IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 1, January 2022

DOI: 10.17148/IJIREEICE.2022.10118

# Prediction Of Covid Using Convolutional Neural Networks

**Shivaprasad G[1], Hemanth Kumar T[2], Dr. H R Divakar[3]**

PG Scholar, Dept. Of MCA, P.E.S College Engineering, Mandya, Karnataka, India[1]

PG Scholar, Dept. Of MCA, P.E.S College Engineering, Mandya, Karnataka, India[2]

Associate Professor, Dept. Of MCA, P.E.S College Engineering, Mandya, Karnataka, India[3]

**Abstract:** The expanding number of people suffering from covid-19 is putting a strain on healthcare systems all around the world. Traditional approaches cannot be used to treat every patient with a respiratory infection because to the limited number of diagnostic tools available. Deep Learning has become increasingly popular in recent years, and it currently serves a critical role in picture classification, notably in medical imaging. Convolutional Neural Networks have been used to successfully diagnose a variety of diseases, including coronary artery disease, malaria, Alzheimer's disease, and other dental issues (CNNs). The test also has a long turnaround time and a low sensitivity. According to the study, infected patients displayed certain radiographic visual characteristics such as fever, dry cough, fatigue, and dyspnoea. X-ray machines are available at all healthcare facilities, and samples do not need to be transferred. This research suggests using a chest x-ray to classify the patient's selection for further testing and therapy. The use of chest X-ray images to diagnose the coronavirus responsible for coronavirus sickness 2019 (COVID-19) is life-saving for both patients and doctors. This is especially significant in countries where laboratory testing kits are unavailable. This study shows how the size of the dataset and the number of convolutional layers affect classification outcomes.

**Keywords:** Covid-19**,** Convolutional Neural Networks, chest X-ray images, life-saving, Dataset.

## I. INTRODUCTION

In 2019-2020, a global health-care crisis has developed from the current Coronavirus or COVID-19 sickness pandemic. Identifying COVID-19 patients is the most difficult component of this pandemic problem. Coronavirus, also known as COVID-19, is an infectious disease that causes acute respiratory syndrome (SARS-COV2) [1].

The coronavirus disease was first detected in December of this year in Wuhan, China, and has since spread throughout the world. The patient was first reported to the WHO country office in China in December 2019 with an unknown cause of pneumonia. Since December 2019, the disease has spread all across the planet. TThe disease soon spread, and the number of cases skyrocketed. The epidemic was then declared a pandemic by the World Health Organization (WHO) [4].

As of November 20, there were 61308116 Coronavirus cases, 1437835 deaths, and 42395359 recovered patients. The world's population was expanding at an alarming rate. Despite the fact that radiological imaging is not recommended as soon as the patient arrives at the clinic for diagnostic purposes. The chest X-Ray picture is useful for assessing therapeutic outcomes and comorbidities in critically ill patients. Coronavirus diagnosis and differentiation from lung illness with indistinguishable opacities is a challenging function that relies on the availability of qualified radiologists. All of the pieces needed to make a new virus come together beneath the cell's membrane. At the cell membrane, the most recent viral generation begins. Each lung's lobes are separated into parts. [2]

In most circumstances, breathing causes air to flow easily through the trachea. The trachea is divided into three sections: a large tube known as a bronchi, smaller tubes known as bronchioles, and tiny sacs known as alveoli. The airway and alveoli of the trachea are flexible and polymorphic. Each air sac swells like a small balloon when you inhale, and contracts when you exhale. The alveoli are surrounded on both sides by small blood vessels known as capillaries.

To live, every cell in your body requires oxygen. Oxygen is delivered into the circulation and dispersed throughout the body when we breathe into our lungs. In the body's very cells, oxygen is exchanged for a waste gas called carbon dioxide, which is then transported back to the lungs by the bloodstream, where it is eliminated from the bloodstream and the breath is evacuated.

IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 1, January 2022

DOI: 10.17148/IJIREEICE.2022.10118

Gas exchange is a vital function that the lungs and respiratory system perform on their own. In mucus that binds the trachea, bronchi, and bronchioles together, the trachea transports the most bacteria [3].
In a healthy organism, the cilia tubes quickly discharge mucus and bacteria from the trachea. That's what's causing their cough. A virus can affect immune cells and cause inflammation in the bronchiole and alveoli, causing your immune system to attack and spread viruses if your immune system is weak, as it is in the case of coronavirus infection. As a result of the illness, the alveoli get clogged with fluids, making it more difficult for the body to obtain the oxygen it needs. It can induce lobar Pneumonia, which affects only one lobe of the lung, or bronchophenia, which affects both lungs' maximum regions. Difficulty breathing, fever, cough, chest pain and coldness, headache, pain, and weariness are all signs of pneumonia. It can lead to a range of significant consequences, including respiratory failure, which occurs when breathing becomes so difficult that a ventilator is required to assist breathing.

## II. EXISTING SYSTEM

As of right now, the Pandemic Covid-19 is wreaking havoc all over the planet. Day by day, the number of cases is increasing, smashing prior day records. Thousands and thousands of experiments are being carried out, but no remedy has yet been discovered [6].
Many suspected cases must be screened for effective isolation and treatment in order to control the spread of covid-19. Radiographic pictures, such as X-ray images of the human chest (Lungs), can be utilised to diagnose the infection, making doctors' tasks easier. Our computer science and engineering section is designing a smart machine to save time and effort [7].
AI refers to machines that perform jobs that would normally need human intelligence. Artificial Intelligence (AI) is a cutting-edge technology enabled by the internet. This could have a big impact on our daily life in the near future [8].
Artificial intelligence in medicine and health care has become a prominent topic in recent years. Traditional healthcare technologies can gather data, process it, and provide a well-defined output to the end-user using Artificial Intelligence technology. Machine learning methods and deep learning are used by Artificial Intelligence to do this [9].
The major goal of the health-related AI approach is to investigate the association between treatment strategies and patient outcomes. The application of artificial intelligence to processes such as diagnosis, treatment protocol creation, patient monitoring, and care [10].
Machine learning, also known as ML, is an Artificial Intelligence application that allows a system to learn and improve on its own. In the development of computer programs, machine learning is clearly defined. The first step in the learning process is to observe or collect data. The main goal is to allow the computer to learn on its own, without the need for human involvement. To determine whether a suspected patient is infected with the coronavirus, classification techniques such as machine learning and deep learning can be applied (covid-19). Corona infected lungs turn yellow, causing the chest X-ray to fade [12].

## III. PROPOSED SYSTEM

Convolutional neural networks, often known as CNNs or Convnets, are a type of deep neural network that is most commonly used to analyse images in deep learning. The regularised variant of multilayer perceptions is the convolutional neural network. Multilayer perceptions typically refer to a completely connected network, in which every neuron in one layer is linked to every neuron in the next layer. Convolutional Neural Network (CNN) image classification takes an input image, processes it, and categories it (e g: Dog, Cat, Car, Medical Field). A computer creates an array of pixels from an input image, which is dependent on the image resolution. Artificial Intelligence has seen a tremendous increase in its ability to bridge the gap between human and machine capabilities.

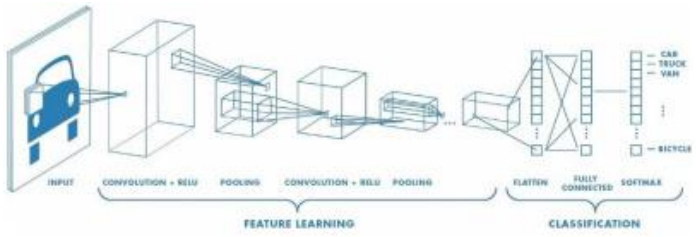


Fig. 1 Analyzing Image Using

IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 1, January 2022

DOI: 10.17148/IJIREEICE.2022.10118

CNN

The conversion design is similar to the connecting network of neurons in the human brain, and it was encouraged by the organisation. The use of a deep learning technology based on deep convolutional neural networks to medical picture processing has yielded encouraging results. The application includes detection, segmentation, and classification, and it covers the entire range of medical picture analysis.

**CNN Model Working**

Convolutional Neural Networks have played an important role in categorising images, particularly medical ones. This has opened up a whole new world of possibilities and made disease diagnosis a lot easier. It also has a higher accuracy in detecting current novel Corona viruses. One of the limitations that researchers face is a small dataset to train their model on. Because COVID-19 is a new condition, the chest Xray dataset of COVID-19 positive patients is also small. To avoid overfitting, a sequential CNN model is proposed for classifying Xray pictures, as in the authors' previous work [14].

COVID-19 identification using a CNN model. Input layers, convolutional layers, fully connected layers, and output layers are the four primary components of this model.

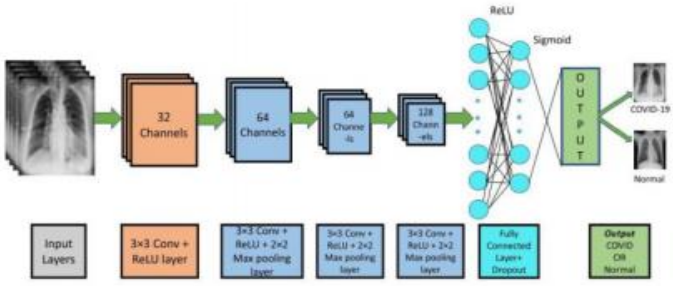


Fig. 2 CNN Model Working

The fine-tuned data set is carried over to the model's input layers. It comprises four CNN layers, the first of which is a 2D convolutional layer with three Three kernels and the ReLu activation function. Rectified Linear is the most popular Unit and one of the most widely utilised activation functions in DL [10].

In contrast to other activation functions like tan, rectified linear activation does not trigger all of the neurons at the same time, making it computationally systematic. The 2D CNN layer, as well as the ReLu activation function and the Average pooling layer, are the next three layers. By convolving filters over the CNN layer, the average pooling layer assembles the features of the CNN layer. It lowers the mathematical cost by reducing the number of parameters used, which helps to avoid overfitting. To avoid overfitting and make the model arithmetic efficient, an Average pooling layer is added after the CNN layer in each of the three layers. The output of the CNN layers is then turned to a lengthy feature vector by a flatten layer in the next stage. The flatten layer's output is fed to the fully connected layer with dropout. Every input neuron in a completely join layer is connected to every activation unit in the next layer.

## IV.DATASET

This paper presents a publicly accessible image dataset that includes X-Ray [7].

This dataset, titled chest X-Ray dataset and available at this site, contains 1560 images that are divided into two categories: 1341 NORMAL and 219 COVID-19. The normal chest X-Ray displays clear lungs with no zones of aberrant pacification, as shown in Figure 3, which depicts examples of chest X-Rays in individuals with pneumonia. To detect Covid-19 Chest X-Ray, a front-view chest x-ray, we use a dataset from Kaggle Dataset. Individual pre-processing approaches are used to pre-process incoming photos [9].

The goal of image pre-processing is to improve the quality of visual information in each input image by removing or reducing noise, improving image quality through greater contrast, removing low or high frequencies, and so on. Strength normalization and Contrast Limited Adaptive Histogram Equalization were utilized in this investigation. In image processing applications, intensity normalization is a fascinating pre-processing step. We used min-max normalization to standardize input photos to the usual normal distribution in our models.

IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 1, January 2022

DOI: 10.17148/IJIREEICE.2022.10118

Although desirable, collecting all chest x-ray images in a super-controlled environment that results in high-resolution and super-clean images is not always possible, and as the artificial intelligence field advances, more and more emphasis is directed on models and frameworks that can work pretty well on variable resolution, quality, and small-scale labelled datasets. Also, the original provider collects photographs from numerous sources, and some of them may have a different dynamic range than others, but during training, all of the images are standardized to the same distribution, making the model less sensitive to that.


Fig. 3 Chest X-ray Dataset

## V. SYSTEM ARCHITECTURE

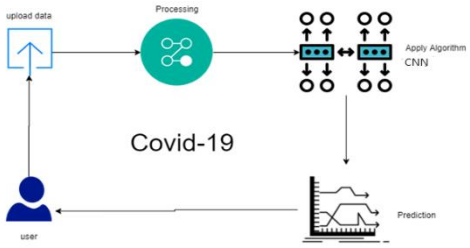


Fig. 4 System Architecture

## VI. CONCLUSION

This work used a deep learning-based method to detect COVID-19 cases from chest X-Ray images. COVID-19 discovery is vital to halting the global pandemic's progress. Given the small size of the publicly available dataset, the results are encouraging. We employed a Convolutional neural network model that we trained with a dataset of 219 COVID-19 and 1341 Normal patients to perform the detection [12].

We employ a model to predict accuracy (VGG16, ResNet50, InceptionV3, MobileNet, Xception, and DenseNet121). The accuracy and F1-Score of the model are outstanding (98 percent , 86 percent , 96 percent , 98 percent , 97 percent , and 98 percent ). The little dataset is used to generate the F1-Score. If we use a multi-class classification and have access to a huge dataset, we can achieve the best results. Finally, the Convolution Neural Network has a high success rate when it comes to detecting COVID-19 with the least amount of time, effort, and money. The clinical viability of a model with such high accuracy has yet to be proven. Such high accuracy will be essential in swiftly detecting COVID-19 individuals, reducing testing time and cost for people.

IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 1, January 2022

DOI: 10.17148/IJIREEICE.2022.10118

The COVID-19 challenges are attempting to reveal AI's drawbacks. Machine learning and deep learning, two existing forms of AI, are attempting to find diverse patterns in training databases. AI can produce adequate results if there is sufficient data for testing and training various systems using various methodologies.

## REFERENCES

[1] Liu, Satapathy, S.C., Zhang, YD. et al (2020). A five-layer deep convolutional neural network with stochastic pooling for chest CT-based COVID-19 diagnosis. Machine Vision and Applications 32, Article number: 14

[2] Ashad, Chowdhury, Md. Muhtadir & Kabir, Nihad&Rahman (2020). PDCOVIDNet: A ParallelDilated Convolutional Neural Network Architecture for Detecting COVID-19 from Chest X-Ray Images. 10.31224/osf.io/myp6c

[3] Boran Sekeroglu1 and Ilker Ozsahi2 (2020).Detection of COVID-19 from Chest X-Ray Images Using Convolutional Neural Networks SLAS TECHNOLOGY: Translating Life Sciences Innovation Volume 25, Issue 6.

[4] Arman Haghanifar, Mahdiyar Molahasani Majdabadi, Younhee Choi (2020). COVID-CXNet: Detecting COVID-19 in Frontal Chest X-ray Images using Deep Learning on 16 Jun 2020.

[5] Cesar, P., Soares, Lucas, P., Soares (2020). Automatic Detection of COVID-19 Cases on X-ray images Using Convolutional Neural Networks on on 2 Jul 2020.

[6] Yi Zhong (2020). Using Deep Convolutional Neural Networks to Diagnose COVID-19 From Chest X-Ray Images on 19 Jul 2020.

[7] Chaimae Ouchicha, Mohammed Meknassi, Ouafae Ammor (2020). CVDNet: A novel deep learning architecture for detection of coronavirus (Covid-19) from chest x-ray images, Chaos, Solitons & Fractals,Volume 140, 110245, ISSN 0960-0779.

[8] Abdelgawad, A., Farhan Haque, F., Foysal Haque, K., Gandy, L. (2020). "Automatic Detection of COVID19 from Chest X-ray Images with Convolutional Neural Networks," 2020 International Conference on Computing, Electronics & Communications Engineering (iCCECE), Southend, United Kingdom,2020, pp. 125-130, doi: 10.1109/iCCECE49321.2020.9231235.

[9] Abbas Sharifi, Mohsen Ahmadi, Shayan Hassantabar (2020). 10. Diagnosis and detection of infected tissue of COVID-19 patients based on lung X-ray image using convolutional neural network approaches, Chaos, Solitons & Fractals, Volume 140, 110170, ISSN 0960-0779.

[10] Aryan Sagar Methil, 'Brain Tumor Detection using Deep Learning and Image Processing', 2021 International Conference on Artificial Intelligence and Smart Systems (ICAIS), 25-27 March 2021, Coimbatore, India

[11] Gajendra Raut, Aditya Raut, Jeevan Bhagade, Jyoti Bhagade and Sachin Gavhane, 'Deep Learning Approach for Brain Tumor Detection and Segmentation', 2020 International Conference on Convergence to Digital World - Quo Vadis (ICCDW), 18-20 Feb. 2020, Mumbai, India

[12] Sanjeevani Bhardwaj and Alok Kole, 'Review and Study of Internet of Things: It's the Future', IEEE International Conference on Intelligent Control, Power and Instrumentation (ICICPI-2016), 2016, Kolkata, India

[13] Zehra Karhan and Fuat Akal, 'Covid-19 Classification Using Deep Learning in Chest X-Ray Images', 2020 Medical Technologies Congress (TIPTEKNO), 19-20 Nov. 2020, Antalya, Turkey

[14] Hanan S. Alghamdi, Ghada Amoudi, Salma Elhag, Kawther Saeedi and Jomanah Nasser, 'Deep Learning Approaches for Detecting COVID-19 From Chest X-Ray Images: A Survey', IEEE Engineering in Medicine and Biology, IEEE Access, Vol.9, pp. 20235 – 20254, 2021

 