International Journal of Research Publication and Reviews

Pneumonia Detection Using Deep Learning

Prof. V.S Padmini ᵃ, Mr. Shah Kamran Quadri ᵇ, Mr. Syed Junaid Ahmed ᶜ, Mr. Syed Zeeshan Hashmi ᵈ, Mr. Ubaid Kashif ᵉ

ᵃ Assistant Professor, Guru Nanak Dev Engineering College Bidar-585403, Karnataka, INDIA
ᵇ,ᶜ,ᵈ,ᵉ UG Student, Guru Nanak Dev Engineering College, Bidar-585403, Karnataka, INDIA

A B S T R A C T

Humans who have pneumonia, a potentially fatal bacterial condition affecting one or both lungs, are frequently infected with the Streptococcus pneumoniae bacteria. According to the World Health Organisation (WHO), pneumonia is to blame for one in three deaths in India. Radiotherapists with advanced training are required to evaluate chest X-rays used to diagnose pneumonia. Therefore, creating an automatic system for diagnosing pneumonia might help treat the illness quickly, especially in distant places. Convolutional Neural Networks (CNNs) have attracted a lot of attention for illness categorization as a result of deep learning algorithms' success in analysing medical imagery. Additionally, pre-trained CNN models' features from huge datasets are quite helpful in picture classification applications. In this study, we evaluate the performance of RESNET 50, a pre-trained CNN model that is used as a feature-extractors, then classify abnormal and normal chest X-rays. The analysis of chest X-ray pictures, specifically for the purpose of detecting pneumonia, can benefit greatly from the use of the pretrained RESNET50 model in combination with supervised classifier methods, according to statistical findings.

Keywords: Pneumonia Detection, Deep Learning, Chest X-Rays, Abnormal and normal chest X-Rays

1. Introduction

1.1 Background:

Pneumonia is a common respiratory disease affecting a significant population worldwide, with millions of cases reported annually.

The disease is associated with high morbidity and mortality rates, especially among vulnerable populations such as the elderly, children, and immunocompromised individuals.

Timely detection and accurate diagnosis of pneumonia are crucial for initiating appropriate treatment and improving patient outcomes.

Delayed or missed diagnosis can lead to complications, prolonged hospital stays, and increased healthcare costs.

1.2 Importance of Early Detection:

Early detection enables timely intervention and appropriate management, which can help prevent the progression of pneumonia and reduce the risk of severe complications.

Pneumonia diagnosis poses challenges due to overlapping symptoms with other respiratory conditions, variations in clinical presentation, and the need for skilled radiologists to interpret imaging findings.

Deep learning techniques have the potential to address these challenges by providing automated and accurate detection, enabling faster diagnosis, and reducing dependence onexpert interpretation.

By facilitating early detection, deep learning can improve patient outcomes, optimize resource allocation, and enhance healthcare efficiency.

1.3 Role of Deep Learning in Pneumonia Detection:

Deep learning is a subset of machine learning that utilizes artificial neural networks to analyze complex patterns and extract meaningful information from large datasets.The hierarchical representation learning capability of deep learning makes it well-suited for medical imaging analysis, including pneumonia detection.Deep learning models can automatically learn and extract features from raw image data, reducing the need for manual feature engineering.The ability of deep learning to handle large amounts of data and learn from diverse image features allows it to capture subtle patterns and improve detection accuracy.Deep learning models can adapt to variations in imaging modalities, making them versatile for analyzing different types of medical images used in pneumonia diagnosis
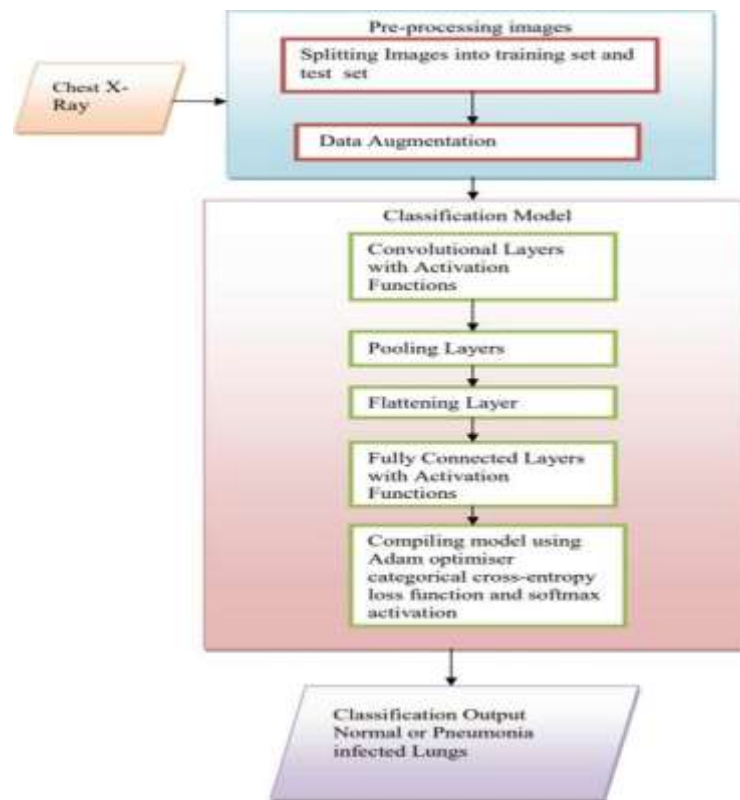
2. Methodology

Figure 1. Detailed schema of the experiment conducted

The first step in designing a successful web site is to gather information. Many things need to be taken into consideration when the look and feel of your site is created.

Certain things we considered are:

2.1 Purpose

What is the purpose of the project?

Our purpose here is to provide a website that can quickly give you the result for the patient.

2.2 Goals

What do you hope to accomplish by building this web site?

Our main goal here is to share accurate pneumoniae detection.

2.3 Target Audience

Is there a specific group of people that will help you reach your goals?

The goal of this project is to help as much people as possible and to improve the accuracy of the web application.

2.4 Content

What kind of information will the target audience be looking for on your site?

Our target audience will be looking for a result of whether the patient is suffering from Pneumoniae or not.

3.Experimental Results

Figure 2: Uploading of Images

Figure 3: Reports

Results

Figure 4: Pneumoniae patient

Figure 5:Normal Patient

4. Conclusions

Presence of expert radiologists is the topmost necessity to properly diagnose pneumoniae disease.This project aims to improve the medical adeptness in areas where the availability of radiotherapists is still limited. Our project helps to facilitate the early diagnosis of Pneumonia to prevent adverse consequences (including death) in such remote areas.The trained model helps the user to detect the pneumoniae with very high (98%) accuracy and in very short time.

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