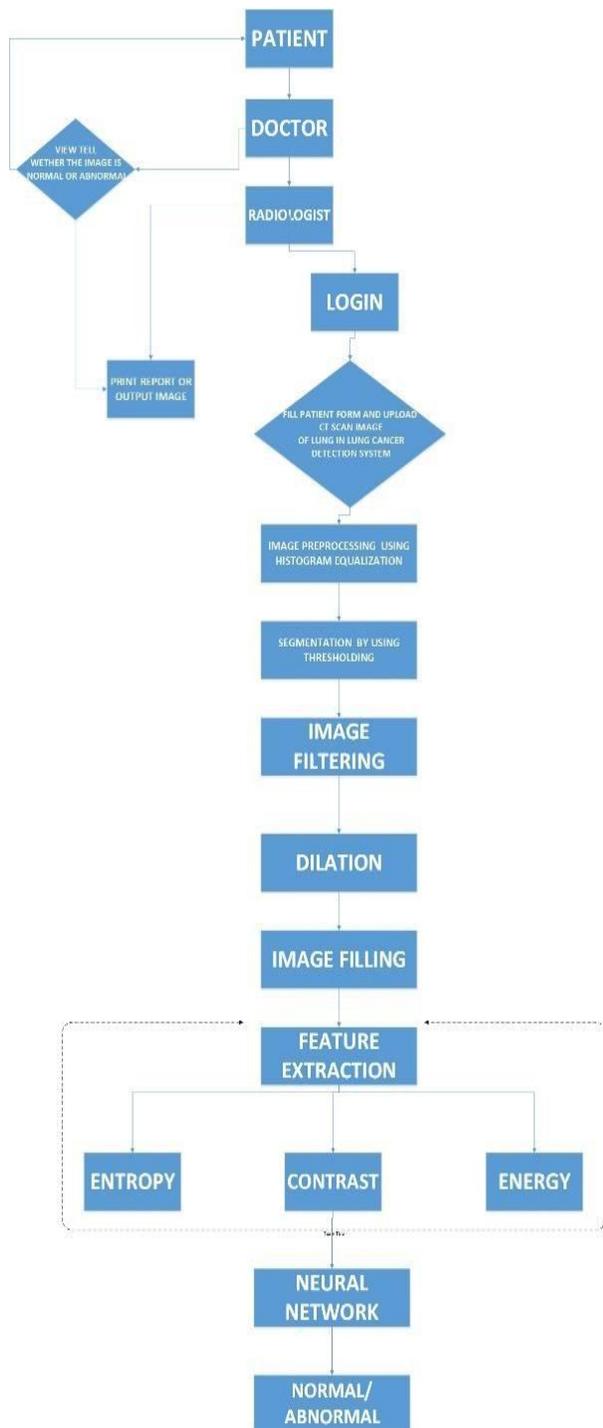
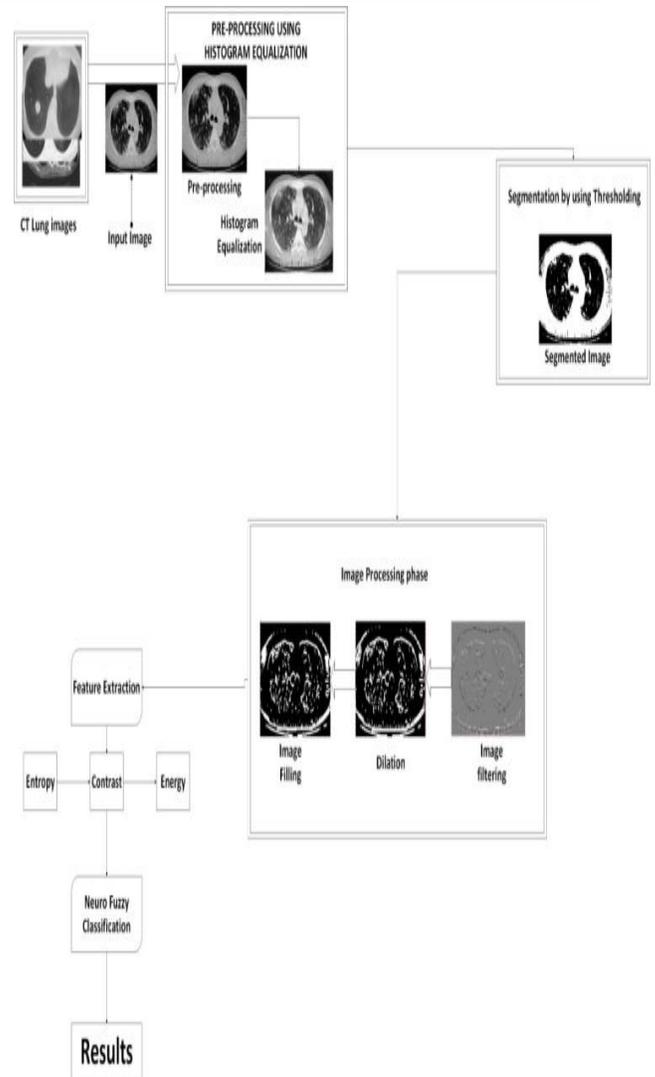


FIGURE1. SYSTEM ARCHITECTURE DIAGRAM



### Image Preprocessing

To improve the image quality ,the input CT image is process- ed in preprocessing. Instead , the processes are executed on image where all details and image data are enhanced.

### Histogram Equalization

It is a procedure by which the intensities of the image can be changed to improve the strength in the image. Histogram Equalization is a procedure that creates a gray map matching the histogram of an image and redistributes all pixel values to be as user- friendly as possible identified as the desired histogram. HE allows for a higher contrast to the areas with lower local contrast. Histogram equalization is a method of

FIGURE2. WIREFRAME DIAGRAM

contrast correction in image processing using the histogram image. Usually this process increases the overall contrast of many images, particularly when near contrast values reveal the available image data. By this modification, the intensities are evenly distributed on the histogram. The histogram equalization achieves so by distributing exactly the most common strength values[26].

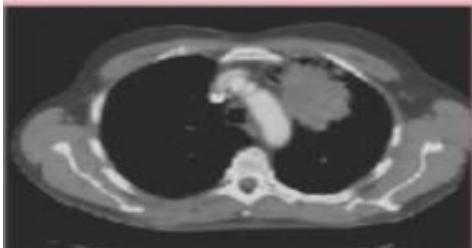


FIGURE3. INPUT IMAGE

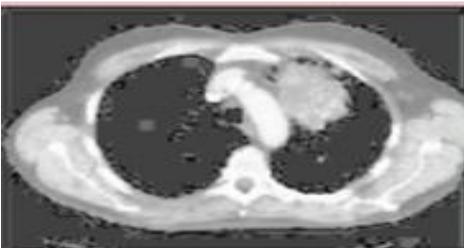


FIGURE4. HISTOGRAM EQUALIZATION OUTPUT

### Image Segmentation

Image segmentation is the method by which a digital image is distributed into various segments, such as pixel sets, also known as super pixels. The main purpose of segmentation is to promote the analysis of the representation of an image. Image segmentation used to define images of objects, edges and boundaries.

### Segmentation by using Thresholding

One of the simplest types of segmentation is the segmenting threshold. The pixels are separated by a given amplitude. Depending on parameters such as pixel threshold values edge based area, clustering etc. There are segmentation types. This relates the gray scale image to the binary image, also called mapping. After this process, the image is distributed into only 2 pixels, 0 & 1. If an image comprises a dark frame work on a bright background, and then thresholding may be used to discern the structure. The Thresholding image divides an image into a foreground and a background. The conversion of images into binary images is carried out mainly. Thresholding may be levels of global or local existence. The same threshold

value for all regions is used in global thresholding while different threshold values are used in local thresholding in a image for particular areas[27].



FIGURES5. SEGMENTATION BY USING THRESHOLDING

### Image Filtering

Image Filtering is a procedure used to transform or improve an image. You can filter out an image to high-light other features or to delete a few features. Filtering the image process requires enhancing the smoothness, sharpening and point.



FIGURE6. FILTERED IMAGE

### Dilation

Dilation technique is used to remove image components that are useful for image extraction represents and determines environmental structure such as boundary, skeleton and convex hulls. Dilation in an image adds pixels to the object's boundaries while erosion eliminates pixels at the object's boundaries. The size and form of the constructing system used to process the image depends on the quantity of pixels added or removed from the objects in an image.



FIGURE7.DILATED IMAGES

### Image Filling

Image Filling is a morphological algorithm when processing images. It simply deals with filling the region of an image, where region can correspond to: Interior; Boundary, Task Extraction begins with an initial collecting the calculated data and building resulting values(features) proposed to be insight full and non-redundant; promoting consequent learning and generalization steps ; and in some cases contributing to improved human understanding[28].



FIGURE8. IMAGE FILLING

### Feature Extraction

It plays an incredibly important function in the creation of images. Until functionality is obtained, different image processing techniques are applied to the sampled image, such as binarization, thresholding, standardization, masking approach, etc. Before that, extraction techniques are used to get useful image classification and recognition features. There are many methods in the extraction of features by which we can detect or reduce portions present in an image. We use Gray Frequency Co-occurrence matrix to estimate the probability of lung cancer involvement. GLCM is a matrix where the number of rows and columns is equal to that of image gray.

#### Entropy

This measures the predictability of a gray- level distribution. The Entropy is predicted to be high if the unit in the area the gray level spreads selectively over the image.

#### Contrast

The other name in short, is 'CON.' Its purpose is to compare the degree of intensity at a location and the adjacent item in an entire image.

#### Energy

This is responsible for the way the project is planned. It makes use of the texture to test on image board. To measure these functions a window value is needed [29].

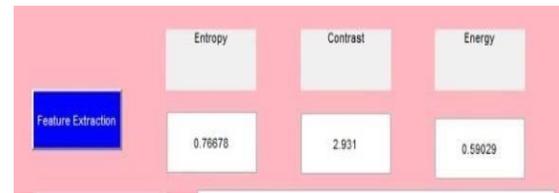


FIGURE9. FEATURE EXTRACTION OUTPUT

### Image Classification

The objective of the classification is to identify related pixels in an image by creating multiple classes based on their similarities. Classification, which is the elementary part of image analysis, shapes the categories by determining the image features. Two primary classifications are: unsupervised classification and supervised classification.

### Neural Network

Neural networks were the most common supervised learning technique for medical applications .They have been used extensively in diagnosing / detecting or predicting cancer , diabetes ,diabetic retinopathy , osteoporosis , nerve disorders and other diseases. A neural network is composed of multiple hidden layers of neurons at each. Neuron is a mathematical function that transforms its inputs into a single output , using weights and an activation function and then transfers it to an other neuron in the next layer.Most neural outputs are inputs to other neurons in the layer below, but here there are no connections between neurons within a layer. This is the most common form of layer ,completely connected.There are also several other types of layers that extract or convert features from their inputs in different ways. Those include one, two and three dimensional convolutionary layers, recurrent layers, pooling layers, standardization layers, and common layers [30].

### Neuro Fuzzy Classification Algorithm

1. A special 3layer neural feedforward network can be called the neuro fuzzy system. The units in the network then use neural network specific t-norms or t-conorms functions. The first layer signifies variables input, the central (hidden) layer characterizes laws of fuzzy, and the third layer signifies variables in output. Fuzzy sets are set as the weights of the (fuzzy) relation. This view of a fuzzy system shows the process flow and parallel structure of the data over the entire process.

Whereas the view of the neural network is not the essence of a learning method being applied is merely a convenience.

2. You can also use a neuro fuzzy system as a Fuzzy Rules system, both the algorithm can be implemented from scratch from training data, and it can be initialized in the form of guidance from previous experience.

3. The method of learning a neuro fuzzy system incorporates semantic property records of the underlying fuzzy system. It leads to limits on future systems changes to parameter.

Literature review content come here. Must use latest 10-15 references in literature review section. Literature view must be written with proper text citation like this: Stress is a normal psychological and physical reaction to the demands of life, Haider (2012).

4. The neuro fuzzy system estimates a function that is partially given n dimensional (unknown) by the training data. Fuzzy rules encrypted inside the software are flippant example and can be used as samples of ambiguous outcomes of training neuro-fuzzy system cannot be called a method of knowledge and has little to do with narrow-minded logic[31].



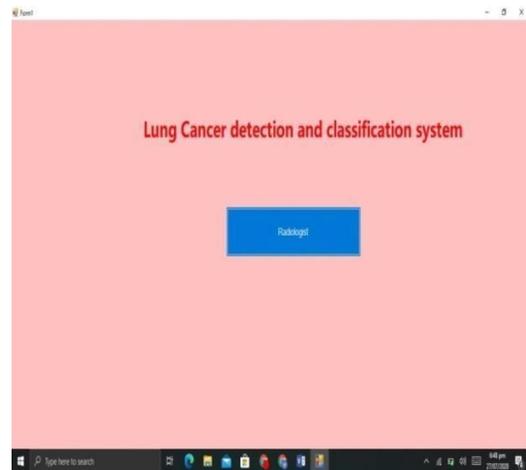
**FIGURE10 .OUTPUT OF NEURO FUZZY CLASSIFICATION ALGORITHM**

#### IV. DATA ANALYSIS & RESULTS

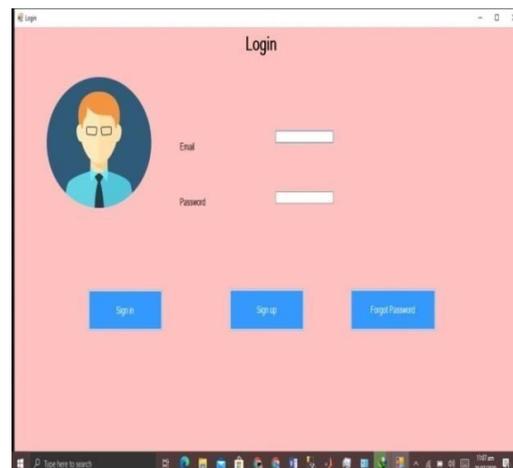
We have been used visual studio 2019 for designing main interface, Radiologist Sign in form, Radiologist sign up form, Patient Information form and Print report form. MATLAB 2016a is used to identify lung cancer from input image of lung and shows that the image of lung is affected by cancer or it is normal image. SQL Server 2012 is used to save radiologist and patient information. MS Visio is used to draw all diagrams.

#### Results

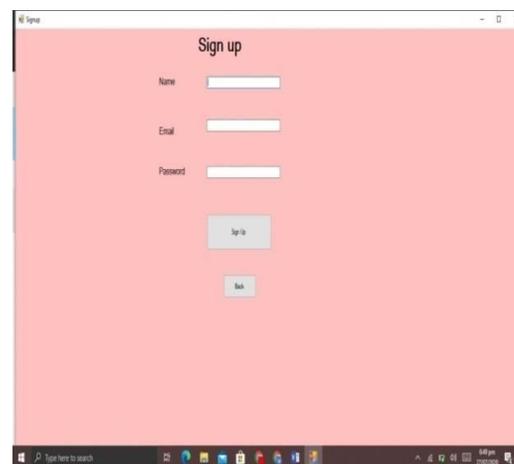
GUI Interface: GUI Application framework for lung cancer detection and classification



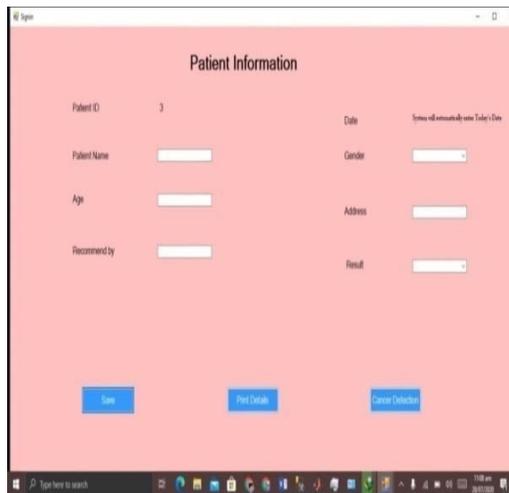
**FIGURE11. MAIN INTERFACE OF LUNG CANCER DETECTION SYSTEM**



**FIGURE12.RADIOLOGIST LOGIN FORM**



**FIGURE13.RADIOLOGIST SIGN UP FORM**



**Patient Information**

Patient ID: 3      Date: System will automatically enter Today's Date

Patient Name:       Gender:

Age:       Address:

Recommend by:       Referral:

FIGURE14. PATIENT INFORMATION FORM

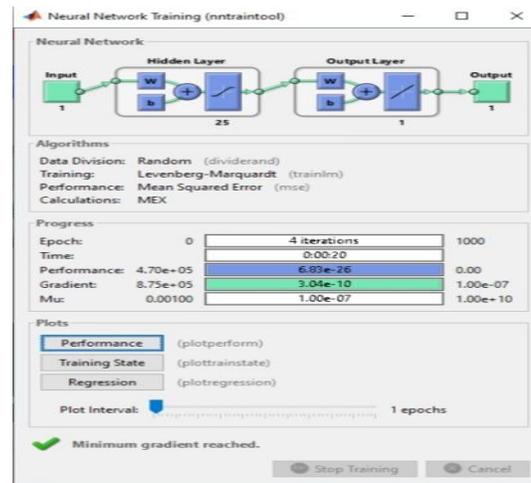
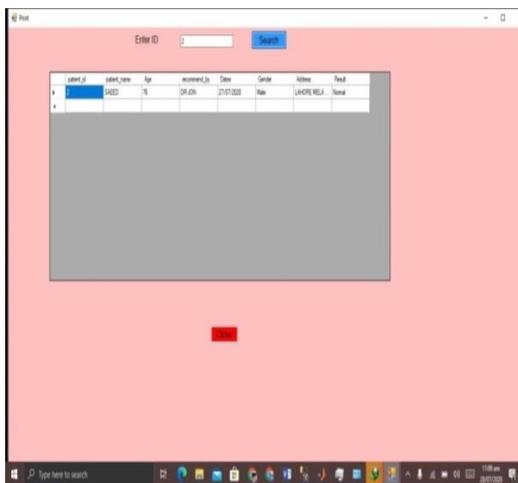


FIGURE17. GRAPHICAL REPRESENTATION OF EPOCH



Enter ID:    

patient_id	patient_name	age	recommend_by	date	gender	address	referral
3	ABED	75	DR.AIN	27/07/2020	Male	144096 WELLA, Hamed	

FIGURE15. PRINT DETAIL FORM

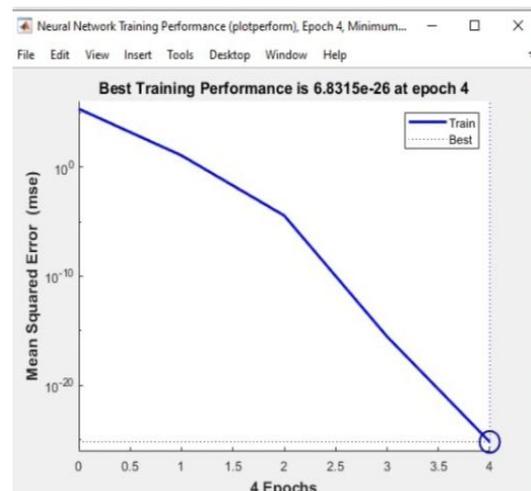
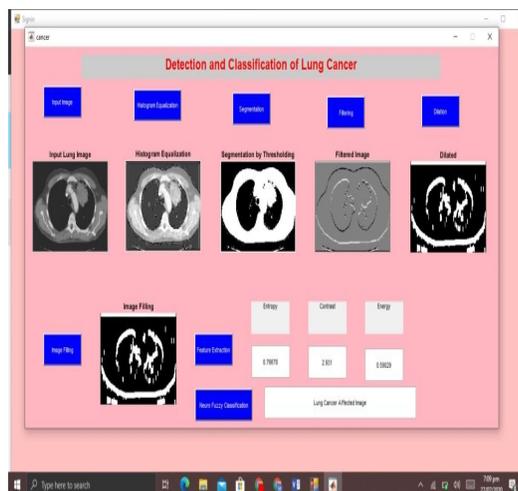


FIGURE18. NEURAL NETWORK TRAINING PERFORMANCE



**Detection and Classification of Lung Cancer**

Buttons:                

Input Lung Image    Histogram Equalization    Segmentation by Thresholding    Filtered Image    Dilated

Image Filling:            

Entropy: 1.7819    Contrast: 2.01    Energy: 0.9823

FIGURE16. GUI FOR LUNG CANCER DETECTION AND CLASSIFICATION

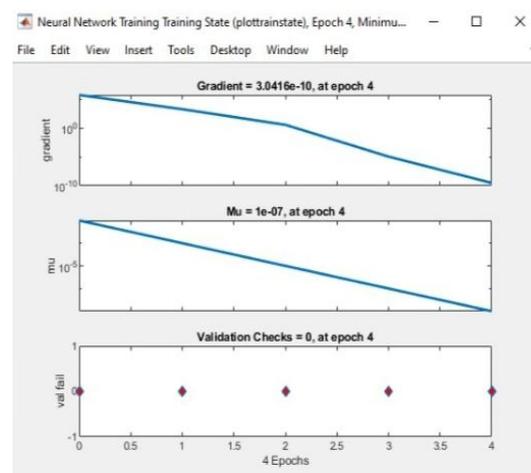


FIGURE19. GRADIENT, MU AND VALIDATION GRAPH

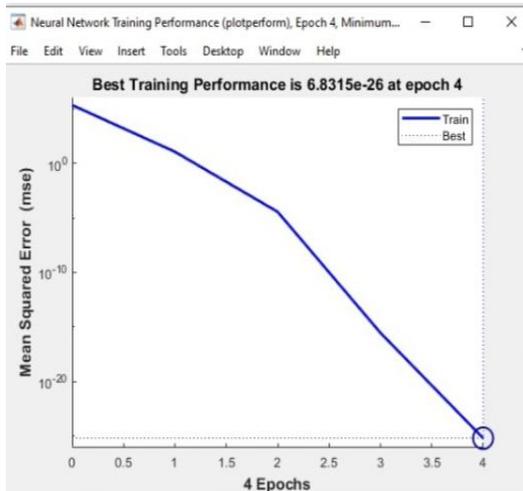


FIGURE 20. GRAPHICAL REPRESENTATION OF REGRESSION

## V. DISCUSSION

Our system has been satisfy all assumption, dependencies and it gives appropriate result that we has been decide before development of it.

## VI. CONCLUSION

The proposed work aims to identify lung cancer nodules by applying pre-processing of images, segmentation, extraction function and classification of images. The nodules are identified by adding certain measures, and those functions are then extracted.

The features gained are then used to determine the disease stage. Further information on early stage, lung cancer diagnosis is given via the collected nodules. Before that, we implemented the detection model by adding that we predict knowing the patient has cancer or is not the result of extracting the feature from the CT image we received. This method lets radiologists and physicians have more information accurately and make the right decision in a short period of time for patients with lung cancer. So this solution is less expensive, less time consuming and easier to implement. Lung cancer is one of the world's gravest diseases. Early diagnosis and early diagnosis of lung cancer can improve existence rate. These techniques include the study of images from Xrays, CT scans, MRI, PET Expert physicians diagnose the disease and use knowledge to classify the stage of cancer. Operations, chemotherapy, Radiation therapy and targeted therapy are included in the treatment. These are extensive, costly and painful treatments. Images from different sources are collected via CT

scanning. Unlike X-ray and MRI images, these images create less noise. An image enhancement technique is being developed for earlier stages of disease detection and treatment; consideration is given to the time factor for detecting the irregularity issues in the target images. It handles the images recorded on CT. From the original image the area of concern i.e. the tumor, is correctly identified. The best results are in equalization, thresholding, image filtering, dilation, image fillin. 3 Features of the extracted region of interest, i.e., Entropy, Contrast and Energy, were extracted. These three factors help to describe the stage of lung cancer. Such features are used for the training of the neural network, and the classification algorithm for neuro fuzzy is used to decide Whether the image is normal or abnormal. On the end of this Process it can be shown that the project fulfils the desired Objectives. The proposed system test, the lung CT images and the result that meets system expectations. These techniques can be used for brain tumour diagnosis, breast cancer, in the future.

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