

**AN OPTIMIZED CONVOLUTIONAL NEURAL
NETWORK APPROACH FOR DETECTING LUNG
DISEASES BASED ON CHEST X-RAYS**

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Abstract

Chest diseases are abundant in the world today. Certain chest diseases can cause severe complications and at times they can be deadly. The COVID-19 pandemic the world is experiencing now also affects the lungs. The risk of lung diseases is massive and concerning, especially in developing countries where people are faced with air pollution and poverty. Pneumonia, lung cancer, asthma, and COVID pneumonia are some of the threatening lung diseases that can affect humans. Early detection of lung diseases can be extremely important in the treatment process that follows up after the diagnosis. Most of the expert systems that have been developed are mostly focused on detecting a particular lung disease. This can be a barrier for expert systems to be deployed in a real-world environment. Therefore, a system to detect multiple chest diseases is essential. Most of the expert systems that are developed ignore the clinical data such as patient medical history in their classification process. Patient's clinical data provides additional insight for the detection of certain lung diseases. In a real-world environment, medical practitioners are presented with a series of patient's clinical data. These additional clinical data are proven to increase the accuracy of chest disease diagnosis. In this research, an attempt is made to incorporate patient's clinical data such as patient age and patient gender in addition to the chest X-ray image data, for classification purposes. Deep learning can play a pivotal role in the early detection of lung diseases. Convolutional Neural Networks (CNN) is a class of Deep learning and has become the most desired technique in the medical field for the classification and identification of chest X-ray images. This research outlines an optimized CNN approach for detecting lung diseases through chest radiography and patient clinical data. The goal of this research is to develop a system, which can simulate the inputs and the data received by medical practitioners into the deep learning model and to provide an output that is accurate to be utilized in real-life medical applications by medical practitioners.

Keywords: Deep Learning, Chest Radiography, Optimized CNN.