LUNG CANCER DETECTION

Sanjana Srinath, Sushma Ganesh Vishal B, Syed Danish, Dr A B Rajendra

Department of Information Science and Engineering

Vidyavardhaka College of Engineering Mysuru

Abstract

Lung Cancer occurs prominently among males and it is the third most prominent cancer among females. The timeous diagnosis and recognition of carcinoma are vital to shrinking the mortality rate across the globe. Since the indications of carcinoma are found only at a later stage, it is vital to diagnose and identify cancer at its starting stage by making use of medical imaging procedures. This effort aims to come up with a technique for automatic classification and identification of carcinoma at its starting stage by employing the SVM algorithm.

Keywords— SVM, Carcinoma

I. INTRODUCTION

During the recent times, Covid 19 has led to people becoming more health conscious. This has also led to everyone trying to adopt a healthier lifestyle, have frequent body checkups and take a little extra care of their body and diseases they may have to face. The recent growth in medical field has brought up the topic of cancers and their treatments again. One of the most common being lung cancer, the current situation has also played a major role in it gaining attention. The major cause of lung cancer is smoking. Physicians believe that the toxic agents called carcinogens present in cigarette will affect the tissue of lungs. Generally, lung cancer does not make any signs or symptoms in its early stages. The symptoms and the indications of the disease will be shown only in its progressive phases.

II. LITERATURE REVIEW

In the reference paper[1] the work embraces the CT imaging procedure of lungs for diagnosis and a probabilistic neural network for cataloguing tasks. First, pre-processing of the CT images of the lungs is carried out to eliminate distortions in the images and to prepare them as input for the next step of feature extraction. Feature extraction is achieved based upon the Grey-Level Co-Occurrence Matrix and the chaotic crow search algorithm.

The cataloguing of lung carcinoma by applying the GLCM features on the CT images is explained here. these GLCM features are provided as input information to the PNN classifier and obtained the cataloguing preciseness of 82.5%. To enhance the accuracy of the PNN classifier, a selection of prominent features with a chaotic crow search algorithm is performed in this work. This improves the accuracy of classification further by 7.5%.

In reference to paper[2], The work adopts a computer-aided diagnosis system which has four distinct steps for the discovery of carcinogenic nodules and tumors from lung Computed Tomography images and they are pre-processing of Computed Tomography lung images, appropriate feature extraction, selection of prominent features and classification. Here the Ant colony optimization technique is employed for appropriate feature extraction to achieve more promising results. Two types of ML techniques, Support Vector Machine and Artificial Neural Network are used to distinguish healthy and affected lung images. ANN demonstrated that it gives more promising results when compared to Support Vector Machine. Employing ANN, the accuracy of the system is noted as 98.40% which is more than the precision achieved by SVM.

[3] Initially thresholding was used to segment the lung tissues from the CT scan images. The approach of directly feeding the segmented CT images was used for the classification purpose, but this was proved

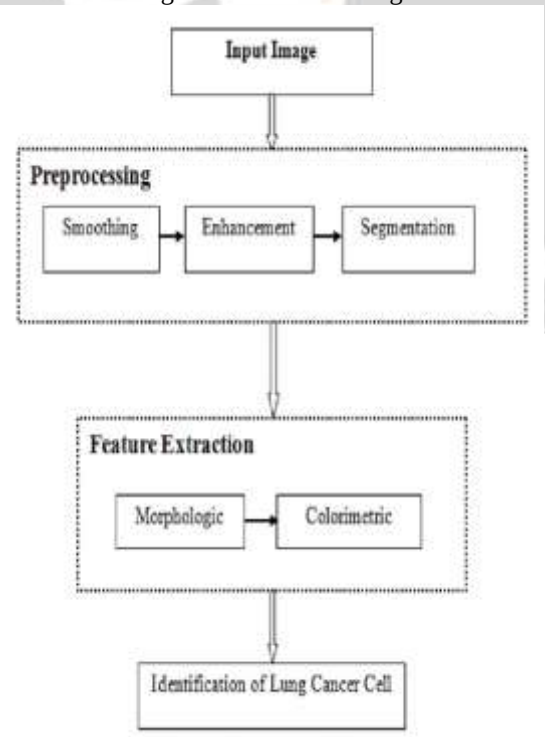
inadequate. A modified U-Net system that was trained on LUNA16 data was used as an alternative method to detect the nodule candidates. But the U-Net Nodule was found to produce many false positives.
Therefore, the regions of the CT images where the nodule candidates are most likely to be present as detected by the U-Net was fed into 3D CNN to further classify the CT images. The 3D CNNs produced a test set Accuracy of 86.6%.

[4] The goal of the paper is to classify the lung tissues into 3 classes namely, normal, benign, and malignant. Due to the availability of a large amount of data from the MR images, it is difficult for manual interpretation and analysis. Detecting the size and location of lung cancer accurately plays an important role in the diagnosis. The diagnosis method consists of four stages, pre-processing of CT images, feature, extraction, and classification, the features are extracted based on DTCWT and PNN. In the last stage, PNN is employed to classify the normal and abnormal.

[5] With the help of image processing and machine learning the paper aims to build an Automatic Diagnostic system for infectious lungs. To define the proper timing of the CT scan the rigger human breathing is detected and the ideal state of the aspiratory phase is evaluated. Noise removal is done by preprocessing, feature extraction extracts helpful options from the image, feature selection optimizes the top-ranking features and SVM classifies the images for detection of lung diseases.

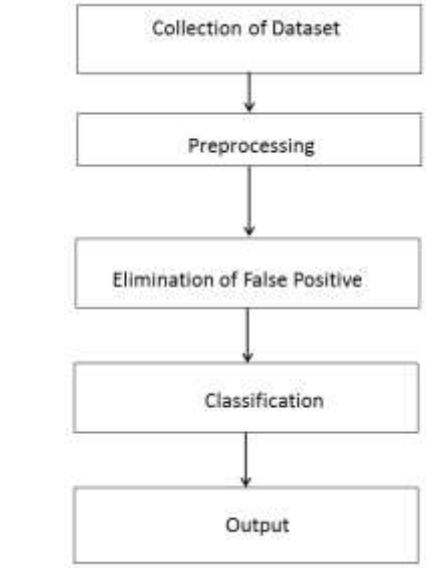
[6] This method requires image acquisition, preprocessing, feature extraction and feature selection. Features are extracted using two approaches GLCM as well as Statistical parametric approach. Lung carcinoma stages are detected. The highest accuracy of 78.95%, precision 0.77, recall 0.83 using Support Vector Machine was obtained.

[7] This paper has aimed to automate the detection of lung cancer to quickly and accurately diagnose the disease by the process of lung segmentation. For the segmentation, basic methods such as thresholding as well as advanced deep learning methods have been adopted. In this study an architecture called U-Net Convolution Network has been successfully implemented on a lungs dataset which contains 267 CT scan images and the segmentation maps of the corresponding images. To segment the regions of lungs, neurons and cells are segmented. The rescaling of image is done. The network consisting of 11 convolutional layers obtained an accuracy of 0.9678 and a loss of 0.0871 for segmentation of the lungs.



Title of the paper	Authors of the paper	Model/Sub Model used
Lung Cancer Detection using Probabilistic Neural Network with modified Crow-Search Algorithm	Sannasi Chakravarthy S R, Harikumar Rajaguru	PNN (Probabilistic Neural Network)
Application of Machine Learning Techniques for the Diagnosis of Lung Cancer with ANT Colony Optimization	Rashmee Kohad, Vijaya Ahire	CAD, SVM(Support Vector Machine),ANN
Cancer Detection and Classification with 3D CNN	Wafaa Alakwaa ,Mohammad Nassef ,Amr Badr	3D CNN
Lung Cancer Detection using Machine Learning	Vaishnavi. D, Arya. K. S, Devi Abirami. T, M. N. Kavitha.	DTCWT and PNN
Automated Diagnostics and Reporting for Detection of Lung Diseases	Reporting for Detection of Lung Diseases. Sanchita Shrivastava, Rupesh Mahajan.	SVM
Analysis of CT scan Images to Predict Lung Cancer Stages Using Image Processing Techniques	Mahmudul Islam, Al Hasib Mahamud, Raqeebir Rab	GLCM, Statistical parametric approach, SVM
Automatic Lung Segmentation on Thoracic CT Scans using U-Net Convolutional Network	Humera Shaziya, K. Shyamala and Raniah Zaheer	U-Net Convolution Network

III. METHODOLOGY



We aim to implement a system that uses CT scan images for detection of lung cancer. Once we input the image, it is then segmented using the Chan vese model for segmenting lung contours.

Segmentation removes the unnecessary background spaces and adjusts the pixels accurately. The system then classifies the images and displays the affected area only.

True/False is displayed on the screen as the output indicating if the lung is affected or not. After which the patient can be sent for further treatments if required.

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