Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 8 Issue 09, September-2019

Detection of Lung Cancer by Machine Learning

P. Pretty Evangeline, Dr. K. Batri
PG Scholar, Applied Electronics, PSNA CET, Dindigul, India
Professor, Department of ECE, PSNA CET, Dindigul, India

***Abstract*: Lung cancer also referred as lung carcinoma, is a disease which is malignant tumor leading to the uncontrolled cell growth in the lung tissue. About 90% of lung cancer is due to smoking. There are two major types of lung cancer: Non-small cell lung cancer (NSCLC) and Small cell lung cancer (SCLC). The most common type is the non-small cell lung cancer (NSCLC) which contributes 80-85% of lung cancer and small cell lung cancer (SCLC) which contributes 15-20% only. Hence for this reason, the early-stage lung cancer i.e. stages I and II are difficult to detect. Many people having lung cancer are diagnosed at stages III and IV. Doctors utilize some methods to diagnose lung tumor, for example: X-rays, CT Scan, PET scan etc..**

Keywords: Malignant, Computed Tomography (CT), feed forward back propagation, artificial neural network

I. INTRODUCTION

The identification of the diseases in the CT images were employed based on the classification of the images using classification algorithms. Rule-based classifiers were employed which identifies the defects by grouping the pixels that were having similar results for rules used into a group. The rules used in the classifier differs based on the applications for which the process is used. In medical images the statistical parameters and the intensity-based features were also needed to get the best features from the images. The noise that affects the features of CT images, the widespread use of CT image imaging requires the need for developing filter for decreasing noise. Some of the related work is given the most thresholding-based segmentation methods attempt to segment the CT images. Most previous works are prepared to compare different thresholding-based image segmentation algorithms based on characteristics such as correctness, stability with respect to parameter choice and stability with respect to image choice. Performance measure like precision, specificity and false positive rate is used to evaluate the accuracy.

II. RELATED WORKS

D.S. Elizabeth, H.K. Nehemiah, C.S. Retmin Raj, A. Kannan [1] proposed that the CT image is pre- processed from the lung parenchyma using greedy snake algorithm. The region of interest (ROI) is extracted by using region growing algorithm. The shape and texture features are extracted from each ROI which is used to train the radial basis function neural network (RBFNN) which classifies the nodules as cancerous or non-cancerous.

Qing Wu and Wenbing Zhao [2] introduces Neural-network based algorithm, refer to as entropy degradation method (EDM) is used to detect small cell lung cancer (SCLC) from computed tomography (CT) images. EDM which transforms the vectorized histogram of each training set into a score. The score is further transformed into probability through a logistic function, a cost function where the difference between the transformation and label is calculated and later be fed back by back-propagation stage.

Ummadi Janardhan Reddy, Busi Reddy Venkata Ramana Reddy, Bodi Eswara Reddy [3] proposed that the lung cancer is identified in early stages in two phases. At first stage, binarization procedure is performed to identify the lung tumour growth. In second stage, division is preformed to portion the lung CT picture and extraction is performed in removing the critical elements which is utilized to train the fuzzy neural networks.

Ammar Odeh, Ibrahim Al Atoum, Abrahim Bustanji [4] proposed the genetic algorithm which gives the optimal solution by various steps like calculating the fitness function, selecting the highest fitness value, crossover process produces good combination, mutation will generate new gene structure. Training datasets are used based on mean and standard deviation, SNR is calculated. The re- evaluation process on the new gene structure indicates which optimal gene is a lung cancer disease.

S. Sasikala, M. Bharathi, B. R. Sowmiya [5] describes that the lung regions are extracted from the CT images. The slices of that regions are segmented. The segmented tumour region is used to train the convolutional neural network. CNN is trained by Back propagation algorithms. It consists of normalized layer, convolutional layer and pooling layer. The main aim of this work is to identify that the tumor in patient's lung is malignant or benign.

Lavanya M, Muthu Kannan P [6] proposed that the images are enhanced by adaptive histogram equalisation and the noises are removed by median filtering. MEM algorithm (modified expectation maximization) is used to segment the lung module which consists of various steps followed by feature extraction. Artificial Neural Network Fuzzy Inference System (ANFIS) classifier is used for disease classification.

Rohit Y. Bhalerao, Harsh P. Jani, Rachana K. Gaitonde, Vinit Raut [7] describes that the lung CT images are pre-processed which converts RGB to gray scale and gray scale to binary image to get efficient and refined image by removing noise. The segmentation is done by watershed segmentation and thresholding. Feature extraction is done by binarization and masking approach. These are input to CNN which classifies cancer or non-cancerous.

Georgy George, Nisha J.S [8] proposed that the image enhancement of lung images is done by median filter, Gabor filter, Fast Fourier Transform. Image segmentation is done using Ostu's Thresholding and marker-controlled watershed segmentation. Feature

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 8 Issue 09, September-2019

extraction is done by morphological operations like erosion. Based on the entropy value and PSNR, the lung cancer is detected. The output of Gabor filter followed by marker-controlled watershed segmentation gives better tumour detection.

Jaspinder Kaur, Nidhi Garg, Daljeet Kaur [9] introduced CAD system to detect lung cancer at early stages. The CT images are pre-processed to remove noise. They are segmented using optimal thresholding. Region of Interest (ROI) is taken by region growing method. The extracted feature set is given to back propagation network which is measured in terms of Mean Square Error (MSE).

Jue Jiang, Yu-chi Hu, Chia-Ju Liu, Darragh Halpenny, Matthew D. Hellmann, Joseph O. Deasy, Gig Mageras and Harini Veeraraghavan [10] they used two multiple resolution residually connected network (MRRN) formulations called incremental- MRRN and dense-MRRN. These networks simultaneously combine features across multiple image resolution and feature levels through residual connections to detect and segment lung tumors. They have developed a multi-scale CNN approach for volumetrically segmenting lung tumors which enables accurate, automated identification of and serial measurement of tumor volumes in the lung. Incremental – MRRN for extracting dense feature representations and dense-MRRN maps of different levels at varying image resolutions.

IV. CONCLUSION

The various algorithms and different methods for detection of lung cancer were studied in this survey. This work aims at detection of lung cancer using digital image processing techniques to get an enhanced images of lung CTs and feed forward back propagation artificial neural network which consists of input, hidden, output layer is trained to differentiate cancerous and non-cancerous images

REFERENCES

1. D.S. Elizabeth, H.K. Nehemiah, C.S. Retmin Raj, A. Kannan, “Computer Aided Diagnosis of Lung Cancer Based on The Analysis of Significant Slice of Chest Computed Tomography Image”, IET Image Process., 2012, Volume. 6, Issue. 6, pp. 697– 70
2. Qing Wu and Wenbing Zhao, “Small-Cell Lung Cancer Detection Using A Supervised Machine Learning Algorithm”, International Symposium on Computer Science and Intelligent Controls, IEEE, 2017
3. Ummadi Janardhan Reddy, Busi Reddy Venkata Ramana Reddy, Bodi Eswara Reddy, “Recognition of Lung Cancer Using Machine Learning Mechanisms with Fuzzy Neural Networks”, International Information and Engineering Technology Association (IIETA), Volume. 36, No.1, February 2019, pp.87-91
4. Ammar Odeh, Ibrahim Al Atoum, Abrahim Bustanji, “Novel Genetic Algorithm for Early Prediction and Detection of Lung Cancer”, Journal of Cancer Treatment and Research ,2017
5. S. Sasikala, M. Bharathi, B. R. Sowmiya, “Lung Cancer Detection and Classification Using Deep CNN”, International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume.8 Issue.2S December, 2018
6. Lavanya M, Muthu Kannan P, “Lung cancer segmentation and diagnosis of lung cancer staging using MEM (modified expectation maximization) algorithm and artificial neural network fuzzy inference system (ANFIS)”, Biomedical Research 2018, Volume.29, Issue.14 pp.2919-2924
7. Rohit Y. Bhalerao, Harsh P. Jani, Rachana K. Gaitonde, Vinit Raut, “A novel approach for detection of Lung Cancer using Digital Image Processing and Convolution Neural Networks”, 5th International Conference on Advanced Computing & Communication Systems (ICACCS) 2019
8. Georgy George, Nisha J.S, “A Novel Approach for the Detection of Small Cell Lung Cancer Based on Entropy and PSNR Value”, International Journal of Computer Science and Information Technologies (IJCSIT), Volume. 6, Issue.4, 2015, pp.3925-3929
9. Jaspinder Kaur, Nidhi Garg, Daljeet Kaur, “An automatic CAD system for early detection of lung tumour using back propagation network”, International Conference on Medical Imaging, m- Health and Emerging Communication Systems (MedCom), 2014
10. Jue Jiang, Yu-chi Hu, Chia-Ju Liu, Darragh Halpenny, Matthew D. Hellmann, Joseph O. Deasy, Gig Mageras and Harini Veeraraghavan, “Multiple Resolution Residually Connected Feature Streams for Automatic Lung Tumour Segmentation from CT Images”, IEEE Transactions on Medical Imaging, 2018.