

Pneumonia Detection Through X-Ray Images Using Convolution Neural Network

Puneet Garg, Akhilesh Kumar Srivastava, Anas Anas, Bhavye Gupta, Chirag Mishra

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Abstract

Pneumonia is a very contagious illness that spreads quickly among newborns. According to UNICEF, pneumonia was to blame for 16% of all baby deaths under the age of five. The main objective of this study is to determine whether a patient has pneumonia using a chest X-ray picture. CNN is used for this for this process, as it's great processing capability makes them the most effective choice for image processing and categorization. By the use of CNN, results will be obtained rapidly, and dependence on medical personnel will be reduced. Additionally, it will produce more precise findings than human vision, which could overlook a little X-Ray feature. More than 17,000 chest X-ray pictures of pneumonic and healthy lungs are included in the collection. This model's total accuracy is 88.62%.

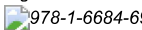
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Introduction

Breathing becomes difficult when the air sacs in the lungs become infected. This condition is known as pneumonia, a lung infection generally brought on by viruses present in the environment (Kaushik, 2020). Due to the low cost of this method, it is frequently used to identify pneumonia. Due of Pneumonia's resemblance to other lung infections, its detection might be challenging (Szepesi & Szilágyi, 2022). The lungs with pneumonia are depicted in Figure 1. Radiologists performed the majority of the laborious and time-consuming analysis of the acquired images (Kundu & Das, 2021). Due to this issue, there is a lot of interest in this field to create software that solely analyses X-rays of the chest and determines whether or not an individual has pneumonia. Regardless of whether they are male or female, everyone may utilize this effortlessly (Rajasenbagam & Jeyanthi 2021).

Figure 1. Pneumonia in Lungs (Source: Browsed on Web Page (Hacking, n.d.) Pneumonia)

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This project's main objective is to identify whether a patient has pneumonia by using images from a chest X-ray (Wang & Zhang, 2021). Due to its high accuracy and the fact that it is more effective than SVM image classification, the model that would be developed would be based on convolutional neural networks (Varshney & Lamba). Because it is readily available and less expensive than other detection methods, chest X-ray pictures are used to diagnose pneumonia in the majority of countries (Yadav & Khan, 2022). The implementation of the machine learning model will lessen reliance on the medical staff and make it simple to identify lung infections. In comparison to results examined by the human eye, this software will provide more accurate results (Pustokhina & Pustokhin 2021). The lung infection caused by pneumonia is seen in Figure 2. Computer-assisted methods.

Image classification, which first pre-processes photos before training a model based on what it learns from the images and then delivering the most accurate results, is the current demanding area of research as a result of advancements in the machine learning domain (Gabruseva & Poplavskiy, 2020). The identification of numerous disorders that are challenging to observe with the naked eye has been assisted by image categorization (Rajpurkar & Irvin, 2017). Because of its highly accurate and efficient outcomes that enable early disease identification and timely delivery of drugs, artificial intelligence is a discipline that is expanding every day (Garg & Dixit, 2022). The construction of models for the classification of medical pictures using machine learning (ML), a branch of artificial intelligence, has achieved notable success (Sharma & Gupta, 2022).

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