A Survey of Lung Tumor Detection on CT Images

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***Abstract*- As of late, image preparing systems are generally utilized as a part of a few medicinal zones for image change in prior identification and treatment stages, where the time element is critical to find the anomaly issues in target images, particularly in different growth tumors, for example, lung tumor, breast cancer, and so on. Lung tumor is the most intense kind of malignancy among every one of the diseases with less survival rate. It is exceptionally hard to examine the growth at its initial stage. The most of work done on the Computed Tomography (CT) scan image because of good clarity and low noise. In this paper, different procedures have been talked about for the location of lung cancer and to classify whether it is benign or malignant with the help of ANN (Artificial Neural Network).**

***Keywords* -** *Computer Tomography (CT), Image Segmentation, Lunge Tumor*

I. INTRODUCTION

The tumor which begins from the lungs is known as lung cancer. Lung cancer is a genuine general health issue everywhere the world. Lung cancer is the uncontrolled growth of abnormal cells that start off in one or both lungs [12]. Lung cancer is the second most regular tumor in both men and women and is main source of cancer death among both men and women. Most lung cancers could be prevented, because they are related to smoking or less often to exposure to radon or environmental factors [13]. Lung cancer can be classified into two main types: Small Cell Lung Cancer (SCLC) and Non-Small Cell Lung Cancer (NSCLC). Small Cell Lung Cancer accounts for 20% of lung cancers, while Non-Small Cell Lung cancer accounts for the remaining 80% [13]. According to the World Health Organization (WHO), 7.6 million deaths globally each year are caused by cancer; cancer represents 13% of all global deaths. As seen below, lung cancer is by far the number one cancer killer [12]. As lung growth cells spread and utilize a greater amount of the body's energy, it is possible to present symptoms that may also be associated with many other ailments [12]. These include:

- Fever
- Fatigue
- Unexplained weight loss
- Pain in joints or bones
- Problems with brain function and memory
- General weakness
- Bleeding and blood clots

Early stage of lung cancer is difficult to detect at stage I and II. Most people with NSCL are diagnosed only at only at stage III and IV.

Types of tumors:

- Benign
- Malignant

A. Benign:

In the event that the tumor is benevolent, then the measure of the tumor is less than 3mm. This is beginning level of disease tumor. Under this class is effortlessly reparable.

B. Malignant:

On the off chance that the tumor is harmful, then the span of the tumor is more prominent than 3mm. This is a wild level of growth tumor. Under this class is not reparable.

In medical Imaging used different types of images are X-ray, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), etc. But for the detection of lung diagnosis CT images are preferred because of good clarity, low noise and very easy to calculate the mean and variance of CT scan images. CT scan images are quickly obtained and don't harm the bones of the patient. CT is the most frequently used imaging technique in the diagnosis of lung cancer [4]. CT images give 3D analysis of the internal body parts and organ analysis is easy because it is taken at different angles. The detection process divided into four parts: Lunge segmentation, Image Enhancement, Classification and Feature Extraction.

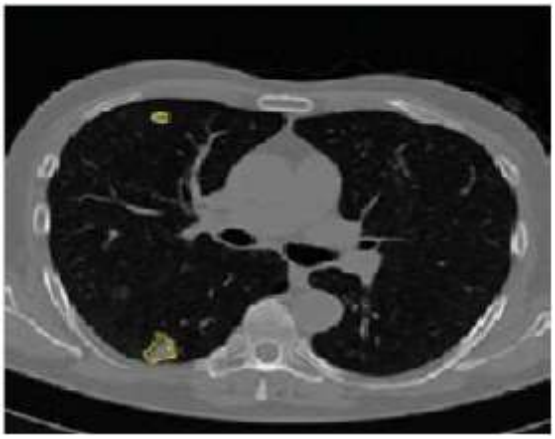

Fig.1: A sample lung image [5]

The basic flowchart for lung nodule detection is illustrated in fig. 2.

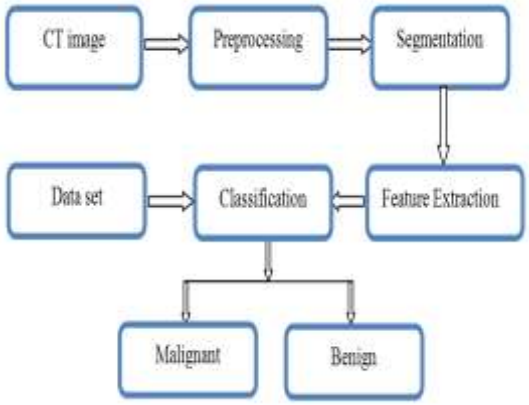

Fig.2: A basic flowchart to determine existence of tumor lung image

II. ORGANIZATION OF PAPER

The organization of the paper further is as follows. The literature review is presented in Section III, comparative study in Section IV and conclusion discussed in Section V.

III. LITERATURE REVIEW

Amutha,Wahidabanu *et al*. [1] has proposed level set Active shape model for the identification of lung tumor. This system depended on part capacity having the base mean square error value. At that point second request components were computed which depended on the histogram of the noise free image. The classification between the normal and abnormal lung image was made on these components.

Hongmei, Petitjean, Dubray, Vera, Su Ruan *et al*. [2] provides an automatic segmentation method on PET images taking into account the random walks (RW) algorithm and an expansion of the random walks structure to coordinate a tumor development data, which is the anticipated tumor area coming about because of a model for lung tumor development and reaction to radiotherapy. The region of interest (ROI) and named seeds are consequently created.

Yuhua, VirendraKumar, Lawrence, Dmitry, ChingYenLi, Rene, Claus, EmmanuelRiosVelazquez, AndreDekker, HugoAerts, PhilippeLambin, XiuliLi, Jie, Robert, Robert, *et al*. [3] has proposed a single click ensemble segmentation (SCES) methodology in view of a current ""Click&Grow"" algorithm. The SCES methodology requires stand out administrator chose seed point as contrasted and different administrator inputs. Additionally proposed a accurate, accurate and programmed single tick group division algorithm in this paper. The critical part of this work is to decrease the human communications while sore depiction stays exact and predictable as a consequence of ensemble segmentation. Despite the fact that the calculation time was expanded for every case subsequent to various ""Click&Grow"" algorithms were connected. The tumor segmentation ought not contrast much with distinctive manual seeds gave by different readers.

Dandil, Cakiroglu, Eksi, Ozkan, Kurt, Canan, *et al*. [4] has proposed a programmed Computer Aided Diagnosis (CAD) framework that effectively separates the lung nodules as benign or malignant on CT images. The proposed CAD framework is an incorporated structure since it incorporates pre-preparing, segmentation, feature extraction, feature selection and classification

steps. SOM strategy incorporated into CAD framework permits fruitful identification of lung nodules in ahead of schedule stages. ANN was favored high exactness rates in classification.

Talebpour, Hemmati, Hosseinian *et al*. [5] provides a new computer-aided detection (CAD) framework exhibited that distinguish little size nodules (bigger 3 mm) in High Resolution CT (HRCT) images. In the initial step, the lung district is separated, and then with a sort of 3D filtering nodule assumed cases is established. In the last step, a neural system is utilized for false positive reduction. For filtering nodule cases from different items in images, it's utilized a cylindrical filter. The discovery execution was assessed tentatively utilizing lung LIDC (Lung Image Database Consortium) image database. Suitable results demonstrate that the utilization of the 3D model and the features analysis based Feature-based (FPs) decrease can precisely identify nodules in HRCT images. The technique has generally great speed and can be promising in clinical application. The outcomes demonstrate that the strategy is strong to different nodule shapes, simple to utilize, does not require any client activity and can be connected for other imaging modalities.

Anam, Akram, Javed, *et al.* [6] has proposed a modernized framework for lung nodule recognition in CT scan images. The framework comprises of two stages i.e. lung segmentation and enhancement, feature extraction and classification. Threshold segmentation is connected to evacuate foundation and concentrates the nodules from an image. A feature vector for conceivable abnormal regions is ascertained and areas are arranged utilizing neuro fuzzy classifier. Framework encourages the location of little nodules which prompt early analysis of lung tumor.

Hui Cui, Xiuying, Michael, David, *et al.* [7] provides an improved RW model that fully utilizes the prior knowledge on PET for lung tumor segmentation from low- contrast CT. The impact of the tumor certainty area and the strolling extent were utilized and the forefront and foundation seeds were acquired in light of the PET automatically.

Mokhled, *et al.* [8] discussed about the different lung tumor recognition methods for different stages. Three techniques were proposed for image enhancement, to remove the noise from the and to improve the image: Auto enhancement, Gabor Filter and FFT (Fast Fourier Transform), Gabor filter is more proficient in light of the fact that it can adequately advance the fringe contrasts among the lung areas. For the image segmentation to isolated the region.

IV. COMPARATIVE STUDY

Table 1: Comparative Analysis

No.	Algorithm	Advantage	Limitation
1	Bayes classification and active contour modeling	Reduces the computation time & internal energy	Not detected difference diseases
2	Random walks algorithm and ROI	Better performance	Can lead to dysfunctional decisions
3	Click & grow algorithm	Stable, automated, highly variable	Manual seeds inputs
4	Self-Organizing Maps (SOM) Method and Artificial Neural Network (ANN)	significantly high sensitivity with very large database, and high accuracy rates	not detected difference diseases
5	Neural Networks	Good speed, easy to use, does not need any	Time consuming

		user action	
6	ROI, Neuro Fuzzy classifier	Uses readily available accounting figures, Acceptable	Computational time for larger data set was more
7	Random walks algorithm	Better performance	Can lead to dysfunctional decisions

V. CONCLUSION

In medicinal sciences, image processing has empowered for precise and quick quantitative examination and perception of medical images of various modalities, for example, CT, MRI, X-Ray, and so forth. Because of headway in image processing instruments, it has gotten to be conceivable to gain excellent images of diverse parts of the human body and investigate the images utilizing different programming, along these lines encouraging the early discovery of numerous illnesses, for example, growth, variations from the norm in organs, and so on accordingly empowering precise analysis which has helped in saving human life.

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