IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

A semi automatic classification of Lung disease using CNN*

KRISHNAVENI T
Department Of Computer Science
K.R College Of Arts And Science

PRABADEVI P
Department Of Computer Science
K.R College Of Arts And Science

Kovilpatti, India

Abstract—CT images were used to identify the lung disease. It is used to observe a variety of lung texture patterns. These images are a mixture of different patterns and therefore it becomes very difficult for the radiologist to distinguish between them and diagnose the disease. One way to solve this problem is to use Convolutional Neural Networks (CNN) have been applied in the field of medical imaging research and have successfully demonstrated their ability for image classification and recognition. Classifying the medical images by selecting the optimal features improves the performance of the classification process. Choosing the best features reduces the time and algorithm effort of the overall process. The main objective of the process is to select the optimal features from the different types of features extracted using different methods. Features were extracted from the images based on LBP features and CVH features. To use the best fit function based on Fisher's criterion to select the optimal features. Combining the fitness function with genetic optimization to improve the efficiency of the genetic algorithm. Feature extraction, optimization and classification play the efficient role to improve accuracy. The overall performance of was measured using performance metrics such as accuracy, sensitivity and specificity.

Keywords— CT , LBP, CVH, CNN, Genetic algorithm.

1. INTRODUCTION

Lung disease is a disease or disorder in which the lungs do not function properly. CT image together with the symptoms of the diseases gives a detailed assessment of the lung diseases. The main causes of lung diseases are caused by smoking, inhalation of medicines, smoke and allergic materials. Lung (CT) images have been used for a variety of purposes including lung parenchyma density analysis, airway

analysis, diaphragm mechanics analysis and nodule detection for cancer screening. In recent years of automated Quantitative analysis has become possible

with the help of computer technology.

To detect lung nodules on CT images, lung region must be separated or segmented from other regions such as muscle, adipose tissue, bone, mediastium and extracorporeal background. All subsequent processing steps are important to select interior of segmented lung area. Lung separation does not properly define the lung borders, the nodules outside the borders are missed. Choosing the right region of the lung area is very important. In the next step is a strong feature extraction method to extract some important features from segmented image. This Step is used to train the neural network and finally the system is tested for cancerous and non-cancerous images.

Early detection of pulmonary nodules is very important for diagnosis and treatment of lung disease. A CNN classification approach for predicting lung disease in CT images using hybrid features is presented.

Neural networks can be used to separate data and have been made in more or less efficient ways. SVMs are effective machine learning techniques for classification and regression. Combined with regression estimation and linear operation inversion, the SVMs are able to provide a novel approach to pattern recognition problems and make connections to statistical learning theories. A Support Vector Machine (SVM) is a discriminative classifier. CNNs have done extensive work on Deep learning. Evaluation of CNN performance in two applications: thoracic-abdominal lymph node detection and classification of interstitial lung disease classification. Based on the evaluation, visualization of CNN model, the CNN performance analysis can be generalized to high-performance CAD systems for other medical imaging.

2. LITERATURE SURVEY

PAPER 1: A REVIEW OF COMPUTER AIDED DETECTION AND DIAGNOSIS OF LUNG CANCER NODULES

In this paper, an attempt has been made to summarize some information about CAD and CADx for the purpose of early detection and diagnosis of lung cancer. Computer Aided Detection and Computer Aided Diagnosis are procedures in medical information that assist physicians in the interpretation of medical images. Imaging techniques in X-ray, MRI, and Ultrasound diagnostics provide a large amount of information that

the radiologist must comprehensively analyze and evaluate in a short time. Thus, the use of digital computers to assist practitioners and physicians in diagnosing diseases and to offer a rapid access to medical information gained importance. CAD systems help scan digital images.

PAPER 2: LUNG DISEASE PREDICTION USING IMAGE PROCESSING AND CNN ALGORITHM

In this paper to predict lung cancer can be a disease of uncontrolled cell growth in the lung tissue. Early stage of cancer is the key to a cure. In summary, criteria established for lung diseases earlier than the planning stage basically include those using X-ray films, CT, MRI so forth. In numerous parts of the planet far reaching screening by CT or MRI isn't yet pragmatic, in order that midsection radiology stays in starting and most elementary system. These systems are essential for the tasks of medical image exploration, lung field segmentation, processing, feature extraction, classification using neural system and SVM

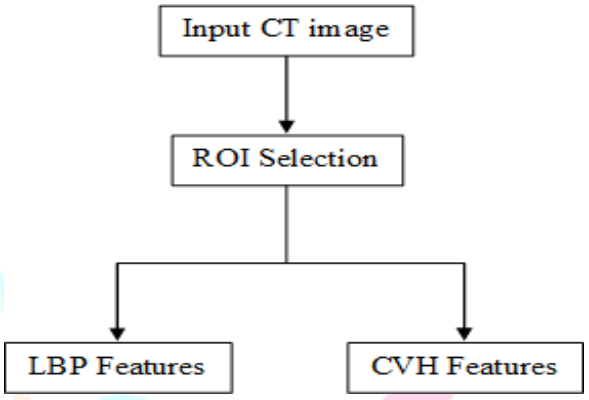
PAPER 3: LUNG DISEASE DETECTION USING FEATURE EXTRACTION AND EXTREME LEARNING MECHINE

In this paper to detect lung disease using Computerized Tomography images, which consist of many structures relevant to the diagnosis and analysis of lung disease. We use ACACM models (Adaptive Crisp Active Contour Models) to segment lung and to propose a novel method for lung disease detection based on ACACM segmented image within the co-occurrence statistics.

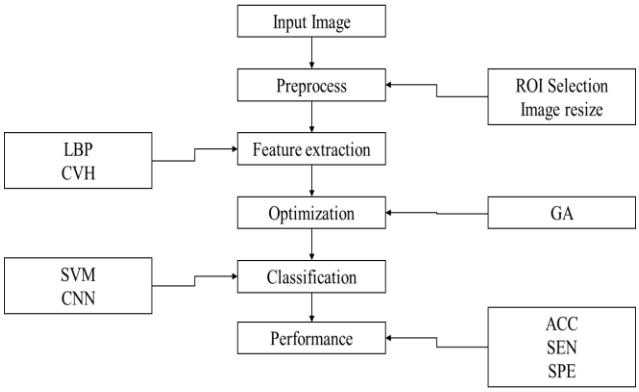
PAPER 4: A SURVEY OF DEEP LEARNING FOR LUNG DISEASE DETECTION ON MEDICAL IMAGES

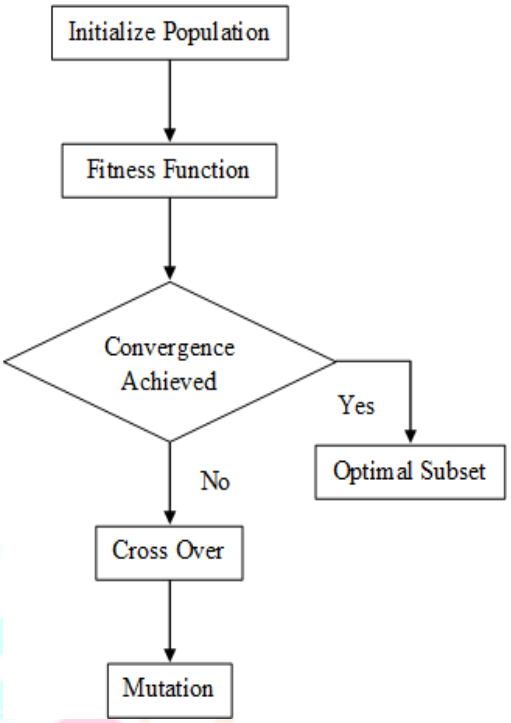
The purpose of this paper is to present taxonomy of state-of-the-art deep learning based on lung disease detection systems, visualize trends in recent work in this area and identify remaining issues and potential future directions in the domain. The survey considered 98 papers published from 2016 to 2020. The taxonomy contains seven attributes commonly found in surveyed paper: image type, features, data augmentation, deep learning algorithm type, transfer learning, classifiers and type of lung disease.

CT pixels are denoted as HU. In CHV function to evaluate a histogram of CT values for each ROI. The number of bins in the histogram is determined by experiments. In fact, we obtain various CVHs with different numbers of bins. Each CVH is tested for classification and the corresponding CAR is calculated. The number of bins which highest CAR value is adopted.



3. ARCHITECTURE





4. PROPOSED METHODS

- LBP features and CVH features.
- Feature Selection.
- Classification.
- Performance Measures.

LBP FEATURES AND CVH FEATURES:

An LBP function is a compact texture descriptor in which the result of each comparison between a center pixel value and one of its surrounding neighbors is encoded as a bit. It produce an integer value for each pixel. Then the compute frequency of each integer is figured out at the ROI level to obtain the corresponding feature vector.

LBP is very flexibly by using circular neighbors and the bi-lateral interpolation of pixel values. These kinds of neighbor's pixel value can be denoted by P and Rthat is sampling P neighbors from a circle of radius R around the center pixel. If the pixels are greater than the center pixel then value is assigned as 1 otherwise the value is assigned as 0. Almost 96 features were extracted using this function.

FEATURE SELECTION:

Feature selection function based on Fisher criterion and genetic optimization, it is referred to as FIG. The Fisher criterion is used to evaluate select feature value and the results based on genetic optimization algorithm is developed to find out optimal feature from candidate features. As the experimentalresults show, the FIG method can provide more effective recognition results with a satisfactory computation costs,compared to full set of original features.

CLASSIFICATION:

The objective of image classification is to classify the accurate disease. In this classification is based on two steps, training of the system followed by testing. A CNN classifiers is used to find disease in lung images.

CNN (convolution neural network) in the field of deep learning, dataset characteristics and transfer learning. It uses a variety of multilayer perceptrons designed for minimal processing. It is also called as move-variant or spatial- variant artificial neural network.

In this stage, an input image of size $R * C$ is convolved with a kernel (filter) of size $a * a$. Each block of the input matrix was convolved independently of the kernel and to produce an output pixel. Generally, a kernel of the convolution matrix is called as a filter and the output image features obtained by convolving kernel with the input images are called as feature maps of size $i * i$.

5. CONCLUSION

CT Lung images were taken as the input. The dataset consists of lung images with nine different type of diseases. The ROI is used to select lung images because the other regions may contain some unwanted information's. CHV and LBP features were extracted. Genetic algorithm and fisher criterion is used to select best features from extracted features. CNN classifiers are used to find disease in lung images. The performance measured indicates that CNN classifier is efficient using the selected best features. It used to identify which type of disease occur in the lungs and predict quickly. CNN classifier provides 96.67%

6. REFERENCES

[1] Zakaria Suliman Zubi and Rema Asheibani Saad, "Using Some Data Mining Techniques for Early Diagnosis of Lung Cancer,"Recent Researches in ArtificialIntelligence, Knowledge Engineering and Data Bases, Libya,2007.

[2] Paola Campadelli, Elena Casiraghi, and Diana Artioli,"A Fully Automated Method for Lung Nodule Detection From Postero-Anterior Chest Radiographs," In Proc. of IEEE TRANSACTIONS ON MEDICAL IMAGING, VOL. 25, NO. 12,DECEMBER 2006.

[3] JabaSheela L and Dr.V.Shanthi, "An Approach for Discretization and Feature Selection Of Continuous-Valued Attributes in Medical Images for Classification Learning," International Journal of Computer Theory and Engineering, Vol. 1, No.2,June2009.

[4] V.Krishnaiah, Dr.G.Narsimha, Dr.N.Subhash Chandra. 2013, "Diagnosis of Lung Cancer Prediction System Using Data Mining Classification Techniques," International Journal of Computer Science and Information Technologies, Vol. 4 (1), 2013, 39 – 45.

[5] T. Nuzhnaya, V. Megalooikonomou, H. Ling, M. Kohn, and R. Steine,"Classification of texture patterns in CT lung imaging," Proc. SPIE,vol.7963, pp. 796336, 1–7, 2011.