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Covid-19 Prediction using Machine learning

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A B S T R A C T

The coronavirus disease pandemic, which started in China, has rapidly spread to various other countries, with many cases being reported all over the world. The most common symptoms of the novel coronavirus include fever, dry cough, and tiredness. In addition to that people may also experience symptoms like aches, pains, or difficulty in breathing. Most of these symptoms show signs of respiratory infections and lung abnormalities which can be detected by radiologists using computed tomography scans. The aim of this project is to study the importance and of chest CT scan images in the diagnosis of COVID-19, as some research confirmations suggest that chest CT could prove some useful in the medical diagnosing of COVID-19 using machine learning methodologies. Rapid and precise COVID-19 screening is possible only by using computed tomography (CT) scan images. The machine learning techniques used in this proposed method are based on a convolutional neural network algorithm (CNN).

1. Introduction

The continuing pandemic of Coronavirus Disease is causing a serious global catastrophe at the moment. This pandemic seems to be the major healthcare threat to humanity as of now. Currently, the tests for detecting the presence of COVID19 are performed on the basis of reverse transcription-polymerase chainreaction(RT-PCR),whichgenerallytakes4–6hourstogenerateresults.Besidesthis,theaccessibilityofthetestingkitsposesanotherseriousproblem in terms of efficient detection of Covid-19. In order to deal with these issues, radiology imaging-based approaches have been proposed by multiple works recently, showing great promise for the application of Artificial Intelligence (AI) and Machine learning (ML) based approaches for the accurate detection of the disease using chest CT scan images. Determined by the need for a substantial evaluation of such AI-based approaches, in this work, CNN-based strategies are surveyed and studied practically to assess the usefulness of the approaches during this pandemic.

The currently proposed approach is trained using a chest CT image-based dataset that consists of scan images with patients affected by COVID19, Community-Acquired Pneumonia, and Non-Pneumonia. It is apparent, that the CNN-based machine learning approach can certainly have a huge impact in controllingtheincreasinglevelofthediseasebyprovidingrapidscreeningandtesting.NowadaysML-basedalgorithmsareusedwidelyinvariousmedical domains, it is big time for ML based methodologies to be implemented in the screening process during this present widespread of COVID-19 disease. In order to make the predictions accurate, we collect the input scan images of the COVID-19 suspects, Accuracy is paramount in this model. CNN algorithm will be used to implement this model. CNN algorithm is considered as one best and widely used algorithms in image classification and pattern recognition. AftertrainingthemodelwetestitagainstdifferentimagestocheckthepredictionTheUIiscreatedusingaflask.Duringdeployment,we can test the image in the UI. Our goal is to provide a user-friendly machine learning model capable of detecting COVID-19 pneumonia.

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2. Methodology

The recent development in the field of Machine Learning, indicates the prospective utilization of several CNN architectures. The illustration of the model is shown below in fig3.1. To train and evaluate the system, we collect the COVID19-CT dataset, which contains 2800 positive CT scans with clinical findings of COVID-19, and 2600 negative images without findings of COVID-19. Collect the mammogram scan images from reliable repositories which have both positive and negative scan images and then split them into test and train datasets. Using the CNN algorithm to filter desired attributes of the positive and negative scan images and train them on a prepared dataset. The trained model is then tested against the test images for prediction and the accuracy is predicted. Then we build a flask UI for predictions to be done by the user. We have performed extensive experiments to examine the potential of our proposed methods. It achieves an accuracy score of 98% on the COVID19-CT dataset.

Working stages of the model
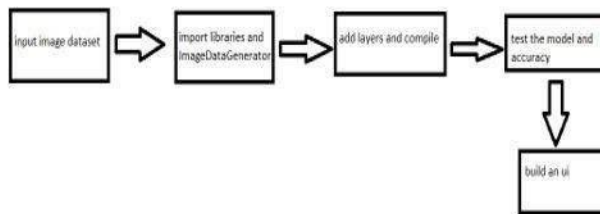
3. Flowchart and Details of the Working Model
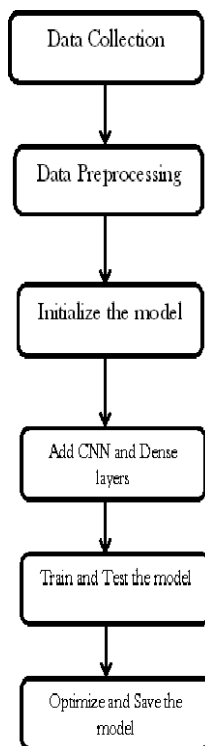
The functioning of our model for the diagnosis of COVID-19 based on CT scan input images is presented here. We have the entire dataset comprising of chest CT scans of COVID-19 positive, negative from various hospitals. Preprocessing of the dataset images is done to intensify aspects of the image that can help with the recognition task in the training phase. Further, the initialization process is done by importing necessary libraries such as Keras, sequential files. Then the CNN and dense layers are used in this model. The dataset training process is done and testing of the model is executed to check

the performance of the model. The efficiency of the system is determined by running the number of epochs. Finally, an optimization process is done to make the model more effective and then the model is saved.

4. Conclusion and Results

In this study, we have proposed a Machine learning-based model to detect and classify COVID-19 cases through chest CT scan input images. Our proposed model is completely automated until the end structure without any manual inspection. Our developed project model is able to perform the Covid-19 detection task at an accuracy rate of 98.08%. This system is compatible so that it can be used in remote places affected by COVID-19 to overcome the scarcity of radiologists. Also, this model is capable in diagnosing other chest-related diseases like tuberculosis and pneumonia. We are planning to make our model more powerful and accurate by using more CT scan images collected from the various hospitals.
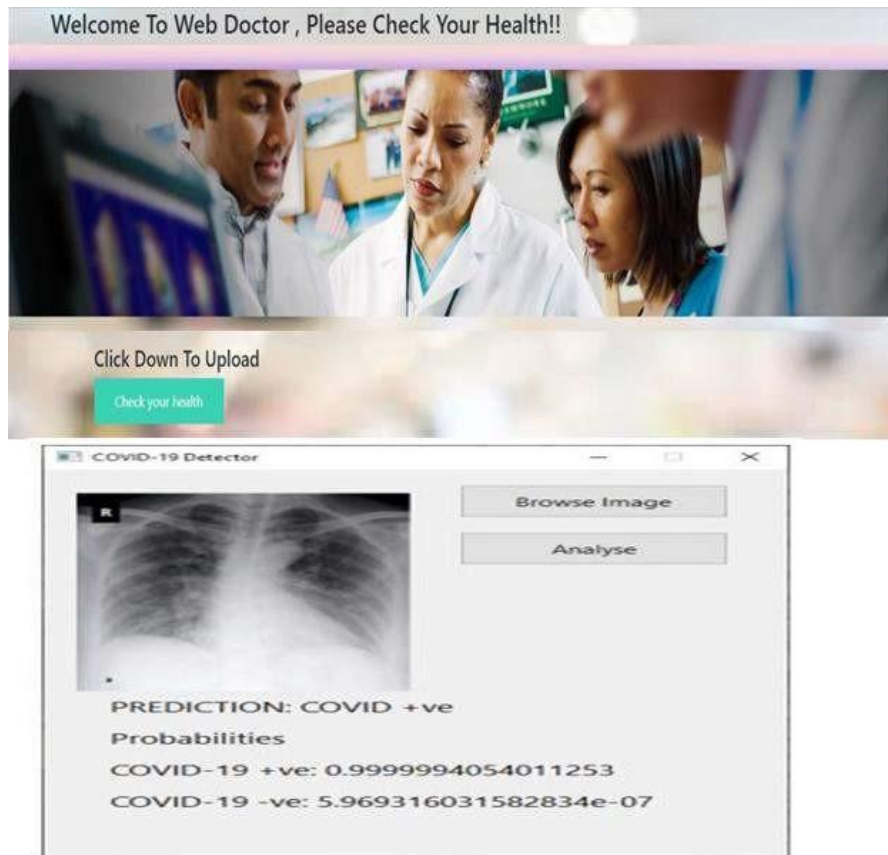
Fig 4.1- User Interface Design

ThespreadofCOVID-19isincreasingnowadaysrapidly.With the high rising number of COVID-19 cases,we require mass testing.In our proposed system,we have tested with multiple CNN layer in order to the Covid-19 affected patients using their chest CT scans.Our intension is to develop a model capable of detecting Covid-19 hassle-free and inexpensive of cost. We believe that in the upcoming days more dataset on COVID-19 will be available, for more accurate studies to be conducted. These findings are promising for machine learning which can be implemented in the medical field as a supportive system for doctors in the spotting ofCOVID-19.

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