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DETECTION OF LUNG CANCER FROM CT IMAGE USING SVM CLASSIFICATION AND COMPARE THE SURVIVAL RATE OF PATIENTS USING 3D CONVOLUTIONAL NEURAL NETWORK

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ABSTRACT

Cancer is a quite common and dangerous disease. The various methods of cancer exist in the worldwide. Lung cancer is the most typical variety of cancer. The beginning of treatment is started by diagnosing CT scan. The risk of death can be minimized by detecting the cancer very early. The cancer is diagnosed by computed tomography machine to process further. In this paper, the lung nodules are differentiated using the input CT images. The lung cancer nodules are classified using support vector machine classifier and the proposed method convolutional neural network classifier. Training and predictions using those classifiers are done. The Nodules which are grown in the lung cancer are tested as normal and tumor image. The testing of the CT images are done using SVM and CNN classifier. Deep learning is always given prominent place for the classification process in present years. Especially this type of learning is used in the execution of tensor Flow and convolutional neural network method using different deep learning libraries.

Key terms: CT image, Convolutional neural network, SVM.

I.INTRODUCTION

Lung cancer is recognized as the main reason behind the death caused due to cancer in the worldwide. And it is not easy to identify the cancer in its early stages since the symptoms don't emerge in the initial stages. It causes the mortality rate

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considered to be the highest among all other methods of cancer. The number of humans dies because of the dangerous lung cancer than other methods of cancer such as breast, colon, and prostate cancers. There exists enormous evidence indicating that the early detection of lung cancer will minimize mortality rate. Biomedical classification is growing day by day with respect to image. In this field deep Learning plays important role. The field of medical image classification has been attracting interest for several years. There are various strategies used to detect diseases. Disease detection is frequently performed by observant at tomography images. Early diagnosis must be done to detect the disease that is leading to death. One among the tools used to diagnose the disease is computerized tomography. Lung cancer takes a lot of victims than breast cancer, colon cancer and prostate cancer together. This can be a result of asymptomatic development of this cancer. The Chest computed tomography images are challenging in diagnostic imaging modality for the detection of nodules in lung cancer. Biomedical image classification includes the analysis of image, enhancement of image and display of images via CT scans, ultrasound, MRI. Nodules within the respiratory organ i.e. lung are classified as cancerous and non-cancerous. Malignant patches indicate that the affected person is cancerous, whereas benign patches indicate an affected person as a non- cancerous patient. This can be done using various classifiers.

II.RELATED STUDY

Over the years, the demographic profile of lung cancer has modified. However, maximum reviews are restricted by means of small numbers, brief follow-up period, and show an inconsistent sample. A complete assessment of changing developments over an extended length has no longer been done. Consecutive lung cancer sufferers have been studied over a 10-yr length from January 2008 to March 2018 at the All India Institute of Medical Sciences, New Delhi, and applicable scientific information, and survival effects have been analysed, Lung most cancers is the leading motive of most cancers-related demise in the world and possibly to remain so in the foreseeable future. According to

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the GLOBACON record 2018, lung most cancers affected approximately 2.1 million and triggered 1.8 million deaths.[2] Cigarette smoking is with the aid of far the most important hazard aspect for lung most cancers. Risk increases with each amount and period of smoking.

III.EXISTING SYSTEM

Support Vector Machines is a method of machine learning approach taken for classifying the system. It examines and identifies the classes using the data. It is broadly used in medical field for diagnosing the disease. A support-vector machine builds a hyper plane in a very high or infinite dimensional area, which can be utilized for classification, regression, or totally different operation like outliers detection. Based on a good separation is obtained by the hyper plane in the SVM. After classification if the gap is large to the nearest training-data pictures of any class referred as functional margin, considering that in generally the larger the margin, the lesser the generalization error of the classifier. Fig-1 shows the support vector machine classifier that constructs a maximum margin decision hyper plane to separate two different categories. Support Vector Machine is a linear model applied for the classification and regression issues.

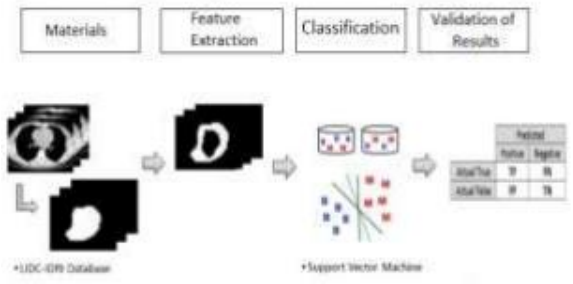

Fig.1. Training and prediction using SVM.

SVM algorithm finds the points closest to the line from both. The classes of these points are referred as support vectors. The mixed data of tumor nodules and normal nodules are provided as input In SVM algorithm the input images given are trained and the results are predicted, tuning the various parameters. Fig shows the training and prediction using SVM. Input images undergo feature extraction. At the training the various SVM parameters are tuned, and then the predictions are made using the hyper plane of SVM.

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IV.PROPOSED SYSTEM:

Convolutional neural networks encompass of multiple layers in its structures. CNN could be feed forward and extremely tremendous approach especially in detection. Network structure is built easy; has less training parameters. A convolution neural network have multiple layers within the neural network, that consists of one or a lot of convolution layers and so succeeded by one or more fully connected layers as in a standard multiple layers in neural network. Convolution neural network architecture is typically employed collaboration with the convolution layer and pool layer. The pooling layer is seen between convolution layers. It confuses the features of the particular position. Since not all the location features are not important, it just needs other features and the position. The pooling layer operation consists of max pooling and means pooling. Mean pooling calculates the average neighbourhood inside the feature points, and max pooling calculates the neighbourhood inside a maximum of feature points.

A CNN uses the learned features with input and make use of 2D convolutional layers. This implies that this type of network is best for processing 2D images. Compared to other methods of image classification, the network uses very little pre-processing. This means that they can use the filters that have to be built by user in other algorithms. CNNs can be utilized in various applications from image and video recognition, image classification, and recommender systems to natural language processing and medical image analysis.

1. Input: This layer have the raw pixel values of image.

2. Convolutional Layer: This layer gets the results of the neuron layer that is connected to the input regions. We define the number of filters to be used in this layer. Each filters that slider over the input data and gets the pixel element with the utmost intensity as the output.

3. Rectified Linear Unit [ReLU] Layer: This layer applies an element wise activation function on the image data. We know that a CNN uses back propagation. Thus in order to retain the equivalent values of the pixels

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and not being modified by the back propagation, we apply the ReLU function.

4. Pooling Layer: This layer performs a down-sampling operation along the spatial dimensions are width and height, resulting in volume.

5. Fully Connected Layer: This layer is used to compute the score classes i.e. which class has the maximum score corresponding to the input digits.

V.RESULTS DESCRIPTION

The dataset used in this paper is a collection of CT images of the carcinoma affected persons and also normal persons. Those images are of DICOM format, every individual image is having a multiple axial slices of the chest cavity. Those slices are displayed in the 2d form of slices. All the medical images are stored in microdicom format. The input image of dicom format is transformed by converting to .png, bmp and jpg format. The pydicom package which is available for spyder environment is used. The python language works good with all the dicom format images.

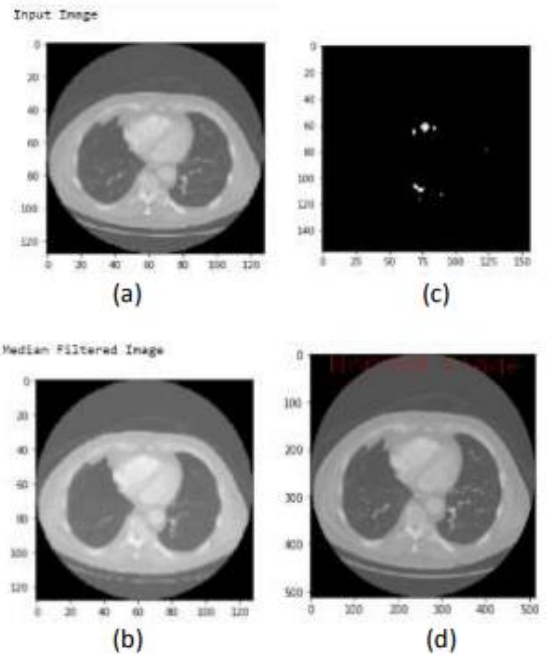

Fig.2. Lung cancer CT scans (a) Input image, (b) Median filtered image, (c) Nodules representation, (d) Detection of nodule as normal nodules

At valuation several metrics are utilised. Using confusion matrix, the performance is calculated. The binary classification technique is also realized. Confusion matrix is the easily understandable metrics used to find the model's accuracy. The accuracy of the system is determined by looking at the TN, TP, FN, and FP. The Results for the SVM classifiers are shown as various parameters like confusion matrix, accuracy score, and reports are extracted. Then

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followed by receiver operating characteristic curve is obtained.

VI.CONCLUSION:

This study draws attention to the diagnosis of lung cancer. Lung nodule classification is benign and malignant. The proposed method CNN architecture is specially regarded for its success in image classification compared to support vector machine. For biomedical image classification operation, it also obtains successful results. CNN architecture is used for classification in the study. Experimental results show that the proposed method is better than the support vector machine in terms of various parameters. The images in the data set used are rather small. In the future, the performance of the system can be improved with a larger dataset and an improved architecture. The proposed system is able to detect both benign and malignant tumors more correctly.

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