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Prediction of COVID-19 Using Genetic Deep Learning in Keras

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Abstract

Rapid spread of Coronavirus disease COVID-19 leads to server pneumonia and it is estimated to create a high impact on the healthcare system. An urgent need for early diagnosis is required for precise treatment, which in turn reduces the pressure in the health care system. Some of the standard image diagnosis available is Computed Tomography (CT) scan and Chest X-Ray (CXR). Even though a CT scan is considered a gold standard in diagnosis, CXR is most widely used due to widespread, faster and cheaper. This study aims to provide a solution for identifying pneumonia dur to COVID-19 and healthy lungs (normal person) using CXR images. One of the remarkable methods used for extracting a high dimensional feature from medical images is the Deep learning method.

Keywords*: - Genetic Deep Learning Convolutional Neural Network (GDCNN), Computed Tomography (CT), Chest X-Ray (CXR), Artificial Intelligence (AI)*

INTRODUCTION

In this research, the state-of-the-art techniques used is Genetic Deep Learning Convolutional Neural Network (GDCNN). It is trained from the scratch for extracting features for classifying them between COVID19 and normal images. Novel coronavirus has been formally named as Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-COV-2) is responsible for causing Coronavirus Disease 2019 (COVID-19).Few symptoms of COVID-19 are cough, fever, a disease of the respiratory system and in some

cases, it leads to pneumonia. Generally, pneumonia is termed as the infection that causes inflammation to air sacs present in the lungs for oxygen transfer or weak immune system, smoking, and aging people. The infected peoples are treated.

The pandemic of COVID-19 is due to its seriousness and its faster transmissibility. Greater impact in the health care department is mainly due to the number of people getting affected day by day, as they need to provide mechanical ventilator for the serious patient admitted in ICU. Hence, number of beds in ICU also needs to be increased drastically. In the above situation, the initial diagnosis is vital for proper treatment which, in turn, reduces the pressure on the health care system.

LITERATURE REVIEW

Linda Wang in 2020 suggested the methodology of COVID-Net: A TailoredDeep Convolutional Neural Network Design for Detection of COVID-19 Cases from Chest X-Ray Images. In this study, we introduced COVID-Net, a deep convolutional neural network design for the detection of COVID-19 cases from CXR images that is open source and available to the general public.

X. Hu, W. Zhang, X. Li, and N. Yu has proposed research as “Minimum Rate Prediction and Optimized Histograms Modification for Reversible Data Hiding”.

They uses prediction error expansion method which divides the pixels of image in 2 sets i.e. cross set dot set. In this paper a novel optimized histograms modification scheme is presented to approximate the optimal embedding performance on the generated Prediction error sequence. In these methods all probabilities are considered and adaptive prediction based on block classification. It causes error because it is based on prediction technique

In 2020, Shervin Minaee proposed a One of the models used in this work, is the pre-trained ResNet18, trained on ImageNet dataset. ResNet is one of the most popular CNN architecture, which provides easier gradient flow for more efficient training, and was the winner of the 2015 ImageNet competition. We reported a deep learning framework for COVID-19 detection from Chest X-ray images, by fine-tuning four pre-trained convolutional models on our training set. We prepared a dataset of around 5k images, called COVID-Xray-5k, with the help of a board-certified radiologist to confirm the COVID-19 labels.

PROJECT MODULE

In the project there is Admin which can access the User interface to perform prediction on COVID-19.

There are one primary role that is admin .In admin there is registration page .firstly user can complete the registration then user are able to login the page. After that there is detection of COVID -19. User uploads the CT Scan report or X-RAY image report

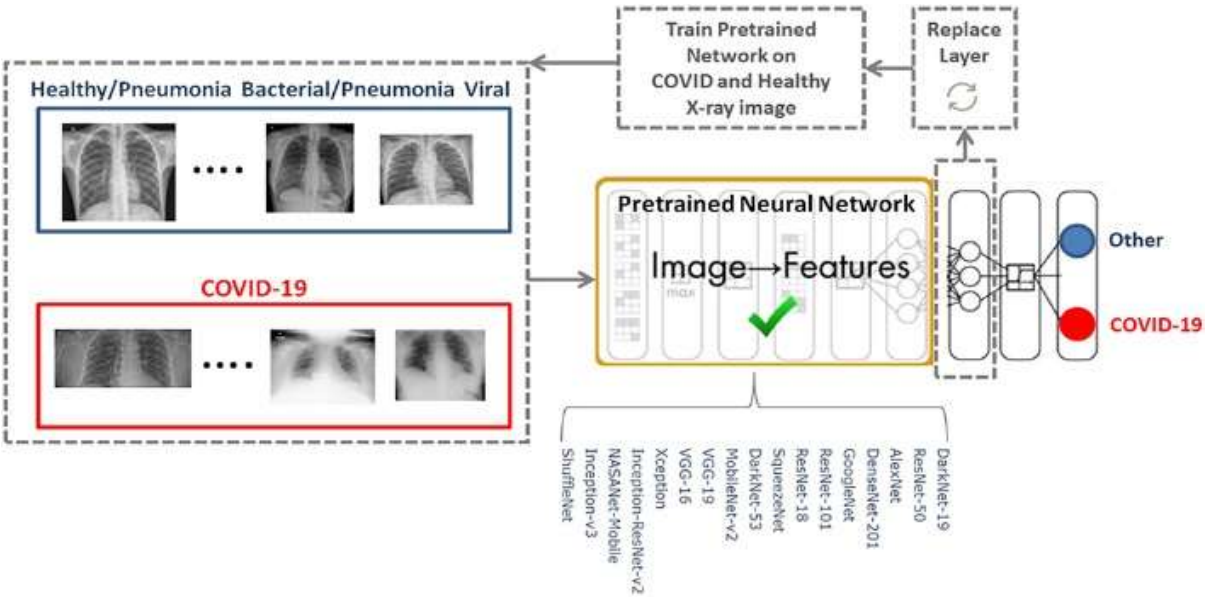

Figure: System Architecture

The advantage of that software is:

1. Early diagnosis of COVID-19 is in urgent need in the treatment.
2. Diagnosis of COVID-19 is faster and cheaper.
3. Reduces the pressure on the health care system.

OBJECTIVES

The objectives are discussed below:

1. To reduce the pressure on the healthcare System.
2. To Increase the testing efficiency of COVID-19 by predicting the present of COVID-19.
3. To Early diagnosis.
4. To provide a solution for identifying pneumonia due to COVID-19 and healthy lungs (normal person) using CXR images.

5. To Extracting features for classifying them between COVID-19 and normal images.

METHODOLOGY

Software requirements

This section mentions the various tools and Frame work that will be required to develop this project.

Web Browser- A web browser is the most essential when we need to access a website.

Python 3.0 - Python is used in this project to develop a front-end part of the system.

Flask - High-level framework for rapid web development.

Hardware requirements

- Processor: Above 1.5GHZ
- Hard Disk: 80GB
- RAM: 2GB

CONCLUSION

In this research, the GDCNNN method is proposed for classifying COVID-19 and normal person, and it is done through CXR image samples. The health care system can use this tool for earlier diagnosis of diseases. In the future we hope to apply this method for a large scale database for achieving better hierarchical classification accuracy.

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