

Early Lung Cancer Detection using Radial Basis Function Neural Networks (RBFNN)

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Abstract - Nowadays cancer has become large threat in human life .There are many varieties of cancer, Lung Cancer is one in every of the common sorts inflicting terribly high rate. The most effective approach of protection from Lung Cancer is its early detection and prediction. The detection of Lung Cancer in early stage may be a difficult downside, the structure of the cancer cells, wherever utmost of the cells are overlapped with one another. It's a machine procedure that kind pictures into teams in keeping with their similarities. During this bar chart equalisation is employed for preprocessing of the photographs and has extraction method and neural network classifier to visualize the condition of a patient in its early stage whether or not it's traditional or abnormal. The performance relies on the proper and incorrect classification of the classifier.

I. INTRODUCTION

Cancer is that the most serious unhealthiness worldwide. Lung Cancer is one in all the foremost dangerous cancers within the world, with the smallest amount survival rate when the diagnosing, with increase within the range of deaths once a year bit by bit. Lung Cancer is cause thanks to uncontrolled growth of abnormal cells in one or each of the lungs .The attainable treatments area unit surgery, therapy, and radiation. The sooner the detection offers the upper the probabilities of productive treatment. It's thought of to be the most reason for cancer death worldwide, and it's onerous to discover in its early stages as a result of its symptoms seem solely within the advanced stages inflicting the death rate to be the very best among all alternative forms of cancer. Additional individuals die thanks to Lung Cancer than alternative forms of cancer like breast, skin, colon, and prostate cancers. There is an important proof indicating that the first detection of Lung Cancer can decrease death rate. The most recent estimates in line with the recent survey provided by world health organization indicate that around seven.6 million deaths in whole world annually thanks to this sort of cancer. There are several techniques to diagnose Lung Cancer, like Chest Radiography (x-ray), X-radiation (CT), resonance Imaging (MRI scan) .but, most of those techniques area unit expensive and time intense. And most of those techniques area unit police work the Lung Cancer in Its advanced stages. Hence, there's an excellent would like of a replacement technology to diagnose the Lung Cancer in its early stages. Image process techniques offer a decent category tool for cultivating the manual analysis. Artificial neural networks provide a very completely different approach to drawback resolution and that they area unit typically known as the sixth generation of computing. The target of this analysis is to use neural networks and their associated analysis techniques to Health care, specifically to the management of Lung Cancer patients. Variety of medical researchers used the analysis of phlegm cells for early detection of Lung Cancer, most up-to-date analysis relay on quantitative data, like the form, size and therefore the quantitative relation of the affected cells.

II. SYMPTOMS of LUNG CANCER

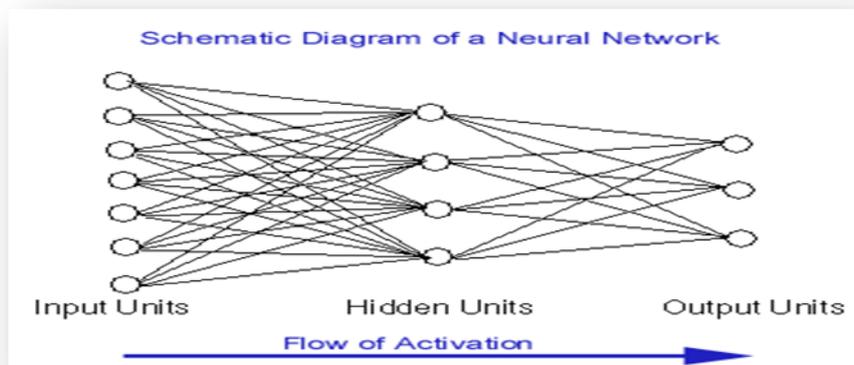
The lungs are usually large in size hence tumors can grow in them for a long time before they are found. Even when the symptoms such as coughing and fatigue occur, people think they are due to other causes. Hence for this reason, the early-stage lung cancer i.e. stages I and II are difficult to detect. Many people having lung cancer are diagnosed at stages III and IV. Doctors utilize a some methods to diagnose lung tumor, for example, X-rays, CT Scan, PET scan etc

1. Coughing, especially if it persists or becomes intense
2. Pain in the chest, shoulder, or back unrelated to pain from coughing
3. A change in color or volume of sputum
4. Shortness of breath
5. Changes in the voice or being hoarse
6. Harsh sounds with each breath
7. Recurrent lung problems, such as bronchitis or Pneumonia.
8. Coughing up phlegm or mucus, especially if it is tinged with blood

III. TECHNICAL SPECIFICATIONS

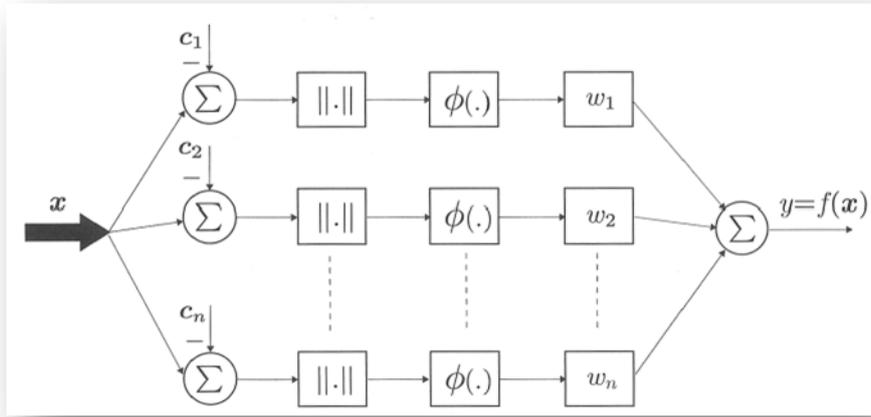
I. Basic ANN Architecture

An artificial neural network is associate scientific discipline system that has sure performance characteristics almost like biological neural networks. Neural network consists of an oversized variety of easy process components known as neurons. every nerve cell connects to different neurons by means that of directed communication links, every with associate associated weight. The weights represent data employed by the network to resolve a drag. Below Fig. shows the essential style of a straightforward multilayer neural network. In general, multilayer ANNs will have over one hidden layer.



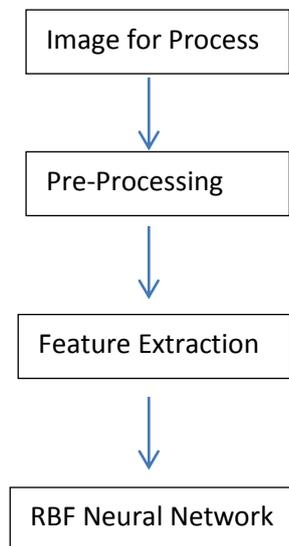
II. RBF Neural Network :

Among the immense kind of neural networks, the RBF-NN may be a definite quantity normally used structure. The look of a RBF-NN in its most elementary kind consists of 3 separate layers. The input layer is that the set of supply nodes (sensory units). The second layer may be a hidden layer of high dimension. The output layer offers the response of the network to the activation patterns applied to the input layer. The transformation from the input area to the hidden-unit area is nonlinear. On the opposite hand, the transformation from the hidden area to the output area is linear. Here the output $y(t)$ is a weighted sum of the outputs of the hidden layer.

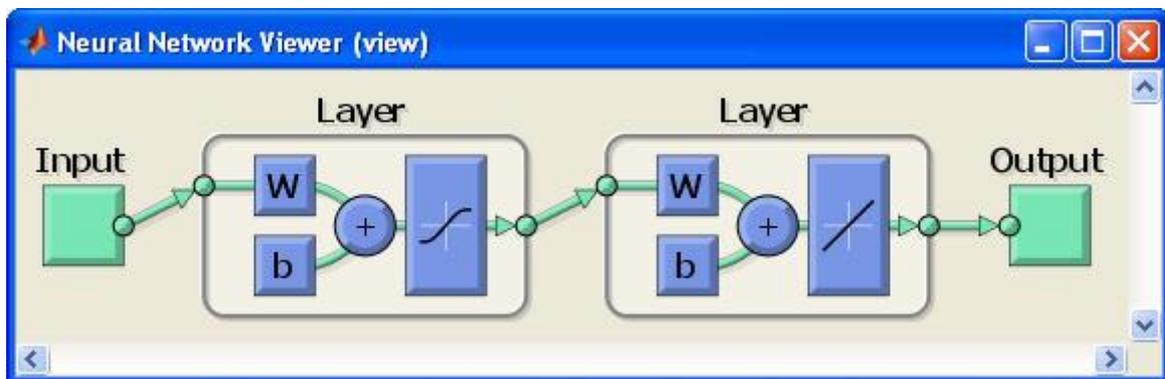


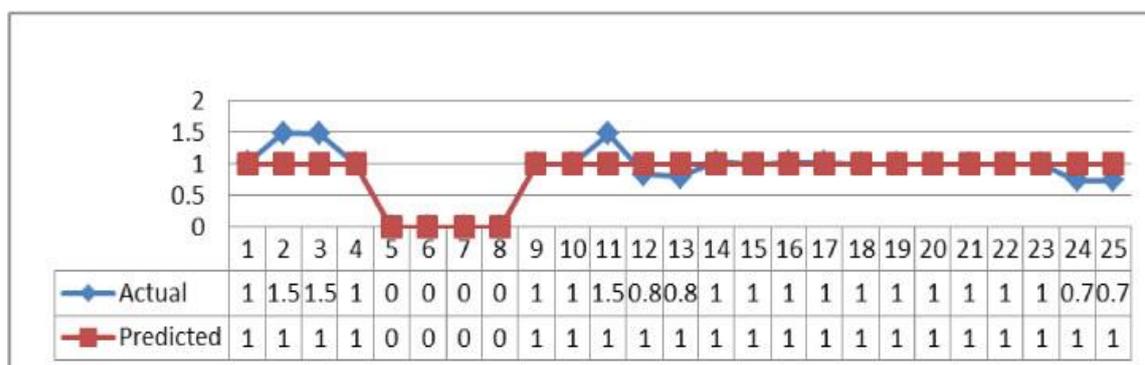
IV. METHODOLOGY

A total range of 50 information managed to be collected. During which 25 are the cancerous and also the remaining 25 are non-cancerous. No further data on the CT scan pictures are obtained, so the medical standing and also the background of the pictures.



V. RESULTS





VI. ADVANTAGES

- 1] It requires less input of knowledge about the problem than other approaches.
- 2] It is skilled of implementing more complex separating of feature space.
- 3] It is amenable to high-performance parallel processing implementation of image.
- 4] It works for both linear and non-linear data.
- 5] It works with high accuracy.

VII. CONCLUSION

Radial Basis Function Neural Network algorithmic ruleshows the simplest results with providing highest TP Rate and lowest FP Rate and just in case of properly classification, it offers the 97% result as compare to alternative classifiers. Radial Basis Function Neural network model may be a diagnostic system that performs at associate accuracy level is made. This prediction might facilitate doctor to arrange for a stronger medication and supply the patient with early identification.

VIII. FUTURE SCOPE

The million order dataset are often elite and image classification are often done on larger dataset. With improved size of informationset numerous problems like uploading data, managing feature set,inflated execution time of classification algorithms etc. may well be thought of. Additional imageoptions are often extracted for higher classification. Numerous combination s of previous options is often accustomed properly classify medical information.

REFERENCES

- [1]. Ilya Levner, Hong Zhangm ,“Classification driven Watershed segmentation ”IEEE TRANSACTIONS ON IMAGE PROCESSING VOL. 16, NO. 5, MAY 2007
- [2]. Anita chaudhary, Sonit Sukhraj Singh,“Lung Cancer Detection on CT Images Using Image Processing ”, International transaction on Computing Sciences, VOL 4, 2012

- [3]. B.V. Ginneken, B. M. Romeny and M. A. Viergever, “Computer-aided diagnosis in chest radiography: a survey”, IEEE, transactions on medical imaging, vol. 20, NO.12,DEC-2001
- [4]. Disha Sharma, Gagandeep Jindal,“Identifying Lung Cancer Using Image Processing Techniques ”, International Conference on Computational Techniques and Artificial Intelligence (ICCTAI’2011), vol: 17, pp: 872-880,2011
- [5]. Nguyen, H. T.,et al,“Watersnakes: Energy-Driven Watershed Segmentation”, IEEE Transactions on Pattern Analysis and Machine Intelligence, Volume 25, Number 3, pp.330-342, March 2003
- [6]. Suzuki K., “False-positive Reduction in Computer-aided Diagnostic Scheme for Detecting Nodules in Chest Radiographs”,Academic Radiology, Volume 13, Number 10, pp.10-15, February 2005
- [7]. D. Lin and C. Yan, “Lung nodules identification rules extraction with neural fuzzy network”, IEEE, Neural Information Processing, vol. 4, (2002)
- [8]. B. Zhao, G. Gamsu, M. S. Ginsberg, L. Jiang and L. H. Schwartz, “Automatic detection of small lung nodules on CT utilizing a Detection of Lung Cancer Stages on CT scan Images by Using Various Image Processing Techniques www.iosrjournals.org 35 | Page local density maximum algorithm”, journal of applied clinical medical physics, vol. 4, (2003).
- [9]. R. A. Blechschtmidt, R. Werthschtzky, and U. Lrcher, “Automated CT image evaluation of the lung: A morphology-based concept”, IEEE Transaction on Medical Imaging., vol. 20, no. 5, pp. 434442, May 2001
- [10]. S.Sivkumar,“Lung Nodule Detection Using Fuzzy Clustering and Support Vector Machine ”, International Journal of Engineering and Technology Volume 5, No. 1, ISSN: 0975-4024, March 2013. [11]. Hala Al-shamlan, Ali El Zaart, “Feature Extraction Values for Breast cancer Images”,International Conference on Bioinformatics and Biomedical Technology,May 25, 2005 [12]. Mokhled S. AL-TARAWNEH, “Lung Cancer Detection Using Image Process-ing Techniques”,Leonardo Electronic Journal of Practices and Technologies,(ISSN 1583-1078), Issue 20, p. 147-158, January-June 2012.
- [13]. The DICOM Standards Committee. DICOM homepage. <http://medical.nema.org/>, September 2004.
- [14]. Shiyong Hu, Eric A. Hoffman, Joseph M. Reinhardt,“Automatic Lung Segmentation for Accurate Quantization of Volumetric XRay CT Images”, IEEE TRANS-ACTIONS ON MEDICAL IMAGING, VOL. 20, NO. 6, JUNE 2001
- [15]. Hye Suk Kim,Hyo-sun Yoon, “Automatic Lung Segmentation in CT Images using Anisotropic Diffusion and Morphology Operation”, Seventh International IEEE Conference on Computer and Information Technology, 0-7695-2983-6/07, july 2007.
- [16].Rushin Shojaii, Javad Alirezaie,“Automatic Lung Segmentation in CT Images using Watershed Transform”,International Conference on Biomedical Technology, IEEE , 0-7803-9134-9, May 2005.

