

PREDICTIVE MONITORING APPROACH FOR EFFECTIVE LUNG CANCER USING MACHINE LEARNING TECHNIQUES

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering in Computer Science Engineering

By

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF COMPUTING**

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade “A” by NAAC

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CHENNAI – 600 119

MARCH – 2021



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this project report is the bonafide work of **Panuganti Ajay Kumar (37110542)** and **Pendela Venkata Maruthi Akhil (37110561)** who carried out the project entitled **"PREDICTIVE MONITORING APPROACH FOR EFFECTIVE LUNG CANCER USING MACHINE LEARNING TECHNIQUES"** under my supervision from **August 2020** to **March 2021**.

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DECLARATION

I **Pendela Venkata Maruthi Akhil (37110561)** hereby declare that the Project Report entitled “**PREDICTIVE MONITORING APPROACH FOR EFFECTIVE LUNG CANCER USING MACHINE LEARNING TECHNIQUES**” is done by me under the guidance of **MRS. B. KEERTHI SAMHITA, M.Tech.,(Ph.D).**, Department of Computer Science and Engineering at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Computer Science and Engineering.

DATE:

PLACE: CHENNAI

SIGNATURE OF THE CANDIDATE

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ABSTRACT

According to technical developments and the latest trends, we decided to do biomedical research. Detection of lung cancer. Image processing techniques have been used extensively recently to improve pictures and therapies during early detection in several medical fields. There are several cancers, including lung cancer, breast cancer, blood cancer, cancer of the neck, brain cancer, tongue cancer, mouth cancer, etc. There are several cancers. Lung cancer in abnormal cells is a tumor-growing disease. The lungs or the lymph fluid surrounding the lung tissue can remove cancer cells. In this project there is access to the cancer image from MATLAB collected from various hospitals in which the current work is being carried out, which was a colour image we had in MATLAB access to and the conversion followed. Image accuracy and reliability are key factors in this research, and the quality and improvement assessment of images depend on the stage in which Gabor filters are used for low pre-processing techniques, under the Gaussian rules. A normal and annoying image extraction function is used to segment and improve. Based on general features, a comparison of normality is made. This study mainly uses pixel percentage and mask labeling to ensure accurate image comparisons.

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LIST OF ABBREVIATIONS

ABBREVIATION	EXPANSION
MATLAB	Matrix Laboratory
OS	Operating System
CT	Computed Tomography
BMP	Microsoft Windows Bitmap
GIF	Graphics Interchange Files
HDF	Hierarchical Data Format
JPEG	Joint Photographic Experts Group
PCX	Paintbrush
PNG	Portable Network Graphics
TIFF	Tagged Image File Format
RGB	Red Green Blue
SVM	Support Vector Machine

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION OF PROJECT

The tumor is basically an uncontrolled growth of cancerous cells in any part of the body, whereas a brain tumor is an uncontrolled growth of cancerous cells in the brain. A brain tumor can be benign or malignant. The benign brain tumor has a uniformity in structure and does not contain active (cancer) cells, whereas malignant brain tumors have a nonuniformity (heterogeneous) in structure and contain active cells. The gliomas and meningioma's are the examples of low-grade tumors, classified as benign tumors and glioblastoma and astrocytoma's are a class of high-grade tumors, classified as malignant tumors.

According to the World Health Organization and American Brain Tumor Association, the most common grading system uses a scale from grade I to grade IV to classify benign and malignant tumor types. On that scale, benign tumors fall under grade I and II glioma and malignant tumors fall under grade III and IV glioma. The grade I and II glioma are also called low-grade tumor type and possess a slow growth, whereas grade III and IV are called high-grade tumor types and possess a rapid growth of tumors. If the low-grade brain tumor is left untreated, it is likely to develop into a high-grade brain tumor that is a malignant brain tumor. Patients with grade II gliomas require serial monitoring and observations by magnetic resonance imaging (MRI) or computed tomography (CT) scan every 6 to 12 months. Brain tumor might influence any individual at any age, and its impact on the body may not be the same for every individual.

1.2 AIM AND OBJECTIVE

The overall classification of accuracy using this method is found to be 98% which is significantly good. To reduce the false positive and false negative rate and cancer patients will be diagnosed in more accurate way.

1.3 Hardware Requirements:

- Hard Disk – 40GB
- Speed – 2.4 GHZ
- Monitor – 15 VGA color
- RAM – 4 GB
- System – Windows 8/10

1.4 Software Requirements:

- Operating system – Windows XP
- Coding language – MATLAB

CHAPTER 2

LANGUAGE OVERVIEW

2.1 SOFTWARE USED:

Matlab 2013R

SOFTWARE DESCRIPTION:

MATLAB® is a high-level technical computing language and interactive environment for algorithm development, data visualization, data analysis, and numerical computation. Using MATLAB, you can solve technical computing problems faster than with traditional programming languages, such as C, C++, and FORTRAN.

Matlab is a data analysis and visualization tool which has been designed with powerful support for matrices and matrix operations. As well as this, Matlab has excellent graphics capabilities, and its own powerful programming language. One of the reasons that Matlab has become such an important tool is through the use of sets of Matlab programs designed to support a particular task. These sets of programs are called toolboxes, and the particular toolbox of interest to us is the image processing toolbox. Rather than give a description of all of Matlab's capabilities, we shall restrict ourselves to just those aspects concerned with handling of images. We shall introduce functions, commands and techniques as required. A Matlab function is a keyword which accepts various parameters, and produces some sort of output: for example a matrix, a string, a graph. Examples of such functions are `sin`, `imread`, `imclose`. There are many functions in Matlab, and as we shall see, it is very easy (and sometimes necessary) to write our own.

Matlab's standard data type is the matrix_all data are considered to be matrices of some sort. Images, of course, are matrices whose elements are the grey values (or possibly the RGB values) of its pixels. Single values are considered by Matlab to be matrices, while a string is merely a matrix of characters; being the string's length. In this chapter we will look at the more generic Matlab commands, and discuss images in further chapters. When you start up Matlab, you have a blank window called the Command

Window_ in which you enter commands. Given the vast number of Matlab's functions, and the different parameters they can take, a command line style interface is in fact much more efficient than a complex sequence of pull-down menus.

You can use MATLAB in a wide range of applications, including signal and image processing, communications, control design, test and measurement financial modeling and analysis. Add-on toolboxes (collections of special-purpose MATLAB functions) extend the MATLAB environment to solve particular classes of problems in these application areas.

MATLAB provides a number of features for documenting and sharing your work. You can integrate your MATLAB code with other languages and applications, and distribute your MATLAB algorithms and applications.

When working with images in Matlab, there are many things to keep in mind such as loading an image, using the right format, saving the data as different data types, how to display an image, conversion between different image formats.

Image Processing Toolbox provides a comprehensive set of reference-standard algorithms and graphical tools for image processing, analysis, visualization, and algorithm development. You can perform image enhancement, image deblurring, feature detection, noise reduction, image segmentation, spatial transformations, and image registration. Many functions in the toolbox are multithreaded to take advantage of multicore and multiprocessor computers.

MATLAB and images

- The help in MATLAB is very good, use it!
- An image in MATLAB is treated as a matrix
- Every pixel is a matrix element
- All the operators in MATLAB defined on matrices can be used on images: +, -, *, /, ^, sqrt, sin, cos etc.
- MATLAB can import/export several image formats
 - BMP (Microsoft Windows Bitmap)
 - GIF (Graphics Interchange Files)

- HDF (Hierarchical Data Format)
- JPEG (Joint Photographic Experts Group)
- PCX (Paintbrush)
- PNG (Portable Network Graphics)
- TIFF (Tagged Image File Format)
- XWD (X Window Dump)
- MATLAB can also load raw-data or other types of image data

- **Data types in MATLAB**

- Double (64-bit double-precision floating point)
- Single (32-bit single-precision floating point)
- Int32 (32-bit signed integer)
- Int16 (16-bit signed integer)
- Int8 (8-bit signed integer)
- Uint32 (32-bit unsigned integer)
- Uint16 (16-bit unsigned integer)
- Uint8 (8-bit unsigned integer)

Images in MATLAB

Binary images: {0, 1}

- Intensity images: [0, 1] or uint8, double etc.
- RGB images: m-by-n-by-3
- Indexed images: m-by-3 color map
- Multidimensional images m-by-n-by-p (p is the number of layers)

IMAGE TYPES IN MATLAB

Outside Matlab images may be of three types i.e. black & white, grey scale and colored. In Matlab, however, there are four types of images. Black & White images are called binary images, containing 1 for white and 0 for black. Grey scale images are called

intensity images, containing numbers in the range of 0 to 255 or 0 to 1. Colored images may be represented as RGB Image or Indexed Image.

In RGB Images there exist three indexed images. First image contains all the red portion of the image, second green and third contains the blue portion. So for a 640 x 480 sized image the matrix will be 640 x 480 x 3. An alternate method of colored image representation is Indexed Image. It actually exist of two matrices namely image matrix and map matrix. Each color in the image is given an index number and in image matrix each color is represented as an index number. Map matrix contains the database of which index number belongs to which color.

IMAGE TYPE CONVERSION

- RGB Image to Intensity Image (rgb2gray)
- RGB Image to Indexed Image (rgb2ind)
- RGB Image to Binary Image (im2bw)
- Indexed Image to RGB Image (ind2rgb)
- Indexed Image to Intensity Image (ind2gray)
- Indexed Image to Binary Image (im2bw)
- Intensity Image to Indexed Image (gray2ind)
- Intensity Image to Binary Image (im2bw)
- Intensity Image to RGB Image (gray2ind, ind2rgb)

Key Features

- High-level language for technical computing
- Development environment for managing code, files, and data
- Interactive tools for iterative exploration, design, and problem solving
- Mathematical functions for linear algebra, statistics, Fourier analysis, filtering, optimization, and numerical integration
- 2-D and 3-D graphics functions for visualizing data
- Tools for building custom graphical user interfaces

CHAPTER 3

LITERATURE SURVEY

3.1 ANALYSIS OF THE LITERATURE

Literature survey is the main advance in programming improvement measure. Prior to building up the instrument it is important to decide the time factor, economy and friends strength. When these things are fulfilled, at that point the subsequent stage is to figure out which working framework and language can be utilized for building up the device. When the developers begin assembling the apparatus the software engineers need parcel of outer help. This help can be gotten from senior developers, from book or from sites. The major part of the project development sector considers and fully survey all the required needs for developing the project. Before developing the tools and the associated designing it is necessary to determine and survey the time factor, resource requirement, man power, economy, and company strength. Prior to building the framework the above thought are considered for building up the proposed framework. The significant piece of the undertaking advancement area considers and completely survey all the necessary requirements for building up the venture. For each undertaking Literature survey is the main area in programming improvement measure. Prior to building up the instruments and the related planning it is important to decide and survey the time factor, asset prerequisite, labor, economy, and friends strength. When these things are fulfilled and completely surveyed, at that point the following stage is to decide about the product details in the separate framework, for example, what kind of working framework the venture would require and what are largely the important programming are expected to continue with the subsequent stage like building up the apparatuses, and the related activities. Here we have taken the general surveys of different creators and noted down the fundamental central issues with respect to their work. In this venture literature survey assumes a prevailing part in get assets from different areas and all the connected points that are exceptionally valuable under this segment. The most awesome aspect if this is the manner in which things get all together and encourages us to suite our work according to the current information.

3.2 LITERARY REVIEWS

Machine learning method to detect Alzheimer's disease personalised and cost effective

Alzheimer's condition, particularly at an early stage of mild cognitively impaired disease, is often difficult to diagnose during the disease process. At this point, however, it is likely that treatment is most effective in order to bring great benefits to the diagnosis process. The machine describes and tests our approach to personalised and economical AD diagnostics. The study employs a local study to tailor a classification model and calculate the most informative or cost-effective biomarker sequence for a diagnosis. In comparison to the patients who did not have AD, we classified AD versus MCI patients with ADNI within a year. Similarly, the total number (and cost) of biomarkers required for a trustworthy diagnosis by each patient were considerably lowered, all data being examined equally. Therefore it can be used in clinical environments to personalise and efficiently detect AD.

Effect of the weather on mouth, foot, and hand diseases in the northwest of China Wuwei

The principal objective of the paper is to preclude and predict the prevalence of hand, foot, and mouth conditions in Wuwei City, northwest China in order to assess the consequences of various weather conditions for foot, hand and movement disorders. Data on diseases and weather and correlation analyses from 2008 to 2010 have been collected, several linear regressions and exponential curve-fitting methods have been implemented. The results show that there were 2688 cases between 2008 and 2010, and an average annual incidence of male, fibre and oral diseases was 47,62/100,000. In Liangzhou District, Minqin County, Gulang County and Tianzhu Tibetan Autonomous County, average figures for men, foot and father were 42.69, 38.52, 65.92 and 49.18. This disease happened in Wuwei City all year round and had a clear climax in the season. The incidence generally increased between April and the first peak, respectively in May, June and July. In September or October each year the second peak was held. The impact of the disease on an epidemic varied in four areas with different weather factors: average temperature, relative moisture, atmospheric pressure, precipitation and evaporation. Multiple linear regressions show that relative humidity and atmospheric pressures were the major influential factor in County Liangzhou, the average temperature and air pressure in County Gulang. In Minqin County, the incidence and average period of sunshine were found to be exponentially functional. In a nutshell, the prevalence of hand, foot, and mouth diseases varies. Weather and hand, foot, and mouth disease occur in four areas of Wuwei

City with strong correlations. The seasons of summer and autumn were critical for disease prevention and control.

Development of Disease Detection and Identification Index

The disease severity levels of various plants have been widely estimated through spectral data. However, the data for estimating the diseases phases of the plant have not been evaluated. In this study, a spectral disease index was developed in order to determine rust disease levels from wheat leaves in various DS levels. A spectroradiometer for measuring the reflection spectrum of infected leaves with different symptom and DS levels has been used to achieve the study's objective. A new function was created to detect the wavelengths that are most susceptible to the symptoms and the purity of the various signs of the disease was analysed on the leaf level. The most sensitive reflectance ranges were found at 675 and 775 nm. Finally, in order to distinguish three different canopy levels from the stage of disease in the SDI, the standard DS and $\alpha_{675/5-0775}$ differential ratios were used. In the detection of accurate plant protection disease stage, the SDI proposed demonstrated promising performance.

Quantized Analysis for Heart Valve Disease based on Cardiac Sound Characteristic Waveform Method

A new quantized diagnostic method was proposed for analysing the four clinical sounds of the cardiac sound characteristic wave form of the cardio valve to accurately and efficiently analyse cardiac disease. Signals were collected using the BIOPAC acquisition system. The recorded data is transmitted via Ethernet into a computer for storage in real time. A single degree of freedom analytical model was established to extract a typical waveform. In addition, diagnostics parameters were calculated by means of an easy graphical representation to discriminate the cardiac sound of normal and cardiac valve disease to enable an inexperienced user to track the progression of their disease easily. Finally, the usefulness and efficiency of the proposed method are demonstrated in a case study on a patient with a cardiovascular disease before and after surgery.

Non-linear Heart Rate Analysis in Coronary Heart Disease Patients

It underlines the clinical and pronostic importance of non-linear heart rate variability measures in the group of patients with coronary heart disease and the age-matched healthy control group. The methods used were three: the exponent Hurst, the deterrent, and the analytical fluctuations of entropy approximately. The Hurst exponent of the R-R series was identified by a range-re-scaling analysis technique. DFA was used to quantify the heart rate variability's long-term fractal correlation properties. The unpredictability of time series fluctuations is measured by approximate entropy. The short-term scaling exponent was detected. In each exercise test programme patients with CHD have a lower exponent of Hurst, as well as rough entropy separated from healthy controls.

CHAPTER 4

AIM AND SCOPE OF THE PRESENT INVESTIGATION

4.1 AIM

The aim of the project is to predict whether a person is affected by lung cancer using CT scan images of the patient.

4.2 OBJECTIVES

The overall classification of accuracy using this method is found to be 98% which is significantly good. To reduce the false positive and false negative rate and cancer patients will be diagnosed in more accurate way.

4.3 SCOPE OF THE PRESENT INVESTIGATION

From this we can easily identified the lung cancer patient with low cost. The motivation of this paper is to discover the cancer cells in the lungs at earlier stage. The lung cancer detection is the extension of the image processing that produces the results of feature extraction and feature selection after segmentation. The system accepts Lung CT (Computed Tomography) images as input.

CHAPTER 5

PROBLEM AND REQUIREMENT ANALYSIS

5.1 EXISTING SYSTEM

In an existing system proposed a computer aided image processing based method to that gives improved accuracy rate of the lung cancer detection along with the calculation of the pancreatic tumor size (surface area of the tumor) and its location. It also provides with the information that helps to determine whether the tumor is malignant or not. The system, we describing in this paper, detect pancreatic tumor from MRI by integrated Thresholding and morphological process with histogram based method and gives a thorough analysis.

5.2 PROPOSED SYSTEM

An image processing technique is built to detect diseases at early stage of cancer so the patient can take the treatment at early stages. The time factor is major factor to discover the abnormal tissue in target x-ray images. The accuracy and the quality of image is one the major core factor of this research. Image quality as well as image enhancement stage were adopted as low pre-processing techniques based on Gabor filter. This technique is efficient for segmentation stage so the region of interest for feature extraction obtaining. On the basis of general features a normality and abnormality comparison is made. The main feature for detection of accurate image comparison are pixel percentage and mask labeling which gives us the indication that the process of detection this disease plays a very important and essential role to avoid serious stages and to reduce its percentage distribution in the world. To obtain more accurate results we three stages: Image Enhancement stage, Image Segmentation stage and Features Extraction stage.

5.3 REQUIREMENT ANALYSIS

Requirement analysis, also called requirement engineering, is the process of determining user expectations for a new modified product. It encompasses the tasks that determine the need for analyzing, documenting, validating and managing software or system requirements. The requirements should be documentable, actionable, measurable, testable and traceable related to identified business needs or opportunities and define to a level of detail, sufficient for system design.

5.3.1 Functional Requirements

It is a technical specification requirement for the software products. It is the first step in the requirement analysis process which lists the requirements of particular software systems including functional, performance and security requirements. The function of the system depends mainly on the quality hardware used to run the software with given functionality.

i. Usability

It specifies how easy the system must be use. It is easy to ask queries in any format which is short or long, porter stemming algorithm stimulates the desired response for user.

ii. Robustness

It refers to a program that performs well not only under ordinary conditions but also under unusual conditions. It is the ability of the user to cope with errors for irrelevant queries during execution.

iii. Security

The state of providing protected access to resource is security. The system provides good security and unauthorized users cannot access the system there by providing high security.

iv. Reliability

It is the probability of how often the software fails. The measurement is often expressed in MTBF (Mean Time between Failures). The requirement is needed in order to ensure that the processes work correctly and completely without being aborted. It can handle any load and survive and survive and even capable of working around any failure.

v. Compatibility

It is supported by version above all web browsers. Using any web servers like local host makes the system real-time experience.

vi. Flexibility

The flexibility of the project is provided in such a way that it has the ability to run on different environments being executed by different users.

vii. Safety

Safety is a measure taken to prevent trouble. Every query is processed in a secured manner without letting others to know one's personal information.

5.3.2 Non-Functional Requirements

Non-functional requirement (NFR) is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. They are contrasted with functional requirements that define specific behavior or functions. The plan for implementing non-functional requirements is detailed in the system architecture, because they are usually architecturally significant requirements.

i. Portability

It is the usability of the same software in different environments. The project can be run in any operating system.

ii. Performance

These requirements determine the resources required, time interval, throughput and everything that deals with the performance of the system.

iii. Accuracy

The result of the requesting query is very accurate and high speed of retrieving information. The degree of security provided by the system is high and effective.

iv. Maintainability

Project is simple as further updates can be easily done without affecting its stability. Maintainability basically defines that how easy it is to maintain the system. It means that how easy it is to maintain the system, analyze, change and test the application. Maintainability of this project is simple as further updates can be easily done without affecting its stability.

CHAPTER 6

SOFTWARE DEVELOPMENT METHODOLOGY

6.1 ARCHITECTURAL DESIGN

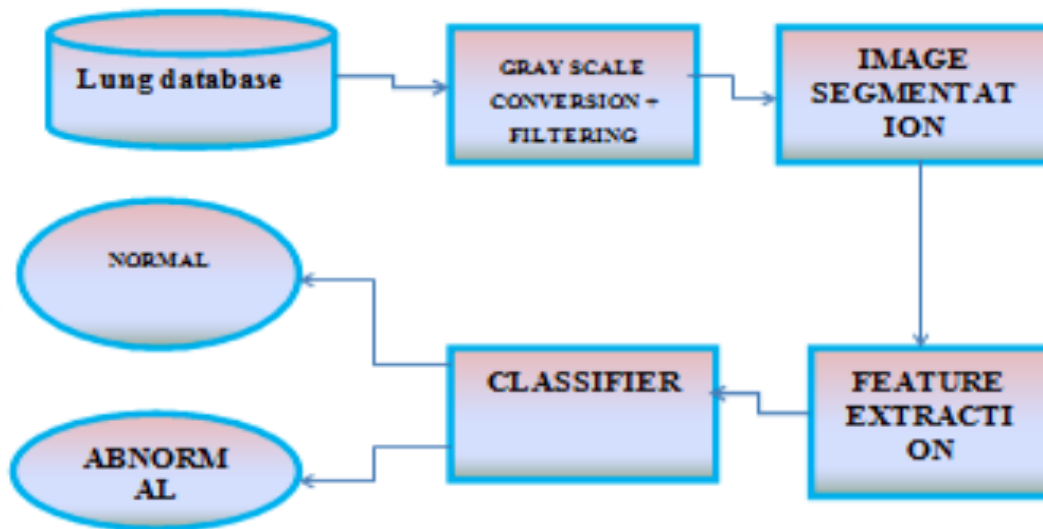


Fig: 6.1 Architecture diagram

6.2 MODULE DESCRIPTION

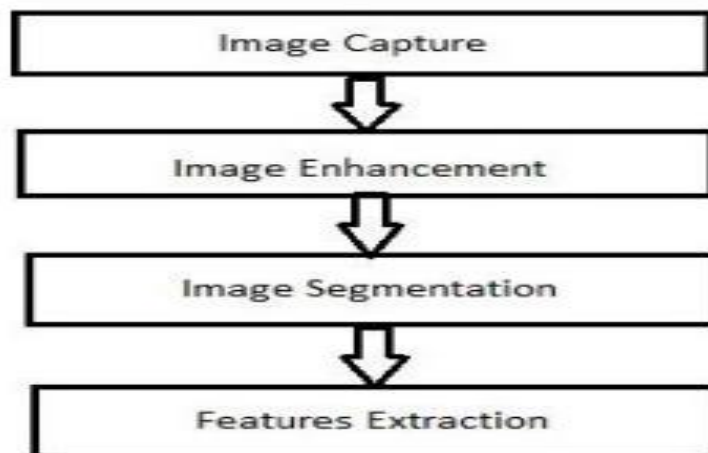


Fig: 6.2 Modules Description

1. IMAGE CAPTURE MODULE

Collect pictures of lung cancer at the respective hospital for cancer. Use a command to access a certain image into MATLAB.

2. IMAGE ENHANCEMENT MODULE

Enhancement of picture is designed to improve the interpretability, perception or other automated picture processing techniques for viewers of people. We use Gabor filters to enhance the image

3. IMAGE SEGMENTATION MODULE

Segmentation divides the image into areas or objects of its components. It has many useful applications for medical professionals, including visualising and estimating the volume of object of concern, detecting abnormalities, qualifying tissue and grading, and more. We use a Segmentation Approach Marker-Controlled Watershed.

4. FEATURES EXTRACTION MODULE

This procedure is used to know the normal or abnormal image For the extraction of functions, we use binarization and masking.

6.3 REQUIREMENT SPECIFICATION

6.3.1 Hardware Requirements:

- Hard Disk – 40GB
- Speed – 2.4 GHZ
- Monitor – 15 VGA color
- RAM – 4 GB
- System – Windows 8/10

6.3.2 Software Requirements:

- Operating system – Windows XP
- Coding language – MATLAB

CHAPTER 7

RESULTS AND DISCUSSION

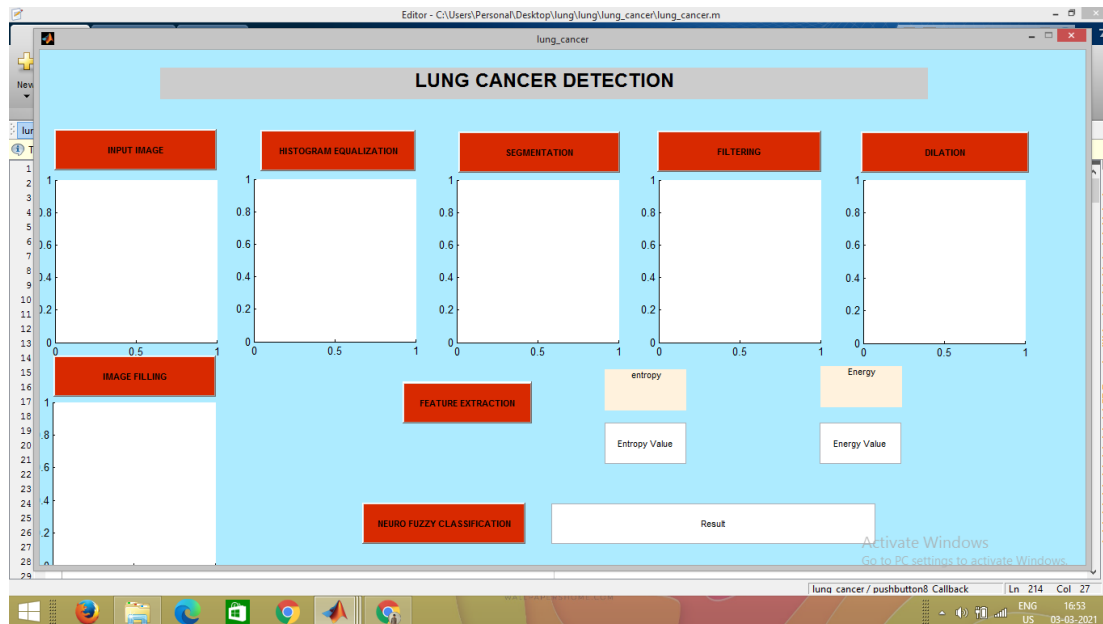


Fig: 7.1 Overview of the project

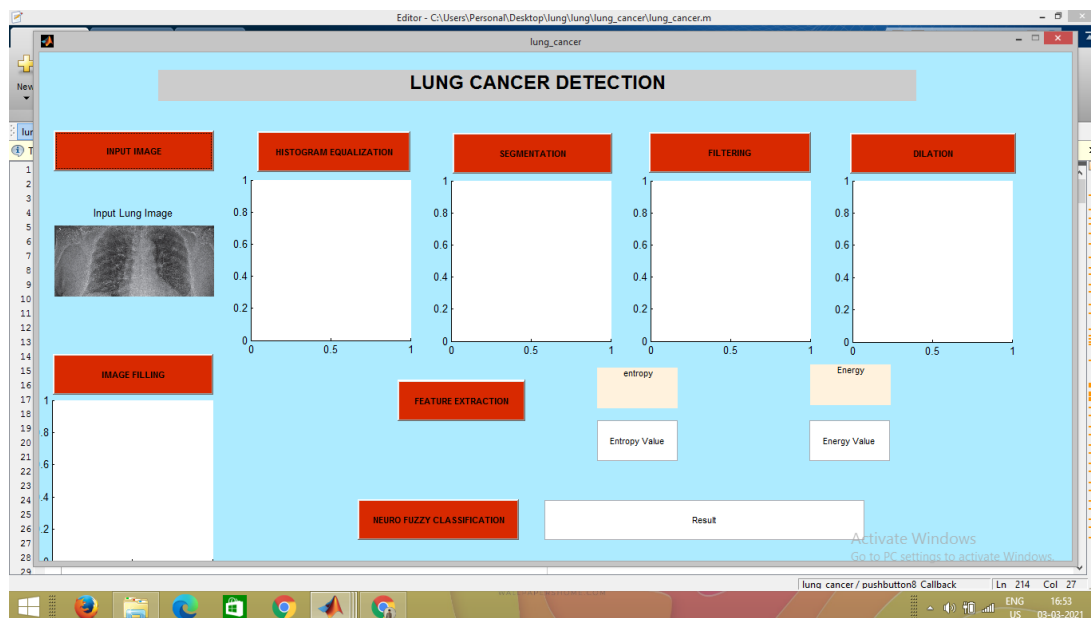


Fig: 7.2 Uploading input image

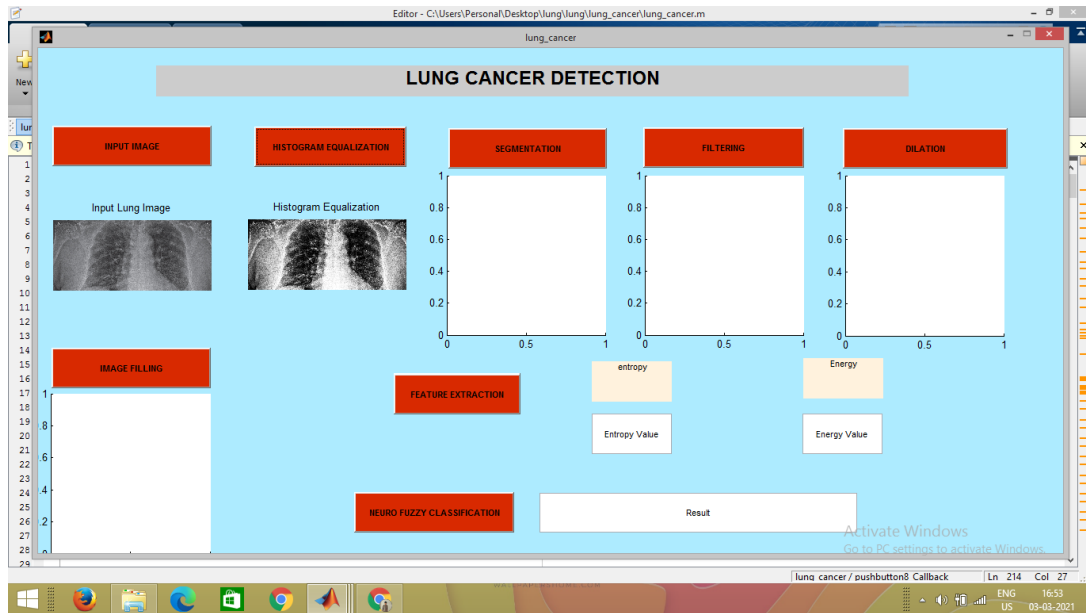


Fig: 7.3 Enhancement of input data

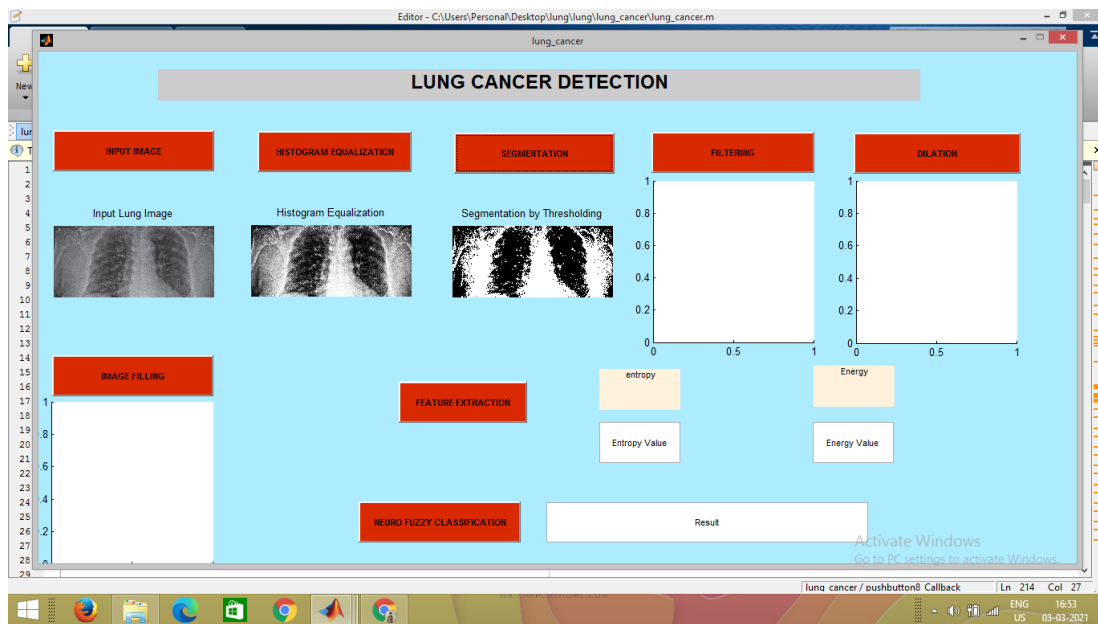


Fig: 7.4 Segmentation of image

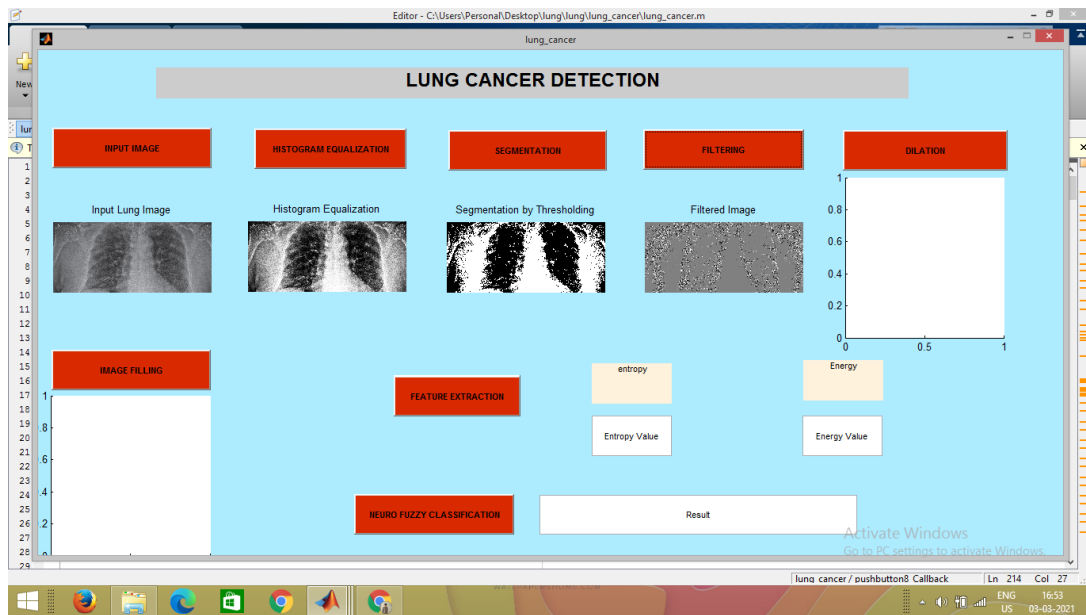


Fig: 7.5 Filtering the image

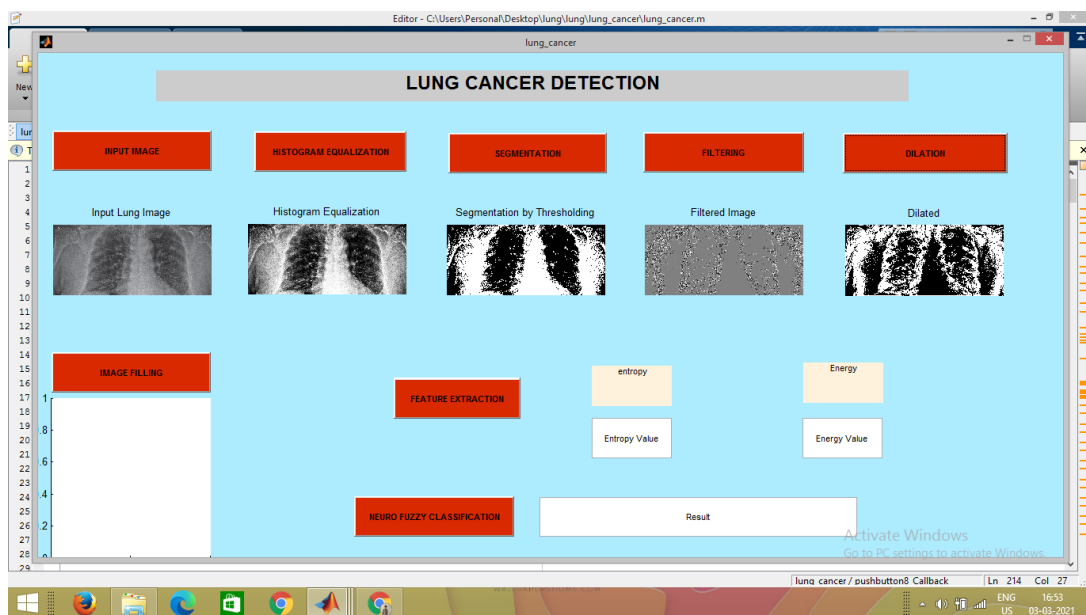


Fig: 7.6 Dilation of image

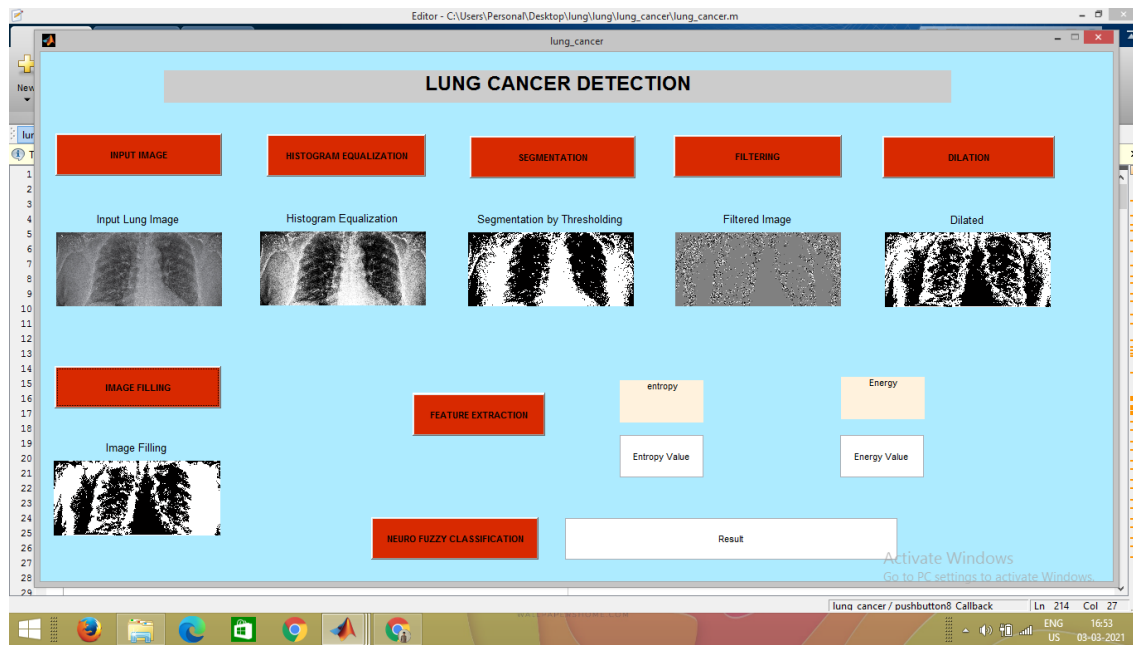


Fig: 7.7 Image filling

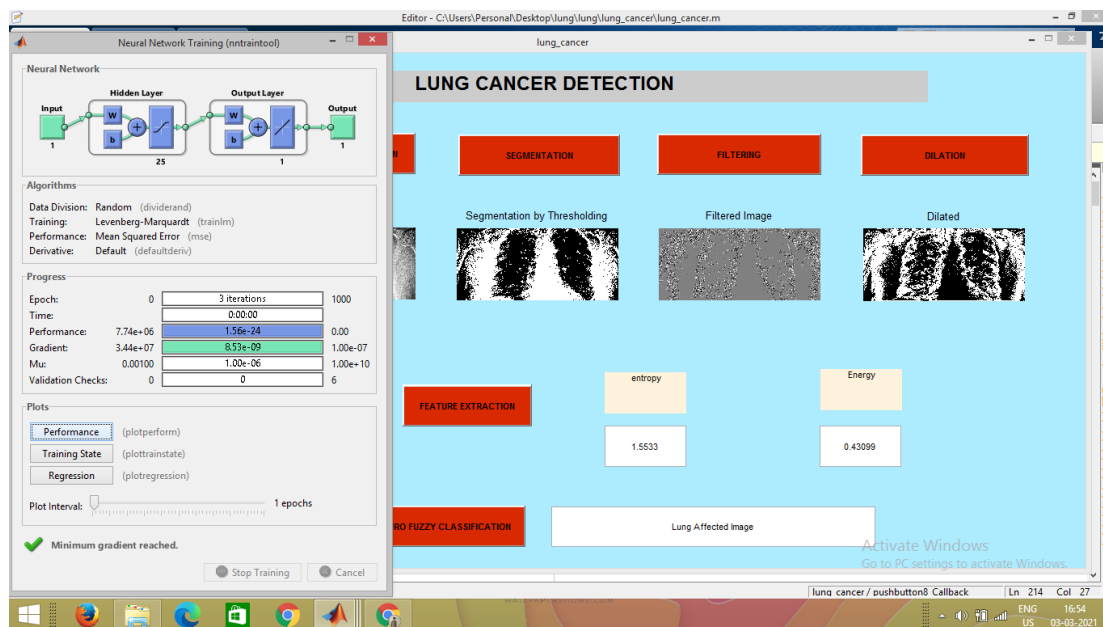


Fig: 7.8 Neural Network Training

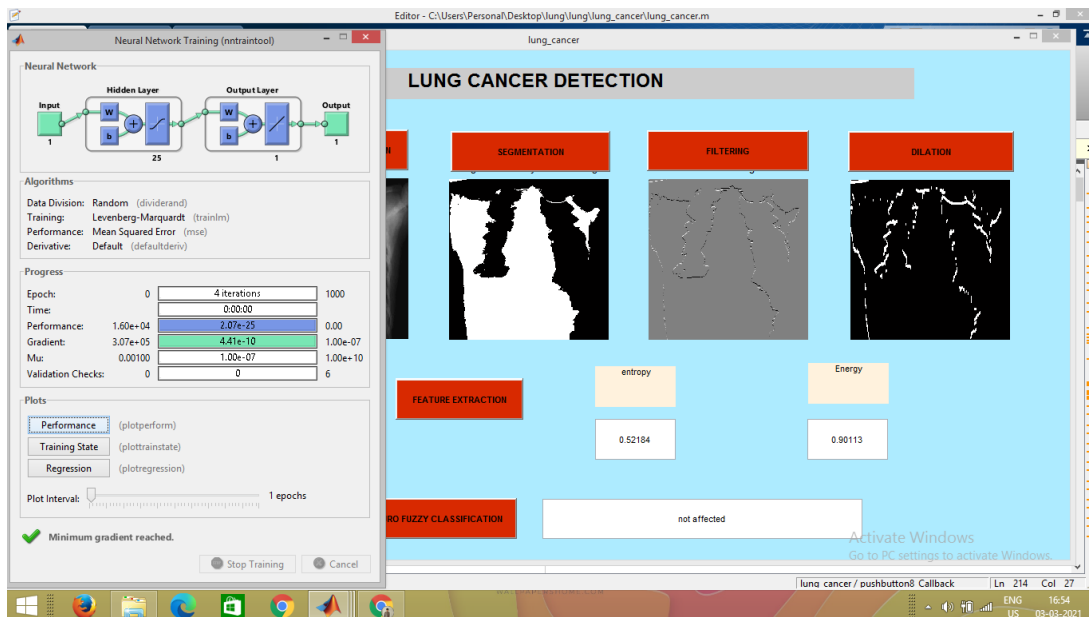


Fig: 7.9 Predicted Output

CHAPTER 8

CONCLUSION AND FUTURE WORK

CONCLUSION

An image improvement technique is developing for earlier illness detection and treatment stages; the time issue was taken in account to get the abnormality problems in target pictures. Image superior and accurateness is that the amount factors of this analysis, angel superior appraisal still as aspartame date wherever were adopted on low preprocessing techniques accurate physicist clarify a part of Gaussian rules. The planned technique is economical for segmentation principles to be an area of interest foundation for feature extraction getting. The planned address offers awfully able after-effects assay with altered acclimated techniques. Counting on accepted options, a course allegory is formed. The most detected options for correct pictures comparison square measure pixels proportion and mask-labeling with high accuracy and sturdy operation.

FUTURE WORK

Here we processed the CT scan images to differentiate the benign and the malignant nodule and its level of the growth of the cancer cells by the machine learning system and detecting the growth of the cancerous cell in the initial stage can be made in our project. Here it presented an approach to differentiate the pulmonary nodules into malignant and benign nodules to assist the radiologist and for the future enhancement. Further loads ought be directed at improving the SVM for classifying malignancy levels of nodules through experiments with various alternatives.

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APPENDIX

A. PLAGIARISM REPORT



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PREDICTIVE MONITORING APPROACH FOR EFFECTIVE LUNG CANCER USING MACHINE LEARNING TECHNIQUES. P. Ajay Kumar [1], P. Venkata Maruthi Akhil [2], B. KEERTHI SAMHITA [3] [1][2] UG Student, Dept. of CSE, Sathyabama Institute of Science and Technology, Chennai, India [3] Associate professor, Dept. of CSE, Sathyabama Institute of Science and Technology, Chennai, India ABSTRACT- According to technical developments and the latest trends, we decided to do biomedical research. Detection of lung cancer.

Image processing techniques have been used extensively recently to improve pictures and therapies during early detection in several medical fields. There are several cancers, including lung cancer, breast cancer, blood cancer, cancer of the neck, brain cancer, tongue cancer, mouth cancer, etc. There are several cancers. Lung cancer in abnormal cells is a tumor-growing disease. The lungs or the lymph fluid surrounding the lung tissue can remove cancer cells.

In this project there is access to the cancer image from MATLAB collected from various hospitals in which the current work is being carried out, which was a colour image we had in MATLAB access to and the conversion followed. Image accuracy and reliability are key factors in this research, and the quality and improvement assessment of images depend on the stage in which Gabor filters are used for low pre-processing techniques, under the Gaussian rules. A normal and annoying image extraction function is used to

B. JOURNAL PAPER

PREDICTIVE MONITORING APPROACH FOR EFFECTIVE LUNG CANCER USING MACHINE LEARNING TECHNIQUES.

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ABSTRACT- According to technical developments and the latest trends, we decided to do biomedical research. Detection of lung cancer. Image processing techniques have been used extensively recently to improve pictures and therapies during early detection in several medical fields. Lung cancer, breast cancer, blood cancer, cancer of the stomach, brain cancer, tongue cancer, mouth cancer, and other cancers are among them. There are a variety of cancers. Lung cancer is a tumor-growing disease caused by abnormal cells. The lungs or the lymph fluid surrounding the lung tissue can remove cancer cells. In this project there is access to the cancer image from MATLAB collected from various hospitals in which the current work is being carried out, which was a colour image we had in MATLAB access to and the conversion followed. Image accuracy and reliability are key factors in this research, and the quality and improvement assessment of images depend on the stage in which Gabor filters are used for low pre-processing techniques, under the Gaussian rules. A normal and annoying image extraction function is used to segment and improve. Based on general features, a comparison of normality is made. This study mainly uses pixel percentage and mask labeling to ensure accurate image comparisons.

Keywords: - Machine Learning, MATLAB, Prediction, Classification, image processing.

1. INTRODUCTION:

The rate of diseases such as cancer, chikungunya, cholera, etc. is also on the increase with the rapid population rates. Cancer is becoming a common cause of death for all of them. Cancer can start with billions of cells almost anywhere in the human body. Human cells normally divide and expand into the new cells that the business requires. When cells become old or damaged, they will die, and new cells will emerge. When cancer cells form, however, this orderly process is disrupted. Older and weakened cells survive as cells become more abnormal, and new cells become unnecessary. These additional cells can uninterruptedly split and develop growths called tumours. The tumour begins to spread to various parts of the body. One of the main causes of death and health problems is lung cancer in many countries with a 5-year survival rate of 10-16%. Researchers began to develop CAD methods which would be applied to CT examinations about a decade ago to help radiologists identify early stage pathological items. Although most types of testing can be performed in minutes or hours, there can be inevitable but significant waiting periods between tests and procedures. Actually, it is not uncommon to delay days or months. Delays of this type for life-threatening disease not only lead to disagreeable experiences, but also to unfavorable survival rates for both patients and care providers. Therefore, accelerating the diagnosis to treatment process is crucial to improving patient outcomes without sacrificing the quality of care. Computational tomography (CT), the most sensitive imaging method of detecting small lung nodules, has been shown to help radiologists assess early risk factors for lung cancer research, especially since introduction of the multidetector and helical CT technologies. In comparison to the combination of prostate, colon and breast cancer, the amount of death from lung cancer is greater. Moreover, most lung cancer patients are already at an advanced stage, because at an early stage, lung cancer is hard to detect. These characteristic features are the most reliable features for malignant diagnostics of nodules, size, shapes and volumetric growth rate. However, with the exception of texture, most of the above feature needs to be segmented more accurately.

2. LITERATURE SURVEY:

Machine learning method to detect Alzheimer's disease personalised and cost effective

Alzheimer's condition, particularly at an early stage of mild cognitively impaired disease, is often difficult to diagnose during the disease process. At this point, however, it is likely that treatment is most effective in order to bring great benefits to the diagnosis process. The machine describes and tests our approach to personalised and economical AD diagnostics. The study employs a local study to tailor a classification model and calculate the most informative or cost-effective biomarker sequence for a diagnosis. In comparison to the patients who did not have AD, we classified AD versus MCI patients with ADNI within a year. Similarly, the total number (and cost) of biomarkers required for a trustworthy diagnosis by each patient were considerably lowered, all data being examined equally. Therefore it can be used in clinical environments to personalise and efficiently detect AD.

Effect of the weather on mouth, foot, and hand diseases in the northwest of China Wuwei

The principal objective of the paper is to preclude and predict the prevalence of hand, foot, and mouth conditions in Wuwei City, northwest China in order to assess the consequences of various weather conditions for foot, hand and movement disorders. Data on diseases and weather and correlation analyses from 2008 to 2010 have been collected, several linear regressions and exponential curve-fitting methods have been implemented. The results show that there were 2688 cases between 2008 and 2010, and an average annual incidence of male, fibre and oral diseases was 47,62/100,000. In Liangzhou District, Minqin County, Gulang County and Tianzhu Tibetan Autonomous County, average figures for men, foot and father were 42.69, 38.52, 65.92 and 49.18. This disease happened in Wuwei City all year round and had a clear climax in the season. The incidence generally increased between April and the first peak, respectively in May, June and July. In September or October each year the second peak was held. The impact of the disease on an epidemic varied in four areas with different weather factors: average temperature, relative moisture, atmospheric pressure, precipitation and evaporation. Multiple linear regressions show that relative humidity and atmospheric pressures were the major influential factor in County Liangzhou, the average temperature and air pressure in County Gulang. In Minqin County, the incidence and average period of sunshine were found to be exponentially functional. In a nutshell, the prevalence of hand, foot, and mouth diseases varies. Weather and hand, foot, and mouth disease occur in four areas of Wuwei City with strong correlations. The seasons of summer and autumn were critical for disease prevention and control.

Development of Disease Detection and Identification Index

The disease severity levels of various plants have been widely estimated through spectral data. However, the data for estimating the diseases phases of the plant have not been evaluated. In this study, a spectral disease index was developed in order to determine rust disease levels from wheat leaves in various DS levels. A spectroradiometer for measuring the reflection spectrum of infected leaves with different symptom and DS levels has been used to achieve the study's objective. A new function was created to detect the wavelengths that are most susceptible to the symptoms and the purity of the various signs of the disease was analysed on the leaf level. The most sensitive reflectance ranges were found at 675 and 775 nm. Finally, in order to distinguish three different canopy levels from the stage of disease in the SDI, the standard DS and $\alpha_{675/5-0775}$ differential ratios were used. In the detection of accurate plant protection disease stage, the SDI proposed demonstrated promising performance.

Quantized Analysis for Heart Valve Disease based on Cardiac Sound Characteristic Waveform Method

A new quantized diagnostic method was proposed for analysing the four clinical sounds of the cardiac sound characteristic wave form of the cardio valve to accurately and efficiently analyse cardiac disease. Signals were collected using the BIOPAC acquisition system. The recorded data is transmitted via Ethernet into a computer for storage in real time. A single degree of freedom analytical model was established to extract a typical waveform. In addition, diagnostics parameters were calculated by means of an easy graphical representation to discriminate the cardiac sound of normal and cardiac valve disease to enable an inexperienced user to track the progression of their disease easily. Finally, the usefulness and efficiency of the proposed method are demonstrated in a case study on a patient with a cardiovascular disease before and after surgery.

Non-linear Heart Rate Analysis in Coronary Heart Disease Patients

It underlines the clinical and pronostic importance of non-linear heart rate variability measures in the group of patients with coronary heart disease and the age-matched healthy control group. The methods used were three: the exponent Hurst, the deterrent, and the analytical fluctuations of entropy approximately. The Hurst exponent of the R-R series was identified by a range-re-scaling analysis technique. DFA was used to quantify the heart rate variability's long-term fractal correlation properties. The unpredictability of time series fluctuations is measured by approximate entropy. The short-term scaling exponent was detected. In each exercise test programme patients with CHD have a lower exponent of Hurst, as well as rough entropy separated from healthy controls.

2.1 SCOPE OF THE PROJECT:.

From this we can easily identified the lung cancer patient with low cost. The purpose of this paper is for earlier detection of cancer cells in the lungs. Lung cancer detection is the extension of image treatment resulting from feature extraction and selection after segmentation. Lung CT (Computed Tomography) photographs are accepted as input.

2.2 EXISTING SYSTEM:

In the existing system an image processing method based on computer was proposed to improve the accuracy of the detection rate of pulmonary cancer together with the measurement of the pancreatic tumor sizes (tumor surface area) and their location. It also gives information on the malignancy and malignancy of the tumor. This article describes the system by means of integral thresholds and morphological procedures to detect pancreatic tumour from MRI, using the histogram-based method and provides a thorough analysis.

2.3 PROPOSED SYSTEM:

An image treatment technique is developed so that patients can be treated in their early stages to detect diseases at the earliest stage of cancer. The time factor in target images is a major factor in the detection of abnormal tissues. In this research, precision and image quality are key factors. The low pre-processing techniques based on Gabor filter were used both for image quality and the improvement of the image. This approach is efficient for segmentation in order to obtain the area of interest to extract features. Based on the general characteristics, a normality and abnormality comparison is made. The main characteristic for detecting accurate image comparisons are pixel percentage and mask labelling and show us that the detection process of this disease is very important and essential for avoiding severe steps and reducing distribution across the world. We have three phases to achieve better results: image improvement, picture segmentation and feature extraction.

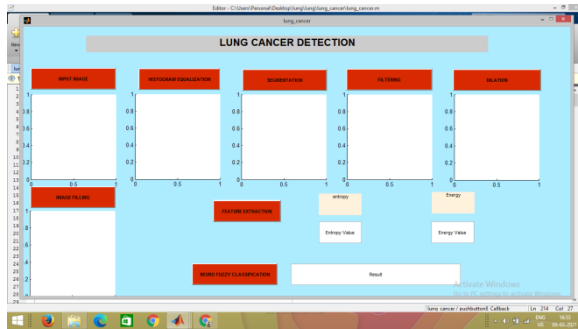


Fig 1 Overview of the Proposed System.

3. SYSTEM ARCHITECTURE:

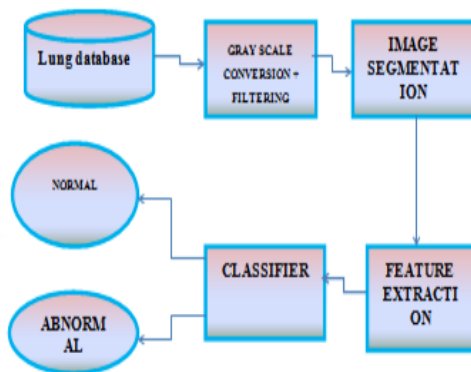


Fig 2. System Architecture

4. MODULE DESCRIPTION:

Project Modules:

- Image Capture Module
- Image Enhancement
- Image Segmentation
- Features Extraction

5. IMAGE CAPTURE MODULE

Collect pictures of lung cancer at the respective hospital for cancer. Use a command to access a certain image into MATLAB.

6. IMAGE ENHANCEMENT MODULE

Enhancement of picture is designed to improve the interpretability, perception or other automated picture processing techniques for viewers of people. We use Gabor filters to enhance the image

7. IMAGE SEGMENTATION MODULE

Segmentation divides the image into areas or objects of its components. It has many useful applications for medical professionals, including visualising and estimating the

volume of object of concern, detecting abnormalities, qualifying tissue and grading, and more. We use a Segmentation Approach Marker-Controlled Watershed.

8. FEATURES EXTRACTION MODULE

This procedure is used to know the normal or abnormal image. For the extraction of functions, we use binarization and masking.

9. CONCLUSION:

In our project, we processed the images of the CT scan to differentiate the benign and the malignant nodule, and its level of growth of the cancer cells through the machine learning system. Here, the approach was presented to differentiate the nodules into malignant and benign nodules for the help and further enhancement of the radiologist. More loads should be directed to improve the SVM by experimenting with several alternatives to classify the malignancy levels of nodules.

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C. Source Code:

```
function varargout = lung_cancer(varargin)

gui_Singleton = 1;
gui_State = struct('gui_Name',    mfilename, ...
                  'gui_Singleton', gui_Singleton, ...
                  'gui_OpeningFcn', @lung_cancer_OpeningFcn, ...
                  'gui_OutputFcn', @lung_cancer_OutputFcn, ...
                  'gui_LayoutFcn', [] , ...
                  'gui_Callback', []);
if nargin && ischar(varargin{1})
    gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
    [varargout{1:nargout}] = gui_mainfcn(gui_State, varargin{:});
else
    gui_mainfcn(gui_State, varargin{:});
end
% End initialization code - DO NOT EDIT


% --- Executes just before lung_cancer is made visible.
function lung_cancer_OpeningFcn(hObject, eventdata, handles, varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to lung_cancer (see VARARGIN)

% Choose default command line output for lung_cancer
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);

% UIWAIT makes lung_cancer wait for user response (see UIRESUME)
% uiwait(handles.figure1);


% --- Outputs from this function are returned to the command line.
function varargout = lung_cancer_OutputFcn(hObject, eventdata, handles)
% varargout  cell array for returning output args (see VARARGOUT);
```

```

% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;

% --- Executes on button press in pushbutton1.
function pushbutton1_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global I
clc
[filename, pathname] = uigetfile('*.jpg', 'Pick an Image');
    if isequal(filename,0) | isequal(pathname,0)

        warndlg('File is not selected');
    else
        I=imread(filename);
        axes(handles.axes1)
        imshow(I);
        title 'Input Image'
    end
title 'Input Lung Image'

% --- Executes on button press in pushbutton2.
function pushbutton2_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global I
t=rgb2gray(I);
he=histeq(t);

axes(handles.axes2);
imshow(he);
title 'Histogram Equalization'
% --- Executes on button press in pushbutton3.
function pushbutton3_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

```

```

global I
%% Histogram Equalization
t=rgb2gray(I);
he=histeq(t);
%% Segmentation by thresholding
threshold = graythresh(he);
bw = im2bw(he,threshold);

axes(handles.axes3);
imshow(bw)
title 'Segmentation by Thresholding'

% --- Executes on button press in pushbutton4.
function pushbutton4_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global I
%% Histogram Equalization
t=rgb2gray(I);
he=histeq(t);
%% Segmentation by thresholding
threshold = graythresh(he);
bw = im2bw(he,threshold);
%% Filter
hy = fspecial('sobel');
hx = hy';
ly = imfilter(double(bw), hy, 'replicate');
axes(handles.axes4);
imshow(ly,[]),

title('Filtered Image')

% --- Executes on button press in pushbutton5.
function pushbutton5_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton5 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global I
%% Histogram Equalization
t=rgb2gray(I);
he=histeq(t);
%% Segmentation by thresholding
threshold = graythresh(he);

```

```

bw = im2bw(he,threshold);
%% Filter
hy = fspecial('sobel');
hx = hy';
ly = imfilter(double(bw), hy, 'replicate');
se = strel('line',11,90);
bw2 = imdilate(ly,se);
axes(handles.axes5);
imshow(bw2),
title('Dilated')

% --- Executes on button press in pushbutton6.
function pushbutton6_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton6 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

global I
%% Histogram Equalization
t=rgb2gray(I);
he=histeq(t);
%% Segmentation by thresholding
threshold = graythresh(he);
bw = im2bw(he,threshold);

%% Filter
hy = fspecial('sobel');
hx = hy';
ly = imfilter(double(bw), hy, 'replicate');
se = strel('line',11,90);
bw2 = imdilate(ly,se);

BW5 = imfill(bw2,'holes');
axes(handles.axes6);
imshow(BW5)

title 'Image Filling'
% --- Executes on button press in pushbutton7.
function pushbutton7_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton7 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

global I

```

```

% figure,imshow(I);
% title 'Input Lung Image'
%% Histogram Equalization
t=rgb2gray(I);
he=histeq(t);
% figure,imshow(he);
% title 'Histogram Equalization'
%% Segmentation by thresholding
threshold = graythresh(he);
bw = im2bw(he,threshold);
% figure,imshow(bw)
% title 'Segmentation by Thresholding'
%% Filter
hy = fspecial('sobel');
hx = hy';
ly = imfilter(double(bw), hy, 'replicate');
se = strel('line',11,90);
bw2 = imdilate(ly,se);
BW5 = imfill(bw2,'holes');
%% Features Extraction
%% Contrast
disp ('Contrast Value');
cmap = contrast(BW5)

%% Entropy
disp ('Entropy Value');
E = entropy(BW5)
set(handles.edit2,'string',num2str(E));

%% GLCM Values
glcm = graycomatrix(BW5,'Offset',[2 0])

% --- Executes on button press in pushbutton8.
function pushbutton8_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton8 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global I
% figure,imshow(I);
% title 'Input Lung Image'
%% Histogram Equalization
t=rgb2gray(I);
he=histeq(t);
% figure,imshow(he);

```

```

% title 'Histogram Equalization'
%% Segmentation by thresholding
threshold = graythresh(he);
bw = im2bw(he,threshold);
% figure,imshow(bw)
% title 'Segmentation by Thresholding'
%% Filter
hy = fspecial('sobel');
hx = hy';
ly = imfilter(double(bw), hy, 'replicate');
% figure, imshow(ly,[]),
% title('Filtered Image')
se = strel('line',11,90);
bw2 = imdilate(ly,se);
BW5 = imfill(bw2,'holes');
C=BW5;
%% mean
c1=mean(C);
%% variance
c2=var(double(C));
%% contrast
d=C;

%% energy, homogeneity, contrast
GLCM2 = graycomatrix(d,'Offset',[2 0;0 2]);
c4 = graycoprops(GLCM2,{'contrast','homogeneity','Energy'});
set(handles.edit4,'string',num2str(min(c4.Energy)));
c24= graycoprops(GLCM2,'contrast');
set(handles.edit3,'string',num2str(min(c24.Contrast)));
%% correlation
c5=corr(double(d));
c6=c5(1,:);
c7=c1;
c8=c2;

c9=[c6 c7 c8];
%% network
net = network
net.numInputs = 6
net.numLayers = 1
P = size(double(c1));
Cidx = strcmp('Cancer',c9);
T = size(double(c2));
net = newff(P,T,25);

```

```

[net,tr] = train(net,P,T);
testInputs = P(:,tr.testInd);
testTargets = T(:,tr.testInd);
out = round(sim(net,testInputs));
diff = [testTargets - 2*out];
detections = length(find(diff==-1))
false_positives = length(find(diff==1))
true_positives = length(find(diff==0))
false_alarms = length(find(diff==-2))
Nt = size(testInputs,2);
fprintf('Total testing samples: %d\n', Nt);
cm = [detections false_positives; false_alarms true_positives]
cm_p = (cm ./ Nt) .* 100      ;
%%
sim_out = round(sim(net,testInputs));
if ((max(c24.Contrast))>1)
    set(handles.edit1,'string','Lung Affected Image');
else
    set(handles.edit1,'string','not affected');
end

```

```

function edit1_Callback(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit1 as text
%        str2double(get(hObject,'String')) returns contents of edit1 as a double

% --- Executes during object creation, after setting all properties.
function edit1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

```

```

function edit2_Callback(hObject, eventdata, handles)
% hObject    handle to edit2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit2 as text
%        str2double(get(hObject,'String')) returns contents of edit2 as a double

```

```

% --- Executes during object creation, after setting all properties.
function edit2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

```

```

function edit3_Callback(hObject, eventdata, handles)
% hObject    handle to edit3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit3 as text
%        str2double(get(hObject,'String')) returns contents of edit3 as a double

```

```

% --- Executes during object creation, after setting all properties.
function edit3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.

```

```

if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

```

```

function edit4_Callback(hObject, eventdata, handles)
% hObject    handle to edit4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit4 as text
%        str2double(get(hObject,'String')) returns contents of edit4 as a double

```

```

% --- Executes during object creation, after setting all properties.
function edit4_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

```

```

function edit5_Callback(hObject, eventdata, handles)
% hObject    handle to edit5 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit5 as text
%        str2double(get(hObject,'String')) returns contents of edit5 as a double

```

```

% --- Executes during object creation, after setting all properties.
function edit5_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit5 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB

```

```
% handles    empty - handles not created until after all CreateFcns called
```

```
% Hint: edit controls usually have a white background on Windows.
```

```
%    See ISPC and COMPUTER.
```

```
if ispc && isequal(get(hObject,'BackgroundColor'),
```

```
get(0,'defaultUicontrolBackgroundColor'))
```

```
    set(hObject,'BackgroundColor','white');
```

```
end
```

```
function edit6_Callback(hObject, eventdata, handles)
```

```
% hObject    handle to edit6 (see GCBO)
```

```
% eventdata reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)
```

```
% Hints: get(hObject,'String') returns contents of edit6 as text
```

```
%    str2double(get(hObject,'String')) returns contents of edit6 as a double
```

```
% --- Executes during object creation, after setting all properties.
```

```
function edit6_CreateFcn(hObject, eventdata, handles)
```

```
% hObject    handle to edit6 (see GCBO)
```

```
% eventdata reserved - to be defined in a future version of MATLAB
```

```
% handles    empty - handles not created until after all CreateFcns called
```

```
% Hint: edit controls usually have a white background on Windows.
```

```
%    See ISPC and COMPUTER.
```

```
if ispc && isequal(get(hObject,'BackgroundColor'),
```

```
get(0,'defaultUicontrolBackgroundColor'))
```

```
    set(hObject,'BackgroundColor','white');
```

```
end
```

```
function edit7_Callback(hObject, eventdata, handles)
```

```
% hObject    handle to edit7 (see GCBO)
```

```
% eventdata reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)
```

```
% Hints: get(hObject,'String') returns contents of edit7 as text
```

```
%    str2double(get(hObject,'String')) returns contents of edit7 as a double
```

```
% --- Executes during object creation, after setting all properties.
```

```

function edit7_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit7 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

% --- Executes on button press in pushbutton9.
function pushbutton9_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton9 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

```