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## Developing Convolutional Neural Networks-Based System for Predicting Pneumonia Using X-Radiography Image

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### Abstract

Pneumonia is a respiratory disease caused by *Streptococcus Pneumoniae* infection. It is a life-threatening disease that causes a high mortality rate for children under 5 years of age every year. Under such circumstances, we have a vital need to develop an appropriate and consistent protocol for the identification and diagnosis of pneumonia. The incorporation of computational approaches into the diagnosis of disease is extremely efficient, promising and reliable. Our goal is to integrate these methods into pneumonia routine diagnosis to save countless lives around the world. We used the machine learning algorithm of Convolutional Neural Networks (CNNs) to identify visual symptoms of pneumonia in X-ray radiographic images and make a diagnostic decision. The dataset used to construct the computational model consists of 5844 X-ray images belonging to the pneumonia affected and normal individuals. Our computational model has been successful in identifying pneumonia patients with a diagnosis accuracy of 84%. Our model may increase the efficiency of the pneumonia diagnosis process and accelerate pathogenicity studies of the disease.

**Keywords:** CNNs, Artificial intelligence, Pneumonia, Disease diagnosis.

### Introduction

Pneumonia is a bacterial disorder that causes severe symptoms such as grunting, chest retraction, central cyanosis, obtundation, lethargy, convulsions and inability to feed or drink [1,2]. Each year about 1,400 cases of pneumonia occur in 100,000 children with around 1 in 71 babies. According to a recent study, pneumonia claimed the lives of over 800,000 children under the age of five last year, or one child every 39 seconds [3].

According to the American Lung Association, pneumonia can be diagnosed in various ways, including a blood examination, pulse oximetry, sputum analysis on a sample of mucus, arterial blood gas examination, pleural fluid culture, or bronchoscopy [4]. Despite the many methods available to diagnose pneumonia, chest radiography remains the main method used for diagnosis. Although x-rays are commonly used, it is difficult to diagnose them based solely on these images. Perusing these images is a bottleneck problem because the area or areas of increased opacity are usually determined by pneumonia [5,6].



defiantly lead to an enormous improvement in the visual diagnosis of many diseases.

#### Availability

The Python source code we have used is freely available at : <https://github.com/peterhabib/PneumoniaAI> . This code can be executed interactively in a Python command line.

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