A Review on The Application of Artificial Intelligence to Aid in The Differential Diagnosis of Covid-19 Using A Deep Neural Network-Based Model

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ABSTRACT

Keywords: artificial intelligence; convolutional neural network; coronavirus 2019; chest Xray; deep learning models; clinical informatics.

INTRODUCTION

The novel corona virus first reported in December 2019, in the Wuhan, China Coronavirus was previously known as Severe Acute Respiratory Syndrome Corona virus 2 (SARS-CoV-2) but the World Health organization renamed it as "Covid19" in February 2020. On January 30, 2020, it was designated a Public Health Emergency of International Concern. Finally, on March 11, 2020, the World Health Organization proclaimed Covid-19 a pandemic. Following the outbreak, the number of patients began to rise on a daily basis, with no new antivirals or vaccinations to deploy as a first line of defence.

AI, or artificial intelligence, is an extensive discipline which is concerned with the innovation in developing brainy machines that can do activities that would ordinarily need human intellect. It mostly refers to the transition of human information into robots that can contemplate like people and mimic their activities, as well as machines that demonstrate attributes similar to the human brain, such as problem solving and learning. On contrary to that Deep learning refer to the sub domain of machine learning that lets computers to response progressively complex glitches. This perfect quality of both AI and deep learning is being applied to solve difficult healthcare problems. The use of artificial intelligence has been crucial in predicting and analysing the course of a covid-19 vaccine. This outcomedriven technology evaluates, screens, tracks, and predicts existing and prospective patients. The principal applications collect information on confirmed, recovered, and fatal incidents. Artificial intelligence and deep learning are two examples of such knowledge that can easily monitor the spread of this virus, detect high-risk people, battle the virus through population testing, health checks, and infection treatment advice, and control.

OBJECTIVES

Our aim is to assess the role of AI and deep learning in coronavirus 2019. And to understand and analyze how Artificial Intelligence (AI) and deep learning can help fight against corona virus 2019. Most importantly our aim is to study a new technology centered on deep convolutional neural networks (CNN model) that can help radiologists and clinicians in distinguishing corona virus 2019 cases utilizing chest X ray images. It may also help to distinguish the chest congestion differences between pneumonia, T.B and COVID-19.

METHODOLOGY

The databases used in this study were from PubMed, Google scholar, and from journals like Computer Methods and Programs in Biomedicine, scientific reports, and many others. From July 2020 till August 2020 we

searched through articles and assessed the literature from above mentioned databases. We also read through the articles and reviewed for the criteria i.e. a) On how AI and deep learning techniques help in the prevention, detection & management of covid-19, b) CNN, a class of deep neural network technology for the detection of coronavirus 2019 cases from chest X ray images, and c) Working of deep CNN models in general and the best model among them with exact accuracy.

RESULT & CONCLUSION

Wang and Wong [1] suggested a deep learning network for covid-19 identification (COVID-Net) that achieved 83.5 percent accuracy in categorising covid-19, normal, and instances of viral-pneumonia and bacterial-pneumonia. To examine the covid-19 case using chest X-ray images, Hemdan [2] utilized different deep learning models and suggested a model i.e. COVIDX-Net including seven CNN models. A distinctive pre-prepared deep learning model on the dataset containing 224 affirmed Covid19 pictures was prepared by Apostolopoulos and Mpesiana [3] and accomplished 98.75% and 93.48% precision for 2 and 3-classes, separately. By utilizing chest X-ray pictures Narin et al. [4] prepared ResNet50 model and accomplished a 98% Covid-19 identification exactness for two classes. Next to SVM (support vector machine) classifier Sethy and Behera utilized different convolutional neural organization (CNN) models for covid-19 grouping. When used on chest X-ray pictures, the ResNet50 model with SVM classifier demonstrated accuracy and sensitivity of 95.33 percent in both. Currently, Ozturk et al. [5] have proposed a deep organisation based on the DarkNet concept. It consists of seventeen convolution layers with the actuation function Leaky RelU. It obtained 98.08 percent precision for two fold classes and 87.02 percent precision for multi-class scenarios.
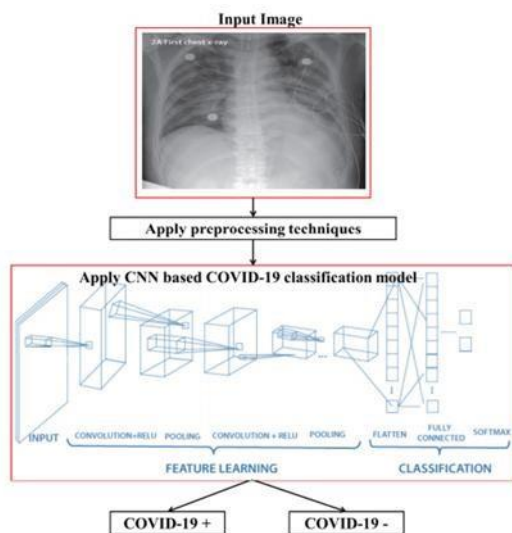
The optimistic and exciting findings of deep learning models in coronavirus identification from radiography images signal that deep learning will play a crucial role in tackling this epidemic in the not-too-distant future. CoroNet was the model investigated in this study thoroughly, and it helps to discriminate between three forms of pneumonia infections as well as how corona virus varied from other illnesses. This model can detect covid-19 illness based on chest radiography images, enabling professionals in emergency situations, assessment, and positive case follow-up [6].

We conclude that AI deep learning techniques have necessitated their need in automatic detection and diagnosis system. Also deep CNN models have shown revolutionary results by detecting covid19 from chest X-ray images. They can show outstanding accuracy and precision for all classes. Overall it is beneficial for health

experts & radiologist to gain better understanding in critical aspects associated with Covid-19 cases. As most instances of COVID-19 are gentle, distinguishing serious and basic cases early is urgent. As of now, an open inquiry is whether explicit chest imaging highlights can anticipate medical clinic course.

REFERENCES

1. Wang, Linda, Zhong Qiu Lin, and Alexander Wong. "Covid-net: A tailored deep convolutional neural network design for detection of covid-19 cases from chest x-ray images." Scientific Reports 10.1 (2020): 1-12.
2. Hemdan, Ezz El-Din, Marwa A. Shouman, and Mohamed Esmail Karar. "Covidx-net: A framework of deep learning classifiers to diagnose covid-19 in x-ray images." arXiv preprint arXiv:2003.11055 (2020).
3. Apostolopoulos, Ioannis D., and Tzani A. Mpesiana. "Covid-19: automatic detection from x-ray images utilizing transfer learning with convolutional neural networks." Physical and Engineering Sciences in Medicine 43.2 (2020): 635-640.
4. Narin, Ali, Ceren Kaya, and Ziynet Pamuk. "Automatic detection of coronavirus disease (covid-19) using x-ray images and deep convolutional neural networks." Pattern Analysis and Applications (2021): 1-14.
5. Ozturk, Tulin, et al. "Automated detection of COVID-19 cases using deep neural networks with X-ray images." Computers in biology and medicine 121 (2020): 103792.
6. Khan, Asif Iqbal, Junaid Latief Shah, and Mohammad Mudasir Bhat. "CoroNet: A deep neural network for detection and diagnosis of COVID-19 from chest x-ray images." Computer Methods and Programs in Biomedicine 196 (2020): 105581.