LUNG CANCER DETECTION USING SPATIAL FCM WITH LEVEL SET AND NEURAL NETWORK CLASSIFIER

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ABSTRACT

Lung cancer keeps on changing on various medical factors depending on topographic areas. The identification of Lung cancer at initial stages is of extreme importance if it is intended to degrade high mortality rate. More than 3/4th of the illness is identified with tobacco utilization. Furthermore, hereditary components, presentation to ecological poisons, second hand smoking expand illness quickly. Cures including chemotherapy, radiotherapy, surgery, epidermal open medications raise survival rate and personal satisfaction. This strategy is more about diagnosing at ahead of schedule and critical stages with keen computational procedures with different noise elimination by segmentation strategies and calculations which is the root idea of digital image processing. Location of CT pictures received from cancer research organizations is investigated utilizing MATLAB. In this paper images of lungs were taken for find various parameters of the texture. Mainly CT images of lungs can be categorised into normal and abnormal. Classification is based on the features extracted from the taken image. Implementation of the system focuses on texture based features e.g. GLCM (gray level co-occurrence matrix) feature plays an vital role in medical field.

Keyword: *Lung Cancer; MATLAB; American Cancer society; Noise Removal; Segmentation; Mortality Rate;GLCM*

1. INTRODUCTION

Cancer can be clarified as uncontrolled cell development having capacity to spread everywhere throughout the body. Our body contains red blood cells (RBC's) as well as white blood cells (WBC's). The main function is to supply fresh oxygen (02) to all parts of the body with the help of blood flow, due to which blood appears red. [1] In the lungs, tissue receives oxygen (02) because of RBC's only.

The hereditary substance of erythrocytes has high centralization of hemoglobin. The cell film comprises of proteins and lipids which is spine of physiological cell capacity. They don't contain any imperative piece of cell, which incorporates hemoglobin. Around 20 lakhs new RBC's are created every second. [2] The cells are delivered in the bone marrow and turn all through the body for around 4 months to and fro in arteries and veins.

Every revolution takes around 20 seconds. Around 75% of the cells and lion's share (majority concentration) grouping of blood in the human body are red platelets [3, 4]. Youthful Dutch scholar Jan Swammerdam portrayed it impeccably with an early magnifying instrument in 1658.

Lung disease, additionally called as carcinoma [5] is a dangerous lung tumor characterized by uncontrolled cell development in tissues of the lung.[6] If left undiscovered, this development enters past the lung by the procedure of 'metastasis'- which produces tumour (as growth cells) from introductory site of infection to another piece of body[7].

Most malignancies otherwise called primary lung cancers, are carcinomas which begin itself in the lungs. [8] There are two primary sorts are carcinoma l)small-cell lung tumour and 2)non-small cell lung cancer. [9] The most widely recognized side effects are coughing(counting blood coughing), weight reduction, breath shortness, and little as wee as serious chest pains[10]. These growth cells aggravates the cycle of RBC generation and debasement. Inside they change the structure and chemical composition of plasma membrane i.e. the external structure of the cell in such a way that these RBC's do not die as per the corresponding lifetime. Accordingly the RBC count continues expanding and more number of cell gets accumulated bringing about shortening of veins and supply routes and extreme blasting. These results into blood through cough and so on.

In this, current work focuses on finding tumour, area of the nodule and percentage of area affected in the lung. In this fuzzy k means segmentation is used to isolate a lung of a CT image and GLCM algorithm is used for feature extraction.

2. PROPOSED METHOD

In this, available lung CT scan images are passed through the system which is having following stages: pre-processing stage, segmentation stage, feature Extraction stage and classification.

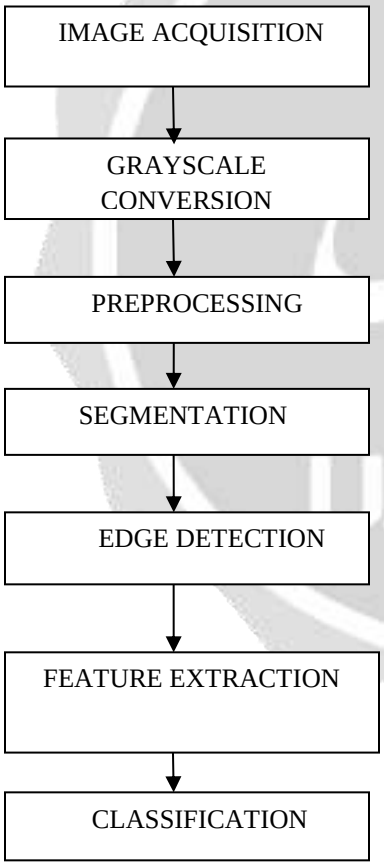

Fig-1 Block diagram

The high pass filter is used to smooth and sharp the input image in the preprocessing stage. As well as, fuzzy k means algorithm is used for the segmentation purpose. After image segmentation, the features such as intensity values, type of cancer and percentage of area affected are extracted from the detected tumour in the classification stage.

2.1 Image Acquisition

Input image is acquired from database. First collect CT scan images of lung cancer which are stored in matlab .CT scan images has low noise so we select them. Computed Tomography having better clarity, low distortion and noise.

Fig-2 Input Image

2.2Grayscale Image

In the digitized world, a greyscale image is a computerized/digital image, in which the estimation of every pixel is an individual example, i.e., it conveys just power or intensity i.e. white or black in terms of display. Pictures of this kind, otherwise called white (maximum amplitude) and dark (minimum amplitude) pictures, comprise selective shades of dim. Grayscale pictures are the after effect of measuring the amplitude of light at every pixel in a single band of the light spectrum. They can likewise be obtained from a full coloured picture. The explanation for picking grayscale picture is even least pixel power is additionally useful in recognizing changes in the cells. In fact, a dim shading is one in which the R, G, B planes have equal intensity, the intensity level represented as a number from decimal 0 to 255. For each pixel in a RGB grayscale picture, G = B = R. The amplitude differs in extent with the number speaking to the brightness levels of the RGB hues. Dark is spoken to by R = G = B = 0 and white is spoken to by R = G = B = 255.

Fig-3 Grayscale Image

2.3 Pre-processing

In pre-processing stage, High Pass Filter is used. As the name proposes, it passes the frequency over certain cutoff frequency and weakens all the frequency beneath the cutoff frequency. A high pass filter is essentially utilized for making bright images by sharpening. It is done when contrast is improved between the nearby regions with expansion or reduction in amplitude level. A high pass filter sets high edge cutoff to get data of a picture while cutting the low frequency information. The premise of the high pass filter is intended to build the intensity of the middle pixel with respect to neighboring pixels[13].

Fig-3 Preprocessed Image

2.4 Image Segmentation

Segmentation is nothing but the partation of image. segmentation is typicaly use to detect object and boundaries of an image. We use fuzzy k means algorithm. Fuzzy k means extract seeds indication the presence of object or background at ct scan image. The marker location are then set to be regional minima typically gradient of the original input image and the fuzzy k means algorithm is applied[15].

Fig-4 Segmented Image

Fig-5 Segmented Lung Nodule Image

2.5 Edge Detection

Edge detection is an image processing technique for finding the boundaries of objects within images. It works by detecting discontinuities in brightness. Edge detection is used for image segmentation.

Fig-6 Edge Detected Image

Fig-7 Gradient Mask

2.6 Feature Extraction

Image texture features Extraction stage is an important stage that uses algorithms and techniques to detect and separate various desired portions or shapes (features) of a given image. With this necessary feature required for analysis is extracted to predict the probability of lung cancer presence, the following two methods are used such as Binarization and GLCM, both methods are based on strong facts that related to lung anatomy and information of lung CT imaging.

2.6.1 GLCM (Grey Level Co-Occurrence Method)

The GLCM is a tabulation of how often different combinations of pixel brightness values (grey levels) occur in an image. Firstly we create gray-levelco-occurrence matrix from image by using graycomatrix function in MATLAB software. From this we can calculate texture measures from the GLCM. The features extracted using this method are (contrast, correlation, energy, Homogenity).

Fig-8 Possible location of cancer

2.7 Classification

In classification stage, regression tree algorithm is used. Regression trees are binary decision trees. The tree is constructed by splitting the entire data into subsets by using all the independent variables. The goal is to produce terminal nodes that are as homogeneous as possible with respect to the target variable. It is used to detect the presence of tumour, type of cancer, and percentage of area affected.

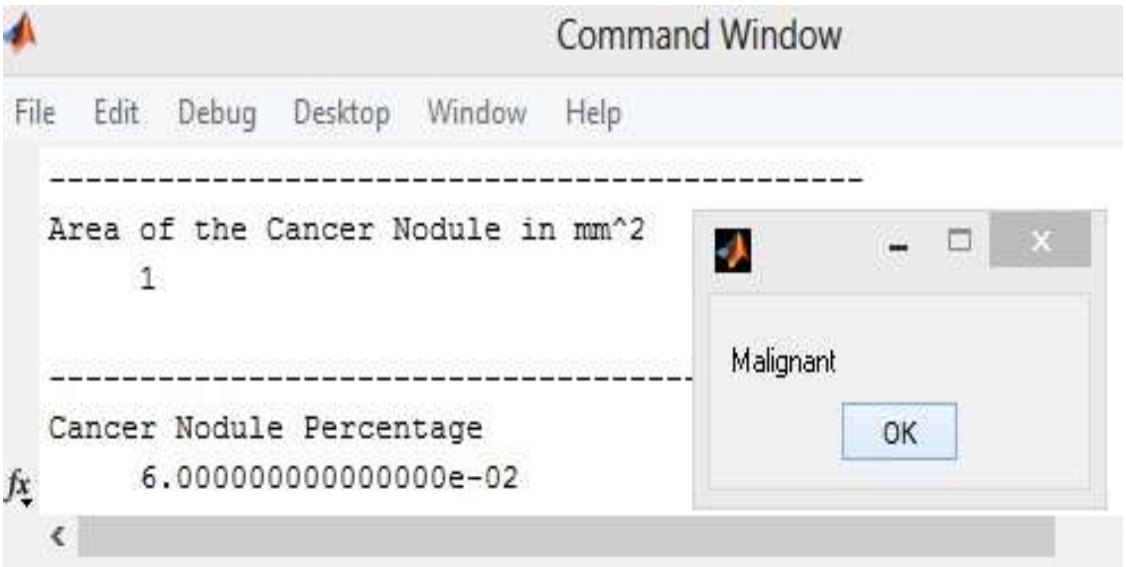

Fig-9 Output

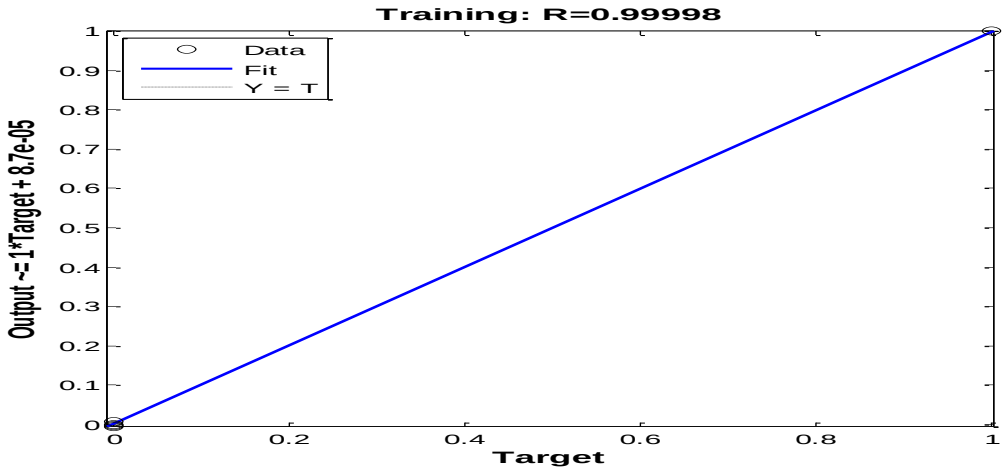

Fig-10 Regression

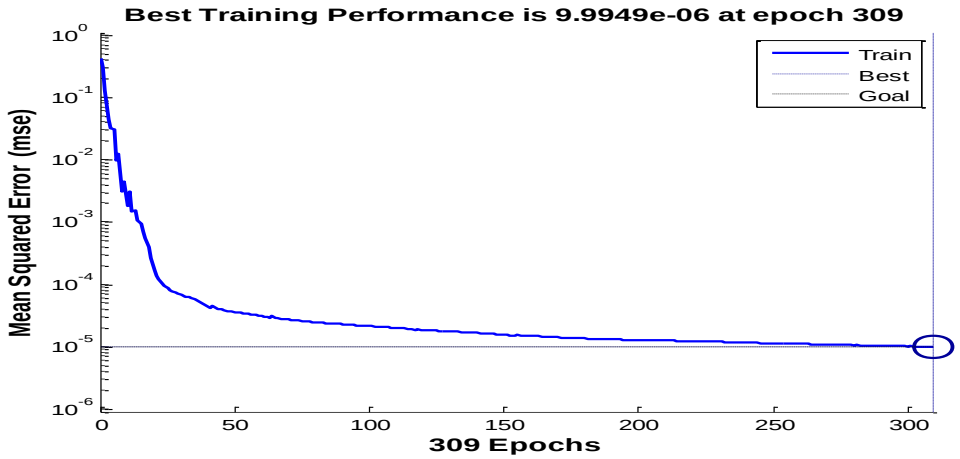

Fig-11 Performance

3.CONCLUSION AND FUTURE APPLICATION

The above technique can be handled in two stages 1) Processing of distortion input image utilizing filter and segmentation 2) Morphological operations on CT picture. The growth influenced lungs locale can be seen in the last algorithm process for particular CT information image. The proposed strategy can likewise be connected to identify some other malignancy like breast cancer, skin malignancy and so forth. Also it finds place in medical research as well.

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