



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 7, July 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

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Using Deep Learning to Detect Influenza

ADITHYA S, M S SOWMYA

Student, Department of Master of Computer Application, Bangalore Institute of Technology, Bengaluru,
Karnataka, India

Professor, Department of Master of Computer Application, Bangalore Institute of Technology, Bengaluru,
Karnataka, India

ABSTRACT: A lethal condition that harms the human respiratory system is pneumonia. Pulmonary gas pockets grow irritated as a result. It may occur as a result of bacterial or viral illnesses. In addition to making breathing difficult, it hurts. If not treated right away, it may become serious and even fatal. Therefore, it is critical to find pneumonia as soon as feasible. Therefore, the primary goal of the research is to create a self-learning model whose training is done on numerous digital X-rays of the chest to identify individuals with pneumonia. This can aid in a speedy identification of the illness and prompt treatment. The model is refined after being trained on ResNet to provide good prediction and accuracy. The improved model has a 91% accuracy rate for illness classification.

Millions of people throughout the world suffer from the serious and common infectious disease known as pneumonia. Having over four billion deaths caused by it each year, this serves as a major cause of death. To quickly and effectively treat pneumonia, This can greatly enhance treatment outcomes, early identification is essential. Unfortunately, it might be difficult to correctly diagnose pneumonia, especially in settings with limited resources and access to skilled medical personnel. Deep learning has become a potent technique for medical image analysis in recent years. It has the potential to significantly boost pneumonia detection's precision and effectiveness, perhaps saving lives. Deep learning algorithms have the capacity for swiftly and accurately analyse vast amounts of data, enabling medical practitioners to make better decisions.

This essay's primary goal is to offer a solution to this significant issue in public health. We specifically suggest creating

A framework for deeper learning as identify Chest X-ray with influenza pictures. The VGG16 architecture will serve as the model's foundation. To enable the algorithm to precisely distinguish between healthy and infected lungs, a sizable collection X-ray of the chest pictures, both without while pneumonia, will be used to train it. The proposed methodology could considerably increase the efficiency and precision of pneumonia detection, allowing medical personnel to diagnose and treat patients more successfully.

KEYWORDS: VGG16, machine learning, Pneumonia detection, Deep learning.

I. INTRODUCTION

Computational models with numerous processing layers can learn representations of data at various levels of abstraction thanks to deep learning. The state-of-the-art in many other fields, combining genetics and discovering drugs object identification, visual object recognition, as well as recognize speech significantly enhanced using these methods. How can be determined by a machine should modify its internal parameters, which are required to derive the representation in each covering from the representation in the preceding neural networks, layers uses the backpropagation technique. Recurrent while large convolution nets have provided insight into sequential data types like text and speech, made advancements Here processing of pictures, expression, sound, and vision.

The majority of modern civilization is powered by machine learning, including social network content filtering, e-commerce website suggestions, and a growing number of consumer goods like cameras and smartphones. Machine-learning algorithms are used to choose relevant search results, recognise objects in photos, convert speech to text, match news articles, posts, or products with users' interests, and more. These applications are increasingly using a number of methods known as intense study. I ability of traditional machine-learning approaches to analyse natural data in its raw form was limited. For decades, designing a feature extractor that converted the raw data (such as the pixel values of an image) was crucial to building a pattern-recognition or machine-learning system. This required meticulous engineering and extensive domain knowledge.

II. LITRATURE SURVEY

H. M. Ünver and E. Ayan [1] A bacterial infection is the cause of the lung disease known as pneumonia. For the therapy process to be successful, early diagnosis is crucial. Typically, a skilled radiologist can identify the illness from chest X-ray scans. The look of the condition, which can be muddled in chest X-ray pictures or mistaken with other diseases, is one reason why diagnosis might be arbitrary. Computer-aided diagnosis systems are therefore required to direct the practitioners. For the objective of diagnosing pneumonia We employed the well-known convolutional neural network models Xception in this study. and Vgg16.. The Xception network, however, had better effectiveness in identifying pneumonia patients. As a result, we discovered that every network on the same dataset has unique specific abilities.

Uchenna & Doun, Jeong [2] To be able to categorise and identify the existence of asthma caused by a variety of an X-ray of the chest samples, this study suggests a trained multilayer neural system entirely from scratch. We built creating a convolutional neural network model from scratch to identify elements in a chest X-ray picture and categorize it to figure out if an individual has been infected with pneumonia, in contrast to Other methods that just use traditional handmade processes or learning transfer methodologies to produce a great classification performance. The dependability and interpretability problems frequently experienced while dealing with medical images could be lessened through the use of this paradigm.

Pranav Rajpurkar [3] We create a process that is more accurate than practising radiologists in identifying Chest X-rays from infection. featuring more than 100,000 frontal-view X-rays scans of patients with 14 disorders, ChestX-ray14 is now huge publicly available accessible chest X-ray dataset. Our system, A 121-layer convolutional neural network called CheXNet was developed on this dataset. On a test group that has annotations from four active academic radiologists, we compare CheXNet's performance to that of radiologists. On the F1 metric, we discover that CheXNet performs better than the typical radiologist. To detect all 14 diseases in ChestX-ray14, we expand CheXNet and achieve cutting-edge results for all 14 diseases.

Muhammad Farukh [4] Every year, 700,000 children worldwide lose their lives to pneumonia, which affects 7% of the world's population. The main method for diagnosing this illness is chest X-rays. Examining chest X-rays is a difficult undertaking, even for a qualified radiologist. The accuracy of diagnosis needs to be increased. The radiologists' decision-making process may be aided by the effective model for the identification of pneumonia that is developed this research and trained on digital chest X-ray pictures. We offer a novel weighted classifier-based methodology that optimally combines the weighted predictions from cutting-edge deep learning models like ResNet18, Xception, InceptionV3, DenseNet121, and MobileNetV3. This strategy is a supervised learning strategy.

III. PROPOSED METHODOLGY

In this research, we suggest creating a X-ray of the chest to detect tuberculosis using machine learning pictures. The VGG16 Architecture, a popular deep learning architecture in computer vision, would serve as the foundation for the proposed model.

In the suggested system, we first prepare the dataset. The creation of the model, Mendeley Data used data from a sizable dataset of Labelled Chest X-ray images and Optical Coherence Tomography (OCT). There are 5686 total photos in the dataset.

Next, we'll import the required libraries before getting the photos. To categorise the X-ray images with and without pneumonia, we will develop a A framework for deep learning is built on the VGG16 architecture with modifications to the final layers. The model will be trained using the practice data, and its performance will be assessed on the validation set. To improve the effectiveness of the model, we will adjust its hyperparameters as needed. The trained model will be saved and deployed in the flask of the Web framework.

The suggested approach uses chest X-ray pictures and VGG16 Architecture to build a deep learning model for pneumonia identification. The technology is anticipated to offer a reliable and effective tool for pneumonia detection, enabling more rapid treatment and better patient outcomes.

excellent Accuracy: The VGG16 Architecture, the model for our suggested system, is renowned for its exceptional accuracy in image recognition applications. It has excelled in a number of picture classification contests.

Simplicity: When compared to existing deep learning architectures like ResNet or Inception, the suggested approach is rather straightforward. It has fewer layers, which makes it simpler to comprehend and change.

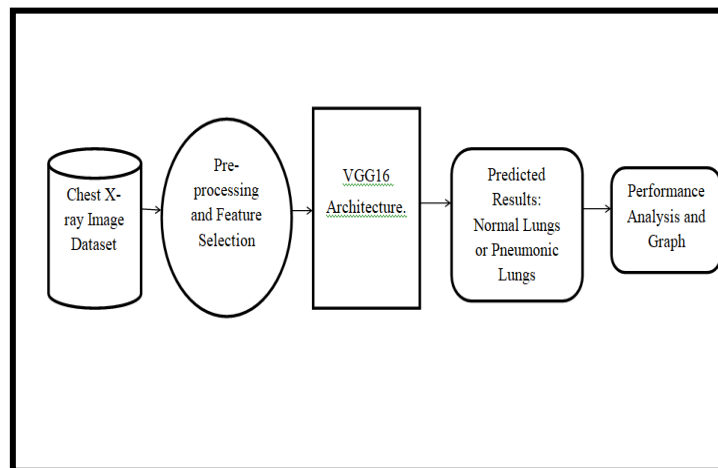


Fig. 1. Proposed Architecture

IV. IMPLEMENTATION

Data Collection: Gathering a large and diverse dataset of medical records, patient symptoms, lab test results, and other relevant data related to influenza cases. The dataset includes positive cases of influenza as well as negative cases or cases with other similar respiratory illnesses to ensure a balanced and representative dataset. There are 5,856 chest X-ray images from the dataset. Chest X-ray scans with and without pneumonia will from the dataset.

Data Preprocessing: Clean and preprocessing the data to handle missing values, normalize features, and convert categorical variables into numerical representations. Data preprocessing is a crucial step to ensure that the data is in a suitable format for deep learning algorithms.

Installing The Necessary Libraries: Installing the nessary libararies such as numpy and pandas for the implantation.

Building a Model: Convolutional Neural Networks (CNNs) are commonly used for medical image analysis, while Recurrent Neural Networks (RNNs) or Transformer-based models may be more suitable for processing sequential data like patient records.

Training: Splitting the dataset into training and validation sets. Training the deep learning model using the training data and optimize its parameters using techniques like stochastic gradient descent (SGD) or Adam. Monitor the model's performance on the validation set during training to avoid overfitting.

Evaluation: After training is completed, evaluate the performance of the model on a separate test dataset to assess its accuracy, precision, recall, and other relevant metrics.

V. CONCLUSION

To give an effective and precise solution for the pneumonia identification problem based on X-ray pictures, we proposed our Pneumonia identification utilising VGG16 Architecture in this project. Because of its excellent accuracy, transfer learning capabilities, and simplicity, the VGG16 architecture has been chosen. The suggested model has been adjusted to perform better at the specific goal of detecting pneumonia. It was trained on a large dataset of chest X-ray pictures with and without pneumonia. The accurate and efficient detection of pneumonia could be increased with the successful implementation of this initiative, allowing for more efficient therapy and diagnostic for this dangerous infectious disease. The suggested model is applicable in clinics and hospitals, giving medical staff an important tool to help with pneumonia screening. The study has the potential to save many lives by improving pneumonia identification and treatment, and overall it marks a substantial advancement in the area of medical image processing. The suggested model outperforms its counter alternatives in experiments in terms of precision efficiency, reaching training accuracy of 95.34% and validation accuracy of 92.00%.



|| Volume 12, Issue 7, July 2023 ||

| DOI:10.15680/IJIRSET.2023.1207153 |

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