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LUNG CANCER DETECTION SYSTEM

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Abstract: Lung Cancer is one of the dangerous disease which affects the human being easily. The reasons for getting lung cancer are Smoking, Exposure to secondhand smoke, Exposure to radon gas, Family history of lung cancer. Earlier there are some mechanisms for detecting lung cancer. The mechanisms are principal component analysis, naive Bayes, k-nearest neighbor, etc, but these algorithms give less accuracy and also these algorithms are used for smaller datasets. In this project we use neural networks that take large datasets and give more accuracy. The detection of lung cancer in early stages can save human lives and based on the symptoms also we can detect lung cancer. But based on the symptoms we can't decide whether it is a lung cancer or sometimes, it might be another disease. In this project we are using Convolution neural networks to detect lung cancer. Here first we remove the noise from the image after that we divide the image into multiple segments then we find the features of the image i.e. we calculate the size of the nodule. Based on those features we detect lung cancer. This project will easily tell whether the patient has lung cancer or not.

Index Terms **– Deep Learning, Segmentation, Convolution Neural Networks, K-means Clustering**

I. INTRODUTION

Lung cancer, as one of the most severe cancers with high incidence, has a devastating effect on human lives. Early detection of lung cancer has significantly reduce the mortality but suffers from a high false positive rate that leads to unnecessary diagnostic procedures Quantitative image analysis coupled deep learning techniques has the potential to reduce this false positive rate. Our project is very much helpful to the doctors to identify the stage of lung cancer. One of the important steps in detecting early stage cancer is to find out if there are any pulmonary nodules in the lungs which may grow to a tumor in recent future. Computerized Tomography (CT) Scan images are helpful to reduce the cancer deaths.

II. LITERATURE REVIEW

We have done some research work before doing this project. The detection of lung cancer involves two stages: one is the detection of lung nodules and another one is the reduction of false-positive rate. In recent years so many solutions are proposed but those solutions have some drawbacks and there are some improvements which are needed to be done in the future. In machine learning methods, researchers use Convolution neural networks but the drawback is they took help from radiologists to identify whether the patient has lung cancer or not. After that using CNN they identify the stage of the patient[1]. In another paper they use deep residual networks to identify the local and global features of a nodule. Deep residual networks give good results but it is composed of many layers, accuracy may be saturated. Some researchers propose random forest and XGBoost but those algorithms will give less accuracy and they will take only small datasets. Some researchers develop CAD Systems to detect lung cancer using SVM. To reduce the mortality rate we have to identify lung cancer in an early stage. The technique proposed by Hua,kai-lung for detection of lung cancer is Convolution neural networks and deep belief networks. He compares both classification techniques based on his classification he gets the highest accuracy using CNN.

III. PROPOSED SYSTEM

To develop lung cancer detection system we will use four steps:

- Preprocessing
- Segmentation
- Feature Extraction
- Classification

For Preprocessing we are using Weiner filter. For Segmentation we are using K-means Clustering, for Feature Extraction we are using Gray level co-occurrence matrix and for Classification we are using Convolution neural networks

3.1 Preprocessing

Data Preprocessing is a technique that removes the noise in the image. The main aim of preprocessing is to remove the impurities from the image which is useful for the forthcoming process. There are many preprocessing techniques i.e. Median filter, Mean filter, Wiener filter, Gaussian filter, Bilateral filter. Among these techniques we use wiener filter. This filter gives accurate results out of these filters.

3.1.1 Wiener Filter

The Wiener filter is a restoration process that means it will restore the image by removing the noise from the image to get the clarity of that image and it is better than an inverse filter. The Weiner filter incorporates both degradation function and the statistical characteristics of noise into the restoration process and it minimizes the mean square error. That's why it is also called a minimized mean square error filter.

3.2 Segmentation

Segmentation is a process of dividing the noise-free image into multiple segments. The purpose of dividing the image is we can easily extract the particular part of that image which is useful to tell whether the patient has lung cancer or not. There are many techniques out of those techniques we are using K-means clustering.

3.2.1 K-means Clustering

K-means clustering is an iterative algorithm that tries to partition the dataset into Kpredefined distinct non-overlapping clusters. It tries to make the inter-cluster data points as similar as possible while also keeping the clusters as far as possible. It assigns data points to a cluster such that the sum of the squared distance between the data points and the cluster centroid is at minimum

3.3 Feature Extraction

In image processing, Feature extraction is one of the important steps which means it first takes the segmented image and then it extracts the particular feature based on the problem statement. In our project we use a gray-level co-occurrence matrix.

3.3.1 Gray-Level Co-occurrence Matrix

A gray-level co-occurrence matrix is a statistical measure that is purely based on spot counting which is similar to local binary patterns. The process is firstly we look into one spot and look into its neighborhood after that we are going to count down the number of elements. As the name suggests co-occurrence which means that two objects need to occur simultaneously together. It is the best method to extract the features.

3.4 Classification

Classification is a method in which we categorize the given information into a given variety of classes. The fundamental goal of a classification problem is to pick out the elegance to which a new facts will fall beneath which Classifier based on training set.
There are some classification techniques that ate given bellow

- Convolution neural networks
- Back propagation
- Decision tree

In these techniques we use Convolution Neural Networks.

3.4.1 Convolution Neural Networks

Convolution neural networks are a type of neural network that is most often applied to image processing problems. The word Convolution itself refers to the filtering process. A convolution neural networks have a couple of layers that are unique. If there is any complex image it processed the image into an understandable format. Firstly it takes the extracted image and then it classifies the image based on the data we have and finally it tells whether the patient has lung cancer or not. CNN is generally used to analyze visual images by processing data with a grid-like topology that's why CNN is also called "Convent".

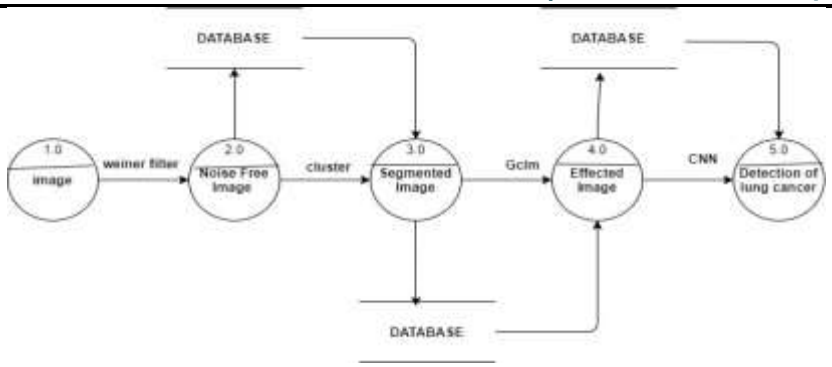

Fig 3.4.1.1 Architecture

IV. Conclusion

In this paper, we propose an approach to Lung cancer Detection employing feature extraction using a Gray level co-occurrence matrix and using convolution neural networks we identify whether the patient has lung cancer or not. The highest accuracy we get is 89%.

V. References

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