|| Volume 4 || Special Issue 9 || ICCEME 2019-2020 || ISSN (Online) 2456-0774
INTERNATIONAL JOURNAL OF ADVANCE SCIENTIFIC RESEARCH
AND ENGINEERING TRENDS

DETECTION OF LUNG DISEASES USING CNN ALGORITHM

Prof. Archana Bhamare[1], Omkar More[2], Sharwari Kate[3], Kanchan Jawale[4]

Asst. Professor, Pimpri Chinchwad College of Engineering, Pune[1]
Student, Pimpri Chinchwad College of Engineering, Pune,[2,3,4]

archanabhamare1234@gmail.com , mailmeomkarmore7077@gmail.com, katesharwari1998@gmail.com, kanchanjawale3@gmail.com

Abstract: Lung diseases are very serious health problems in the life of people. These diseases include chronic obstructive pulmonary disease, pneumonia, asthma, tuberculosis, and lung diseases. The timely diagnosis of lung diseases is very important. Many methods have been developed for this purpose. In this paper, we demonstrate the feasibility of classifying the lung pathologies in lung X-rays using conventional and deep learning approaches. In the paper, convolutional neural networks (CNNs) are presented for the diagnosis of lung diseases. The architecture of CNN and its design principle are presented. For comparative purpose, backpropagation neural networks (BPNNs) with supervised learning, competitive neural networks (CpNNs) with unsupervised learning are also constructed for diagnosis lung diseases. All the considered networks CNN, BPNN, and CpNN are trained and tested on the same lung X-ray database, and the performance of each network is discussed.

Keywords: *- CNN Disease Detect, Cancer Detect, Technology for health.*

application ---------- ----------

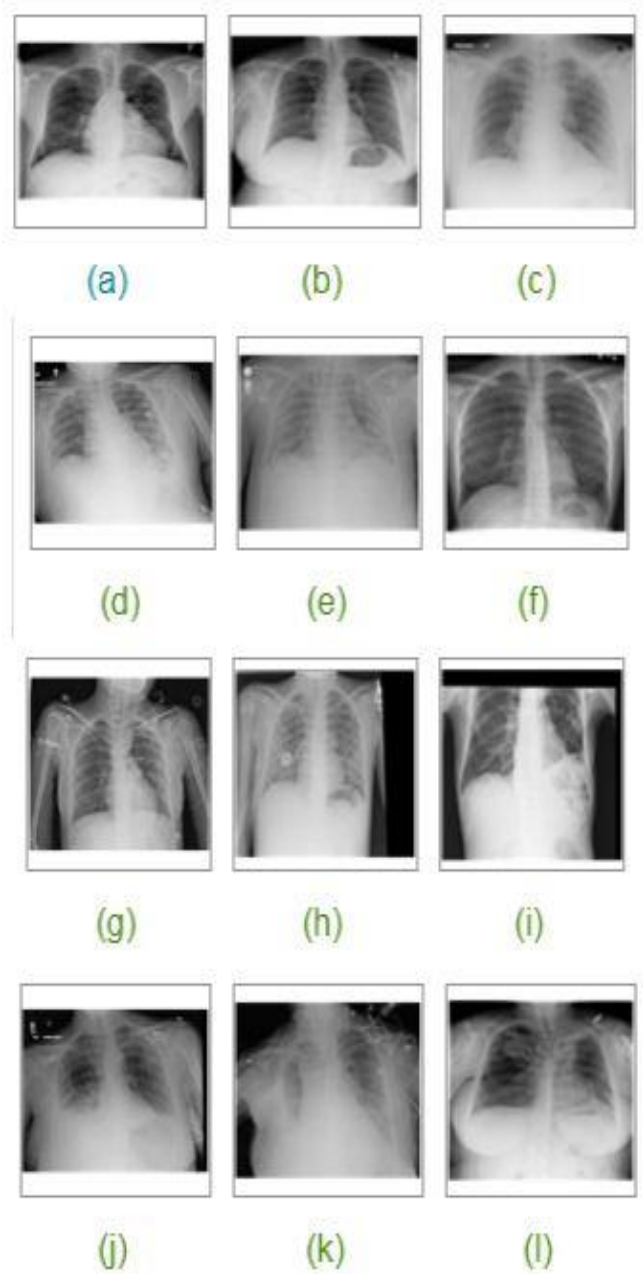
I INTRODUCTION

Medical X-rays are images which are generally used to diagnose some sensitive human body parts such as bones, lung, teeth, skull, and so on. Medical experts have used this technique for several decades to explore and visualize fractures or abnormalities in body organs [1]. This is due to the fact that X-rays are very effective diagnostic tools in revealing the pathological alterations, in addition to its noninvasive characteristics and economic considerations [2]. Lung diseases can be shown in CXR images in the form of cavitations, consolidations, infiltrates, blunted costophrenic angles, and small broadly distributed nodules [3]. By analyzing the lung X-ray image, the radiologists can diagnose many conditions and diseases such as pleurisy, effusion, pneumonia, bronchitis, infiltration, nodule, atelectasis, pericarditis, cardiomegaly, pneumothorax, fractures, and many others [4].

Classifying the lung X-ray abnormalities is considered as a tedious task for radiologists; hence, many algorithms were proposed by researchers to accurately perform this task [5–7]. Over the past decades, computer-aided diagnosis (CAD) systems have been developed to extract useful information from X-rays to help doctors in having a quantitative insight about an X-ray. However, these CAD systems could not have achieved a significance level to make decisions on the type of conditions of diseases in an X-ray [2–4]. Thus, the role of them was left as visualization functionality that helps doctors in making decisions.

A number of research works have been carried out on the diagnosis of lung diseases using artificial intelligence methodologies. In [1], multilayer, probabilistic, learning vector quantization, and generalized regression neural networks have been used for diagnosis lung diseases. The diagnosis of chronic obstructive pulmonary and pneumonia diseases was implemented using neural networks and artificial immune system [8]. In [9], the detection of lung diseases such as TB, pneumonia, and lung cancer using lung radiographs is considered. The histogram equalization in image segmentation was applied for image pre-processing, and feedforward neural network is used for classification purpose. The above research works have been efficiently used in

classifying medical diseases; however, their performance was not as efficient as the deep networks in terms of accuracy, computation time, and minimum square error achieved. Deep learning-based systems have been applied to increase the accuracy of image classification [10, 11].



These deep networks showed superhuman accuracies in performing such tasks. This success motivated the researchers to apply these networks to medical images for diseases classification tasks, and the results showed that deep networks can efficiently extract useful features that distinguish different classes of images [12–15].

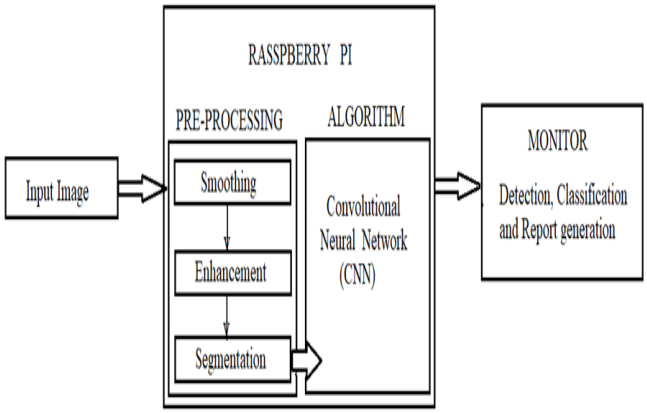
Most commonly used deep learning architecture is the convolutional neural network (CNN). CNN has been applied to various medical images classification due to its power of extracting different level features from images [11–15].Having gone through the related research studies, in this paper, a deep convolutional neural network (CNN) is employed to improve the performance of the diagnosis of the lung diseases in terms of accuracy and minimum square error achieved. For this purpose, traditional and deep learning-based networks are employed to classify most common thoracic diseases and to present comparative results. Backpropagation neural network (BPNN), competitive neural network (CpNN), and convolutional neural network (CNN) are examined to classify 4 common diseases that may be found in the lung X-ray, that is pneumonia, lung cancer, bronchitis and asthama. In this paper, we aim at training both traditional and deep network using the same lung X-ray dataset and evaluating their performances. The dataset contains frontal-view X-ray images of unique patients.

III PROPOSED SYSTEM

Lung diseases are malignant, that is top cause of lung disease-related deaths. Prognosis for patients with this disease is poor with 5-year survival rate of less than 20 %. Most patients have poor prognosis because of a diagnosis made at an advanced disease stage. Patients diagnosed at early stage have significantly higher 5-year survival of over 70%. These findings emphasize early detection and diagnosis as important step that significantly affects treatment outcome. Introduction of digital pathology and CNN based system will eliminate the limitation of detection of lung diseases at its early stage.

In this project a unique architecture will be used for less time-consuming detection system to be designed. Further CNN algorithm will be applied and using the coding language Python the design will be implemented on the system for improving the limitations of detection of various diseases using a single architecture.

IV BLOCK DIAGRAM



Project Specifications

1) Hardware Required
- Raspberry Pi
- HDMI to VGA Converter
- Memory Card
- Memory Card reader

2) Software Tools Used
- Integrated Development Environment (IDE)

V CONCLUSION

From this proposed system we observed that machine learning using CNN can be used for faster and accurate disease detection as health care professional. The primary objective of this project is to suggest the need for a comprehensive framework that can largely automate the process of performing lung disease detection which can also scan x-ray and CT scan images. Therefore, implementing the digital detection of diseases shall both save time and make the overall process more robust, productive and beneficial to the patient. Besides this, the main problem of human dependency is eliminated.

REFERENCES

[1] Joyjit Chatterjee, Garima Sharma, Ayush Sexena, Anu Mehra, Varun Gupta, "A Robust Automatic Algorithm for Statistical Analysis and Classification of lung Auscultations",IEEE,13 May 2019.

[2] Shubhangi Khobragade, Aditya Tiwari, C.Y. Pati1 and Vikram Narke, "Automatic Detection of Major Lung Diseases using lung radiographs and classification by Feed-forward Artificial Neural Network",2016 IEEE 1st International Conference on Power Electronics, Intelligent Control and Energy Systems (ICPEICES).

[3]Marios Anthimopoulos, Stergios Christodoulidis, Lukas Ebner, Andreas Christe, Stavroula Mougiakakou, "Lung Pattern Classification for Interstitial Lung Diseases Using a Deep Convolutional Neural Network", IEEE Transactions on Medical Imaging,29 February 2016.

[4] Anita Chaudhary, Sonit Sukhraj Singh, "Lung Cancer Detection on CT images by using image processing",2012 International Conference on Computing Sciences.

[5] Azian Azamimi Abdullah and Norafifah Md Posdzi, Yoshifumi Nishio, "Preliminary Study of Pneumonia Symptoms Detection Method using Cellular Neural Network", International Conference on Electrical, Control and Computer Engineering 2011 (InECCE).