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Artificial Neural Networks (ANNs) in Lungs Cancer Detection

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Abstract-The research looks into the use of an Artificial Neural Network model to detect the presence of lung cancer in someone's body. We developed an Artificial Neural Network (ANN) in this paper to detect the presence or absence of lung cancer in the human body. Symptoms such as yellow fingers, anxiety, chronic disease, fatigue, allergy, and wheezing, coughing, shortness of breath, swallowing difficulty, and chest pain were used to diagnose lung cancer. They were used as input variables for our ANN, along with other information about the person. Our ANN was created, trained, and validated using the data set "survey lung cancer." The ANN model was found to be 96.67 percent accurate in detecting the absence or presence of lung cancer.

Key words: Artificial Neural Networks, Cancer Detection

INTRODUCTION

Cancer is a broad term. It refers to the illness that occurs when cellular changes cause uncontrolled cell growth and division (1). Most cells in the body serve specific functions and have fixed lifespan (**Figure 1**).

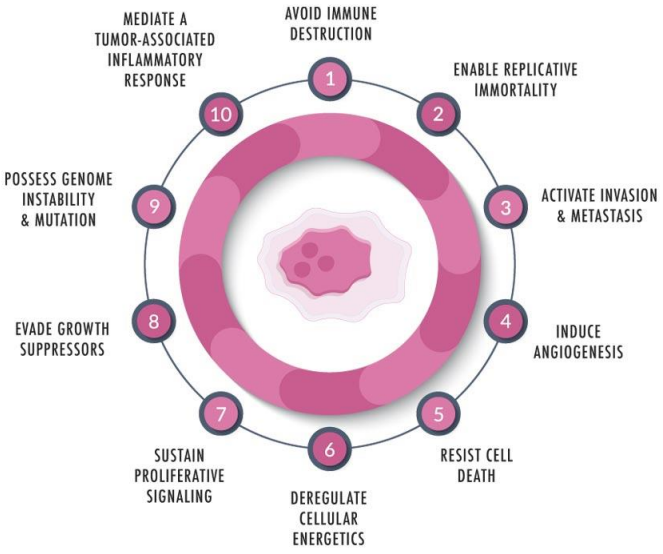

Figure 1: The 10 hallmarks of cancer, as defined by Douglas Hanahan and Robert A. Weinberg

Cell death, on the other hand, is a natural phenomenon known as apoptosis (**Figure: 2**). A cell is programmed to die so that the body can replace it with a newer, better-functioning cell. Cancerous cells do not have the mechanisms that train them to stop dividing and die (2).

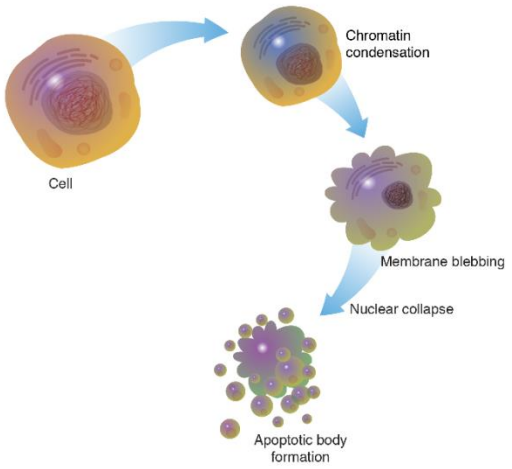

Figure 2: Apoptosis

As a result, they grow in the body, consuming oxygen and nutrients that would otherwise go to other cells. Cancerous cells can form tumors, harm the immune system, and cause other abnormalities that prevent the body from functioning properly. Lung cancer is a type of malignant lung tumor that is distinguished by uncontrolled cell growth in lung tissues. Lung cancer is the foremost reason of malignancy death (3). The primary goal of our research is to detect the presence of lung cancer cells using attributes, which are a collection of human symptoms and data (**Figure 3**).

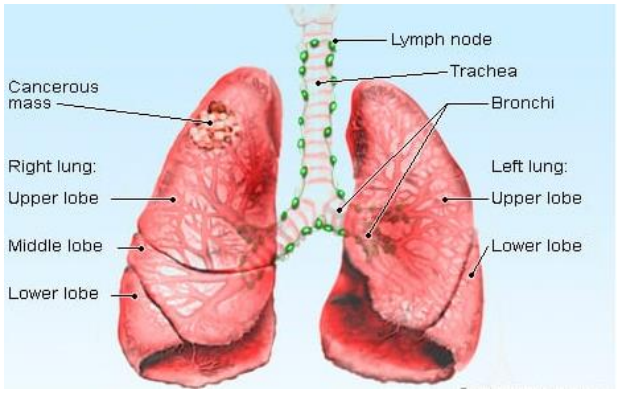

Figure 3.Cancer

An artificial neural network (ANN) is a computational model made up of several processing elements that receive inputs and output results based on predefined activation functions. Artificial neural networks (ANNs) are computational networks that are biologically inspired (4). Among the various types of ANNs, we focus on multilayer perceptions (MLPs) with back propagation learning algorithms in this paper (**Figure: 4**).

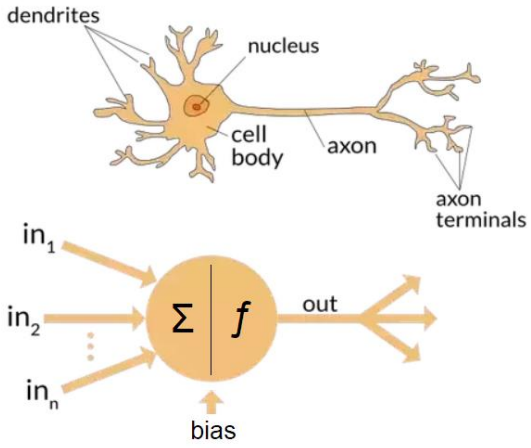

Figure: 4. artificial neural network (ANN) is a computational model made up of several processing elements that receive inputs and output results based on predefined activation functions

MLPs, the most common ANNs used for a wide range of problems, are supervised procedures with three layers: input, hidden, and output (**Figure: 5**). we discuss the structure, algorithm, data preprocessing, over fitting, and sensitivity analysis of MLPs. Furthermore, we discuss the benefits and drawbacks of MLPs and recommend their use in ecological modeling. Finally, an example of MLP's practical application in ecological models is presented (5).

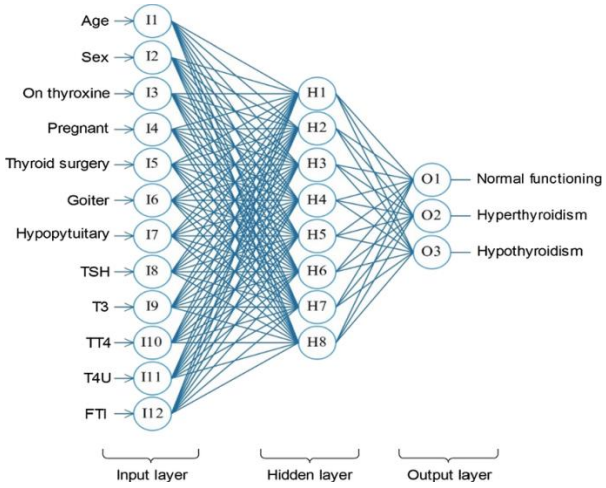

Figure: 5. MLPs, the most common ANNs used for a wide range of problems, are supervised procedures with three layers: input, hidden, and output

Artificial neural networks (ANNs) are statistical models in which the mathematical structure replicates the biological organization of neural cells while simulating the brain's learning dynamics. Although definitions of the term ANN vary, the term is typically used to refer to a neural network used for non-linear statistical data modeling. The neural models used in various fields of medicine today, such as oncology, are not designed to be biologically realistic in detail, but rather to be efficient models for nonlinear regression or classification(6).

ANN inference has applications in tasks that require focusing attention. ANNs have a place in clinical decision support as well, but their success is dependent on better integration with clinical protocols, as well as an understanding of the need to combine different paradigms to produce the simplest and most transparent overall reasoning structure, and the willingness to test this in a real clinical setting (7). We assessed the evidence for potential improvements in the use of ANN in lung cancer research (**Figure: 6**). our analysis revealed that the use of ANN in the medical literature was frequently not done correctly. A close collaboration between physicians and biostatisticians could be beneficial in identifying and correcting these errors (8).

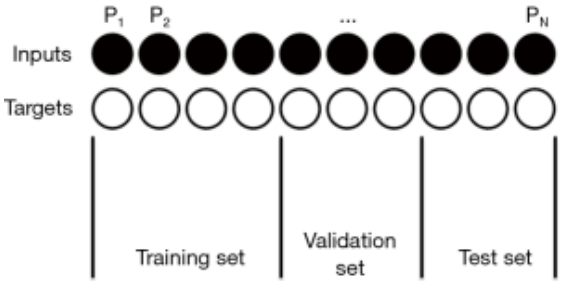

Figure: 6. Evidence for potential improvements in the use of ANN in lung cancer research

The goals of this study are as follows: to identify some appropriate factors that cause lung cancer, to model an Artificial Neural Network that can be used to detect the presence of lung cancer, artificial neural networks (ANNs) are similar to our neural networks and offer a good technique for solving the classification and prediction problems(9).

An ANN is a mathematical model that is inspired by the structure and functionality of natural neural networks. Input and output layers are present in neural networks, as well as (in most cases) hidden layers that transform the input into something that the output layer can use (10). When a neural network is used to detect cancer, the ANN Model goes through two stages: training and validation. The network is first trained on a dataset. The weights of the neural connections are then fixed, and the network is validated to determine the classifications of a new dataset.

CONCLUSION

Lung cancer is one of the most lethal diseases that has ever existed. Unfortunately, once this disease has spread to a significant extent or reached a critical stage, it is extremely difficult to treat. Computer-Aided Detection (CAD) is one of the rapidly evolving technologies that aids in the detection of cancer by incorporating patient-related information such as scans such as CT-Scan, X-Ray, MRI Scan, unusual symptoms in patients, biomarkers, and so on. SVM, CNN, ANN, Watershed Segmentation, Image enhancement, and Image processing are some of the methods used to improve accuracy and speed up the process.The most commonly used datasets for training are LUNA16, Super Bowl Dataset 2016, and LIDC-IDRI. We intend to use this review paper to list all of the major studies that have been conducted in recent years and can be improved upon to achieve better results.

REFERENCES

1. Attal, M., J. L. Harousseau, T. Facon, F. Guilhot, C. Doyen, J. G. Fuzibet, M. Monconduit, et al. 2003. Single versus double autologous stem-cell transplantation for multiple myeloma. *The New England Journal of Medicine* 349, (26) (Dec 25): 2495-502.

2. DEVON CARTER, T cells, B cells and the immune system,2021, https://www.mdanderson.org/cancerwise/t-cells--b-cells-and-the-immune-system.h00-159465579.html

3. Faraz Siddiqui, Sarosh Vaqar, Abdul H. Siddiqui, Lung Cancer(2022) https://www.ncbi.nlm.nih.gov/books/NBK482357/
4. Soft Computing: Fundamentals and Applications by D.K.Pratihar, Narosa Publishing House, New-Delhi, 2014
5. Park, Y. S., & Lek, S. Artificial Neural Networks: Multilayer Perceptron for Ecological Modeling. (2016). In *Developments in Environmental Modelling* (pp. 123-140). (Developments in Environmental Modelling; Vol. 28). Elsevier B.V... https://doi.org/10.1016/B978-0-444-63623-2.00007-4
6. Luca Bertolaccini, Piergiorgio Solli, Alessandro Pardolesi, and Antonello Pasini, An overview of the use of artificial neural networks in lung cancer research, J Thorac Dis. 2017 Apr; 9(4): 924–931. doi: 10.21037/jtd.2017.03.157
7. YongjunXu,XinLiu,XinCao,ChangpingHuang,EnkeLiu,SenQian,XingchenLiu,Yanjun Wu,FengliangDong,ChengWeiQiu,JunjunQiu,KeqinHua,WentaoSu,JianWu,HuiyuXu, YongHan,ChenguangFu,ZhigangYin,MiaoLiu,RonaldRoepman,SabineDietmann,MarkoVirta,FredrickKengara,ZeZhang,LifuZhang,TaolanZhao,JiDai,JialiangYang,LiangLan,MingLuo,ZhaofengLiu,TaoAn,BinZhang,XiaoHe,ShanCong,XiaohongLiu,WeiZhang, JamesP.Lewis, James M.Tiedje,QiWang,ZhulinAn,FeiWang,LiboZhang,TaoHuang,ChuanLu,ZhipengCai, FangWang,JiabaoZhang, Artificial intelligence: A powerful paradigm for scientific research, The Innovation,Volume 2, Issue 4, 28 November 2021, 100179, https://doi.org/10.1016/j.xinn.2021.100179
8. Luca Bertolaccini, Piergiorgio Solli, Alessandro Pardolesi, and Antonello Pasini, An overview of the use of artificial neural networks in lung cancer research, J Thorac Dis. 2017 Apr; 9(4): 924–931.doi: 10.21037/jtd.2017.03.157.
9. Ibrahim M. Nasser, Samy S. Abu-Naser, Lung Cancer Detection Using Artificial Neural Network, International Journal of Engineering and Information Systems, Vol. 3 Issue 3, March – 2019, Pages: 17-23
10. https://www.analyticsvidhya.com/blog/2021/03/basics-of-neural-network/