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CLASSIFICATION OF LUNG CANCER USING NEURAL NETWORK

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Abstract:

Image classification plays a vital role in medical images. Medical imaging technique is most commonly used to visualize the internal structure and function of the body. Magnetic Resonance Imaging (MRI scan) and Computed Temography (CT scan) provides contrast between normal cells and abnormal cells of the body. Lung Cancer is one of the serious disease causes death among the people. Lung Cancer is the uncontrolled growth of abnormal cells. In this classification method, the CT scan images are used to identify the cancerous cells in the lung. The CT scan images of the lung are given as input. The system should process the input image and detect the cancer. This method can classify the stages of the cancer. The different abnormality cells of the patients are taken for processing and classifying the stages of the patients. Support vector machine is used for image classification. Classification is the popular supervised technique. The Support vector machine is used to improve the efficiency for the image classification. Experimental results have shown that the proposed methodology is effective.

Keywords – Temography, Magnetic, supervised technique.

1. INTRODUCTION

In today's digital era, storing and analysis of medical image had been digitized. Even with state of the art techniques, detailed interpretation of medical image is a challenge from the perspective of time and accuracy. The challenge stands tall especially in regions with abnormal color and shape which needs to be identified by radiologists for future studies. The key ask in designing such image processing and a computer vision application is the accurate classification of medical images. The century will pass away, but the birth of medical computing and its reward to advances in medicine will used in a new plate of technological innovations which focus on ideal and convenient delivery of medical services. Both medicine and computing are growing at a rapid rate. Undoubtedly the growth in medicine has benefited much from the growth in computers. Precise diagnosis, fast data and voice communication, instant generation of patient data, invention of biomedical equipment and medical laser technology are a few of these lifesaving rewards from computers to medicine. Even then challenges and potentials remains a lot in both medical and computer. Scientists plan to cope with the waves of new computer technology for the future. The discussion is about the future medical computing by new computer innovations that will have impact on medical delivery system.

The 21st century has seen a transformation of technology in the healthcare industry. Computers now affect all spheres of medicine and new medical advancements have been created to improve efficiency, as well as, simplify testing and treatment processes. Moreover, these new developments have led a faster calculating power, to more intricate testing capabilities and have enhanced the diagnosis process in the medical images. Now, Scientists and Researchers are using MRI and CT Scans in the field of identifying the internal parts of the human body, especially for Lung Cancer

(LC). The proposed system is an efficient system for detection of normal cells and abnormal cells. The method detection is done by using binarization approach and classification of the stages is done by using Support Vector Machine classifier. The method is developed in Mat lab simulation environment in order to check for applicability of proposed method.

2. LITERATURE REVIEW

The literature shows the various methods for the detection of Lung cancer. This method uses a binarization approach and neural network classifier to detect lung cancer. From each CT scan images a feature extraction is done to extract the features of images which were introduced to neural network as input. Lung cancer detection uses images processing procedures to detect the cancer. In this we extract the number of white pixels and check them against some threshold to check the normal and abnormal lungs. The white pixels of a new image is less than that the threshold then it indicates that the image is normal, otherwise, if the number of the white pixels is greater than that of threshold it indicates that the image in abnormal. The fuzzy classifier is used for classification of malignant nodules Fuzzy layer have some common features such as distributed representation of knowledge and ability to handle data with uncertainty and imprecision. Fuzzy logic has tolerance for imprecision of data while neural networks have tolerance for noisy data. The model includes layer such as input layer, fuzzification layer, and rule inference layer. The texture feature estimation algorithms are applied to various lung cancer chest X-ray images such as Small-cell (SC)and Non-Small Cell (NSC) type, as well as on Tuberculosis (TB) images (49 images from each category). Initially, the identifying features are obtained from the X-ray images using image processing and analyzing methods. Then, these features are applied to an expert system to classify the lung cancers into malignant (SC, NSC) and benign (TB).

3. ARTIFICIAL NEURAL NETWORKS

Artificial Neural Network (ANN) takes their name from the network of nerve cells in the brain. Recently, ANN has been found to be an important technique for classification and optimization problem. Artificial Neural Networks (ANN) has emerged as a powerful learning technique to perform complex tasks in highly nonlinear dynamic environments. Some of the prime advantages of using ANN models are their ability to learn based on optimization of an appropriate error function and their excellent performance for approximation of nonlinear function. The ANN is capable of performing nonlinear mapping between the input and output space due to its large parallel interconnection between different layers and nonlinear processing characteristics. An artificial neuron basically consists of a computing element that performs the weighted sum of the input signal and the connecting weight. The sum is added with the bias or threshold and the resultant signal is then passed through a nonlinear function of sigmoid or hyperbolic tangent type. Each neuron is associated with three parameters whose learning can be adjusted; these are the connecting weights, the bias and the slope of the nonlinear function. For the structural point of view a NN may be single layer or it may be multilayer. In multilayer structure, there is one or many artificial neurons in each layer and for a practical case there may be number of layers. Each neuron of the one layer is connected to each and every neuron of the next layer. The functional link ANN is another type of signal layer NN. In this

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type of network the input data is allowed to pass through a functional expansion block where the input data are nonlinearly mapped to more number of points.

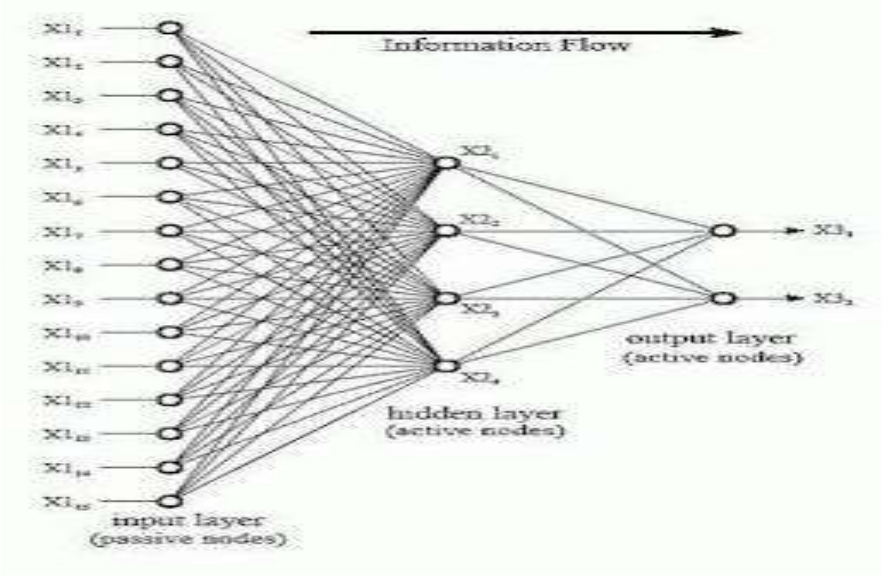

Fig.1. Neural Network Architecture

A Neural Network is a machine that is designed to model the way in which the brain performs a particular task or function of interest. To achieve good performance, they employ a massive interconnection of simple computing cells referred to as 'Neurons' or 'processing units'. Hence a neural network viewed as an adaptive machine can be defined as a neural network is a massively parallel distributed processor made up of simple processing units, which has a natural propensity for storing experimental knowledge and making it available for use. Chemotherapy uses drugs to kill cancer cells. One or more chemotherapy drugs may be given through a vein in arm (intravenously) or totally orally. A combination of drugs usually is given in a series of treatments over a period of weeks or months with breaks in between so that can recover. Chemotherapy is often used after surgery to kill any cancer cells that may remain. It may also be used before surgery to shrink cancers and make them easier to remove. In some cases, chemotherapy can be used to relieve pain and other symptoms of advanced cancer.

4. CLASSIFICATION TECHNIQUES

The process of training of the ANN consists in changing the weights assigned to connections of neuron until the achieved result is satisfactory. Two main kinds of learning can be distinguished: supervised and unsupervised learning. In the first of them external teacher is being used to correct the answers given by the network. ANN is considered to have learned when computed errors are minimized. Unsupervised learning does not use a teacher. ANN has to distinguish patterns using the information given to the input without external help. This learning method is also called self-organization. It works like a brain which uses sensory impressions to recognize the world without any instructions. One of the best known learning algorithms is the Back-propagation Algorithm (BPA). This basic, supervised learning algorithm for multilayered feed-forward networks gives a recipe for changing the weights of the elements in neighboring layers. It consists in minimization of the sum of squares errors, known as a least squares. Despite of the fact that BPA is an ill-conditioned

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optimization problem, thanks to specific way of the errors propagation, BPA has become one of the most effective learning algorithms. In supervised training, both the inputs and the outputs are provided. The network then processes the inputs and compares its resulting

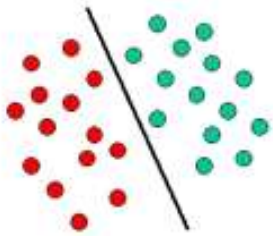

Fig.2.Linear classifier

outputs against the desired outputs. Errors are then propagated back through the system, causing the system to adjust the weights which control the network. This process occurs over and over as the weights are continually tweaked. The set of data which enables the training is called the "training set." During the training of a network the same set of data is processed many times as the connection weights are ever refined. Kohonen has pointed out that the lack of topology in neural network models make today's neural networks just simple abstractions of the real neural networks within the brain. As this research continues, more powerful self learning networks may become possible. But currently, this field remains one that is still in the laboratory.

5. RESULT ANALYSIS

Lung CT-Scans has been collected and after image processing total 16 features have been extracted and trained and based on that trained features the testing image classification is done to check the normal or abnormal state of the patient. The classification is done with the help of neural network which tells the state of the patient whether it is normal or abnormal.

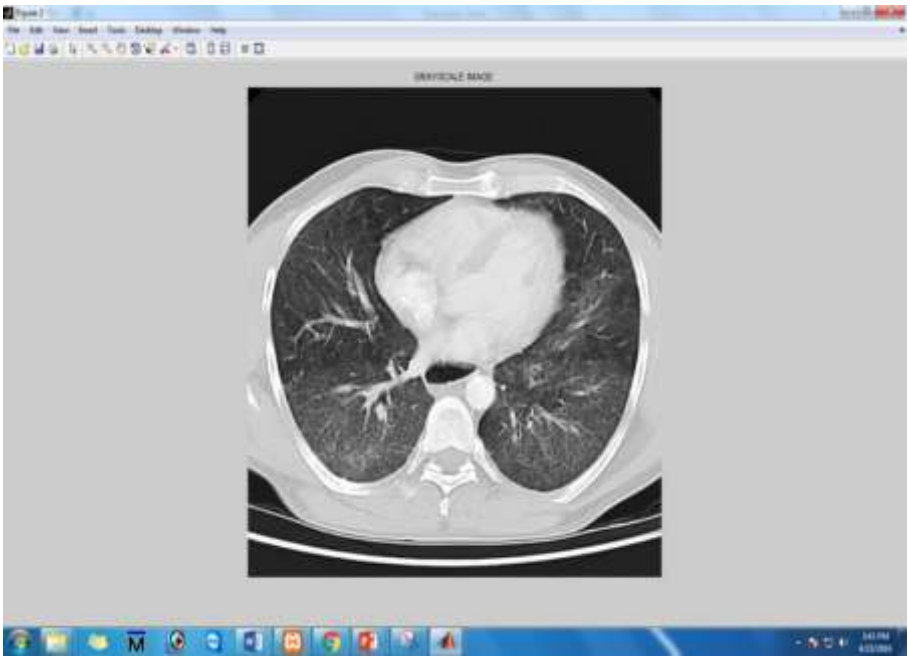

Fig.3.Greyscale image

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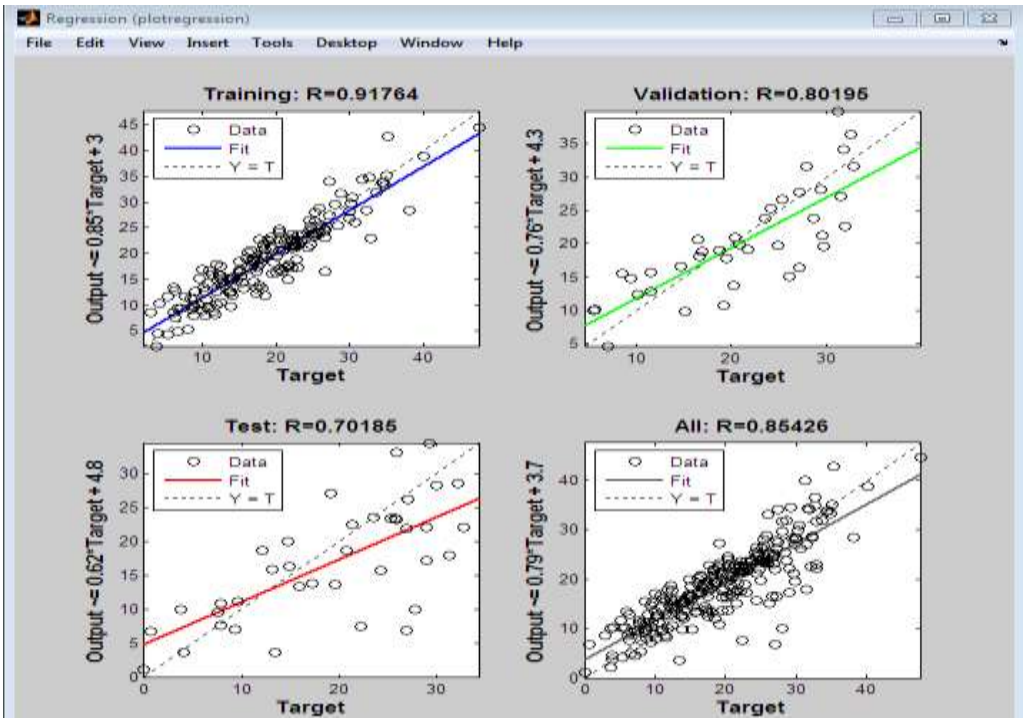

Fig.4. Simulation of Abnormal lungs

Along with this on the basis of features extracted it determines the tested lung images belong to normal or abnormal. Based on the features extracted the above image exceeds the normal range of the lung nodules so the newly arrived image belongs to the abnormal category.

CONCLUSION

ANNs have very efficient tools for classification and pattern recognition and they can be successfully used in cancer applications. They can increase the detestability of dangerous diseases and lower the morality rate of the patients. Lung cancer can be recognized by the doctor based on the tumor present in the lungs. After using the program, the doctor has to decide what to do with the results. The features extracted from the lung images of the patients are useful to detect the normal or abnormal lungs. Although the computers cannot replace oncologist, they can make their work easier and more effective. Proposed system might also be very useful for general practitioners, who do not have wide knowledge about oncologist. ANN and SVM are participated in the lung cancer image classification. The MATLAB stimulation results are based on the images recognition. ANN based on used to the back propagation Algorithm to train the images based on the extracted features of normal range.

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