DEEP LEARNING MODEL FOR DETECTING COVID-19 ON CHEST X-RAYS USING CONVOLOTIONAL NEURAL NETWORK

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ABSTRACT

Currently, COVID-19 is considered to be the most dangerous and deadlydisease for the human body caused by the novel coronavirus. In December 2019, the coronavirus spread rapidly around the world, thought to be originated from Wuhan in China and is responsible for a large number of deaths. Earlier detection of the COVID-19 through accurate diagnosis, particularly for the cases with no obvious symptoms, may decrease the patient's death rate. Chest X-ray images are primarily used for the diagnosis of this disease. This research has proposed a machine vision Convolution Neural Networks (CNN) deep learning algorithm approach to detect COVID-19 from the chest X-ray images. This proposed Convolutional Neural Networks Deep Learning Model technique assured a satisfactory performance in terms of identifying COVID-19 works with a testing accuracy of 99.91%

INTRODUCTION

The COVID-19 is a deadly disease caused by the newly recognized coronavirus. In December 2019, coronavirus (SARS-COV-2) infected the human body for the first time, and it can spread principally among humans through the droplets formed by the infected persons when they speak, cough or sneeze . As the droplets are too heavy to travel far, they cannot spread person-to-person without coming in close contact . Although the exact time is not yet known, a new study has estimated that the COVID-19 can be viable in the air for up to 3 hours, on copper for 4 hours and up to 72 hours on plastic and stainless steel. However, the exact answers to these questions are still not agreed upon by the general health research community and currently under investigation. COVID-19 attacks the lung and damages the tissues of an infected person. At the early-stage, some people may not find any symptoms where most of the people had fever and cough as the core symptoms. Other secondary symptoms could be body aches, sore throat, and a headache could be all possible.

Health professionals and scientists of many countries in the world are attempting to improve their treatment plan and capacity of test through implementing multifunctional testing to stop spreading the virus and for protecting themselves from the deadly virus.

Recently, the reverse transcriptase-polymerase chain reaction (RT–PCR) diagnostic method is found to be effective in detecting the virus. However, the method has some drawbacks, including longer detection time and lower detection rate of the virus. According to the recommendations by WHO provided in October 2020, chest imaging examination is an effective method for the detection of clinical symptoms of people who have been affected and recovered from the virus. On the contrary, X-ray imaging has played a great role in many medical and epidemiological cases due to its wider availability .Chest X-ray is promising for emergency cases and treatment due to its operational speed, cost and simplicity for the radiologists.

In the past, artificial intelligence (AI) techniques were employed to successfully diagnose Pneumonia either from chest X-ray images or CT. The classification methods employed vary from Bayesian function to convolutional neural network (CNN). More recently, CNN has been found to be useful and effective in identifying COVID-19 via image classification. CNN consists of multilayer neural networks, which are highly capable of recognizing the image patterns without conducting diverse preprocessing of

the images. Although several CNN models, including AlexNet, Resnet50, VGG16, VGG19, are available, VGG19 demonstrates better performance for the COVID-19 classification.

SYSTEM IMPLEMENTATION

1 MODULES DESCRIPTION

2 SAMPLE CODE

3 SYSTEM TESTING
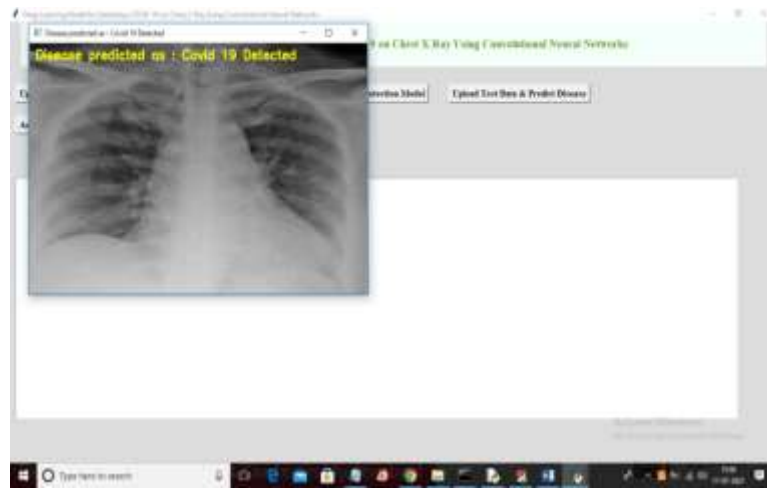
4 TYPES OF TESTS

5 TESTING METHODOLOGIES

SAMPLE SCREENS

CONCLUSION

The coronavirus pandemic has stretched the healthcare systems in every country in the world to its limit as they had to deal with a large number of deaths. Early detection of the COVID-19 in a faster, easier, and cheaper way can help in saving lives and reduce the burden on healthcare professionals.

Artificial intelligence can play a big role in identifying COVID-19 by applying image processing techniques to X-ray images. This work designed and developed an intelligent system for the COVID-19 identification with high accuracy and minimum complexity by convolutional neural network (CNN).

Suitable feature selection and classification are absolutely vital in the COVID-19 detection using chest X-ray images. Chest X-ray images were entered into the system in order to produce the output of the marked lung significant region, which was used to identify COVID-19. The proposed work shows a higher classification accuracy (99.91% %).

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