

1. ABSTRACT

Healthcare systems all over the world are on edge due to the ongoing COVID-19 outbreak. The cases are increasing day by day. Governments, civil society, health professionals, and scientists have been facing a relentless fight against the pandemic of the COVID-19 disease. The early and auto diagnosis helps people to be precautious. One of the ways to combat this disease is the effective screening of infected patients. With illnesses like pneumonia and lung cancer, COVID-19 offers a comparable pattern. Even very skilled medical professionals can be misled by this, leading occasionally to a false positive result.

In this regard, an image classification model can be used to detect and categorise the patient's chest X-ray (CXR) images into COVID-19, pneumonia and lung cancer and is an effective alternative due to its low cost, accessibility, and quick response.

2. INTRODUCTION

COVID-19 broke in march 2019 and was highly widespread. The virus originated in Wuhan, a town in Eastern China, in December 2019. In 2020, it was declared by the World Health Organization (WHO) as a “Public health emergency of international concerns”, and by March 2020 they classified the disease as a pandemic. This virus causes pneumonia with other symptoms, such as fatigue, dry cough, and fever. One of the primary methods of testing coronavirus is reverse transcription polymerase China reaction (RT-PCR), which is performed on respiratory samples, and the testing results are produced within a few hours to two days. This method of detection is expensive and time-consuming. Therefore, designing other methods for virus detection became a crucial requirement.

Convolutional neural network can be used as an alternative to detect COVID-19 and distinguish it from other lung disease such as pneumonia and lung cancer. CNN is a network architecture for deep learning that learns directly from data and are particularly useful for finding patterns in images to recognize objects, classes, and categories. Deep learning is a subset of machine learning .It has demonstrated remarkable success in many applications, particularly in the field of health care. Through various machine learning techniques, AI has shown its effectiveness and high performance in situations involving automatic picture classification. In the modern world, artificial intelligence has been used to automate the diagnosis of numerous diseases. Artificial intelligence refers to systems or machines that mimic human intelligence to perform tasks and can iteratively improve themselves based on the information they collect. It makes calculations and predictions based on analysing the input data, then performs tasks that require human intelligence such as speech recognition, translation, visual perception, and more.

3. LITERATURE SURVEY

Kanakaprabha. S, D. Radha, “Analysis of COVID-19 and Pneumonia Detection in Chest X-Ray Images using Deep Learning”, 2021 International Conference on Communication, Control and Information Sciences (ICCISc) | 978-1-6654-0295-8/21/\$31.00 ©2021 IEEE | DOI: 10.1109/ICCISc52257.2021.9484888

The work aims to detect COVID-19 and Pneumonia patients using deep learning techniques as Normal, Infected, Pneumonia patients. Transfer learning techniques is used for COVID-19 detection. Image modes are with high resolution and used as painless studies for medical diagnosis. Convolution neural network is widely used in deep learning techniques and helpful to identify diseases in short time. Even with any abnormal conditions of the images, prediction can be done with deep learning methods. Lung lesion is one of the common diseases for all age group of humans. Currently, this disease may rise with various other symptoms such as COVID-19, Pneumonia etc. Golden standard diagnosis in COVID-19 is the reverse transcription polymerase chain reaction (RT-PCR) method. This is one of the most widely used laboratory method for detecting COVID-19 virus. Some studies identified that it showed false positive results also. Test carried out too early might lead to false negative results.

Hence, X-ray images of the victim can be used to classify into three types of images such as Normal, COVID-19, and Pneumonia Infected. Bacterial and viral Pneumonia can cause several damages to human respiratory symptoms such as irregular heartbeat, cardiovascular shock, muscle pain, fatigue and it can lead to death in some cases. So, identifying Pneumonia subtypes is a crucial requirement and very helpful for saving time, reduce error in outpatient health conditions. Main motivation is from difficulty for an experienced specialist to identify a subtype of Pneumonia in affected patients. Subtype may lead to complicated health issues for patients.

This model not only detects Pneumonia Infected lungs, but also identifies the subtype of it as bacterial or viral Pneumonia with 80% and 91.46% accuracy, respectively. CNN is the model used to detect Normal and Infected patients like COVID-19 Infected lungs, Pneumonia Infected lungs. The accuracy of detection of COVID -19 is 95 % which a plus about this model and the current requirement of this pandemic with limited cost and computations. This model is more appropriate for medical practitioners, researchers etc.

4. PROBLEM STATEMENT

The aim is to implement an image classification model that detects and categorizes the chest X- Ray images into Normal, Pneumonia, COVID-19 and Lung Cancer using CNN .

5. OBJECTIVES

The Main objective of the project is to detect lung diseases in patients using Chest X-Ray Images through the following steps:

1. Upload X-Ray Images - The system should be capable of getting X-Rays from users that will be utilized by the Model.
2. Detection of Hybrid Model - The system should be able to detect the COVID-19, Pneumonia and Lung Cancer within the X - Ray images that users have uploaded.
3. Display Results - The system should be able to give information that the user can appropriately understand and gain insight from it.

6. SYSTEM DESIGN AND ARCHITECTURE

6.1 EXISTING SYSTEM

The existing system is used to identify COVID-19 and Pneumonia Infected patients using chest X-Ray images with the help of CNN. The identification can be classified as -

1. Identification of affected lungs
2. Identification of Pneumonia affected lungs.
3. Identification of COVID-19 affected lungs.
4. Identification of Pneumonia and COVID-19 affected lungs.

6.2 PROPOSED SYSTEM

In proposed system, the chest X Ray images are used to extract the features of Lung and classify it as normal, COVID-19 and lung cancer. Here, view of Lung density gives the exact level of a density and it also finds the all supplements in Lung. Real datasets from hospitals are taken to increase the efficiency and resolution level of the given input. It is the combined process of a Lung feature extraction.

1. Preprocessing
2. Feature Selection
3. Feature Extraction
4. Classification

6.3 SOFTWARE REQUIREMENTS

- Operating system : Windows XP/ Windows 7.
- Software Tool : Open CV
- Coding Language : Python
- Toolbox : Image processing toolbox.

6.4 HARDWARE REQUIREMENTS

- System : Intel i3/i5 2.4 GHz.
- Hard Disk : 500 GB
- Ram : 4/8 GB

7. REFERENCES

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