



COVID-19 Detection through Transfer Learning using Multimodal Imaging Data

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Abstract: In 2019, the COVID-19 virus has spread to various parts of the world including Indonesia. This global pandemic becomes a lethal outbreak since there is no vaccine to treat or prevent transmission of the virus. Rapid Test is selected as an essential method to detect Covid-19 in Indonesia because the price is fairly cheap compared to the SWAB test. The increase in Covid-19 patients tends to lead to limited capacity for the Covid-19 test available at the hospital so that the latest technology to detect and overcome this pandemic issue is needed. Thus, the present research aims to examine the total of 100 X-Ray chest images of the Covid-19 patients and 100 X-ray normal chest images. The application of Contrast Limited Adaptive Histogram Equalization (CLAHE) and Convolutional Neural Networks (CNN) methods are implemented to analyze the dataset with two scenarios in obtaining the detection results. The results of this research reveal that the application of CLAHE is likely to affect Covid-19 detection accuracy using CNN. Also, the application of the CNN basic model shows significant results compared to the application of VGG16 transfer learning.

Keywords: COVID-19, Multimodal Imaging, Machine Learning, CNN, Neural Network.

INTRODUCTION

As the novel Corona virus is declared as global emergency by World Health Organization (WHO) were most of the cases it is affecting the lungs, Radiologic work is extremely crucial for diagnosing the patients. In most of the Countries due to exponential rise in cases precautionary measures like hygiene, social distancing and isolation is the solution. The COVID-19 is Severe Acute Respiratory Syndrome cause fever, cough, and illness in respiratory system lead to infection or inflammation of air sacs in lungs plays an important role in oxygen exchange may be responsible to Pneumonia is highly in transmissibility.

In the Current situation covid -19 is spreading all Over The World. So we want to Detect Covid-19 Patient To early stage. Main Motivation of The System Is To Detect Covid-19 To early Phase And Save The Human life. Coronavirus is spread All over world .We Detect covid 19 at early stage. The Main Scope Of Our System is that we can Bring the covid-19 situation under control As soon as possible that's why we use our system to detect covid-19.

LITERATURE SURVEY

1. Author: Buyut Khoirul Umri ,Muhammad Wafa Akhyari

Abstract:- In 2019, the COVID-19 virus has spread to various parts of the world including Indonesia. This global pandemic becomes a lethal outbreak since there is no vaccine to treat or prevent transmission of the virus. Rapid Test is selected as an essential method to detect Covid-19 in Indonesia because the price is fairly cheap compared to the SWAB test. The increase in Covid-19 patients tends to lead to limited capacity for the Covid-19 test available at the hospital so that the latest technology to detect and overcome this pandemic issue is needed. Thus, the present research aims to examine the total of 100 X-Ray chest images of the Covid-19 patients and 100 X-ray normal chest images. The application of Contrast Limited Adaptive Histogram Equalization (CLAHE) and Convolutional Neural Networks (CNN) methods are implemented to analyze the dataset with two scenarios in obtaining the detection results. The results of this research reveal that the application of CLAHE is likely to affect Covid-19 detection accuracy using CNN. Also, the application of the CNN basic model shows significant results compared to the application of VGG16 transfer learning

2. Author: Fian Yulio Santoso

Abstract: COVID-19 pandemic caused vast impact worldwide. Many efforts have been made to tackle the pandemic, including in the deep learning community. In this research, a modification of deep neural network based on Xception model is proposed. The model is used for COVID-19 detection based on the chest X-ray images. The proposed model implements two stacks of two dense layers and batch normalization. The layers addition is used to avoid overfitting of



the proposed model. The performance of the proposed model is compared to Resnet50, InceptionV3 and Xception. The experiment result shows that the proposed model has better performance than the other models used in the research. However, its computational time is higher than the other models used in the research

EXISTING SYSTEM

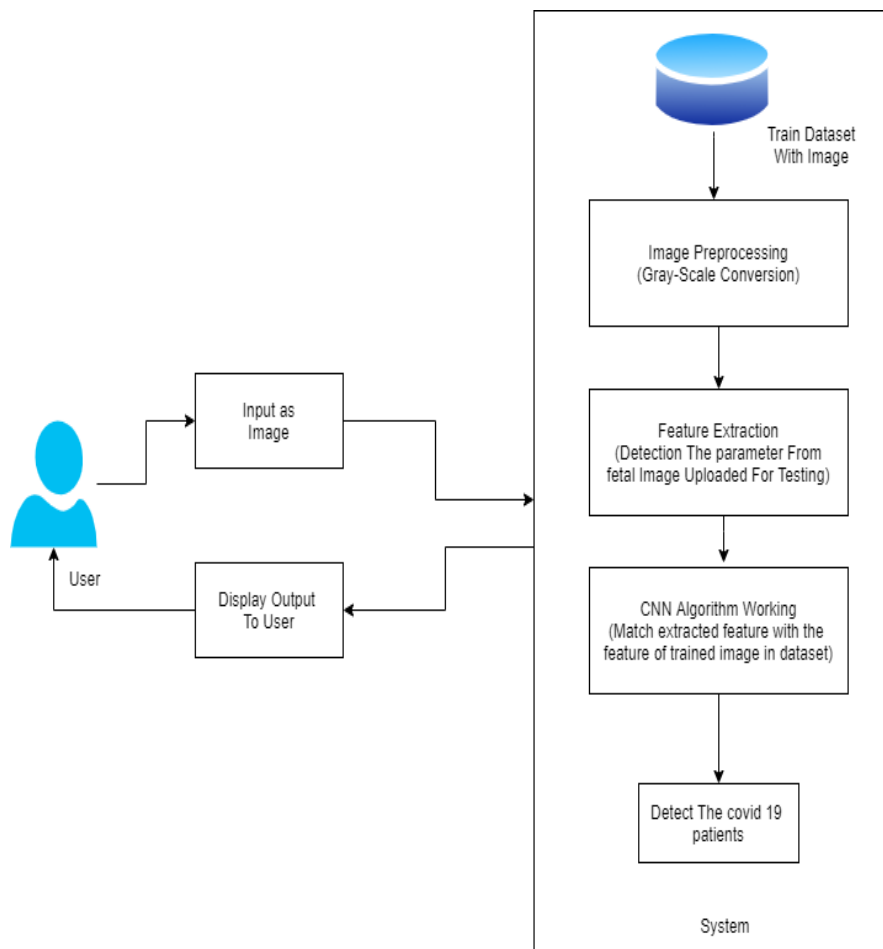
The current COVID-19 pandemic has impacted the world with over 18.35 million infections and over 6,96,147 deaths so far (as of 5th August 2020) [1]. Early identifying, isolation and care for patients is a key strategy for a better management of this pandemic. Our study aims to provide a conceptual transfer learning framework to support COVID-19 detection with the use of image classification using deep learning models for multiple imaging modes including X-Ray, Ultrasound, and CT scan. The acquisition of a sufficiently large, publicly available corpus of medical image sample data for fully training deep learning models is challenging for novel medical conditions such as COVID-19 since collection and labelling of images requires significant time and resources to compile. An alternative method of training deep learning models is “transfer learning” whereby a deep learning network is pre-weighted with the results of a previous training cycle from a different domain. This technique is commonly used as a basis for initializing deep learning models which are then fine-tuned using the limited available medical sample data

PROPOSED SYSTEM

Early detection of Covid-19 patients The System’s main motivation is to detect Covid-19 in its early stages and save human lives. Machine Learning is used in the suggested system. We employ the CNN algorithm for training and testing. Deep Learning algorithm Convolutional Neural Network (ConvNet/CNN) It can accept an image as input and rank it (learnable weights and biases) to distinct aspects/objects in the image and be able to distinguish between them Problem formulation and resolution The Covid 19 is the major problem to solve.

The current situation we make numerous attempts to save human life.

SYSTEM ARCHITECTURE





Let S be the Whole system $S = I, P, O$

I-Input

P-Procedure

O-Output

Input(I)

I=Covid 19 x-ray dataset

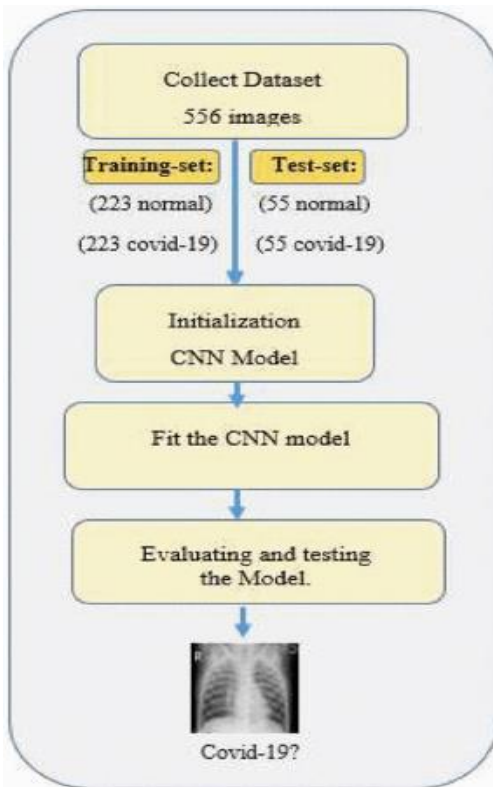
Where, dataset image Procedure (P),

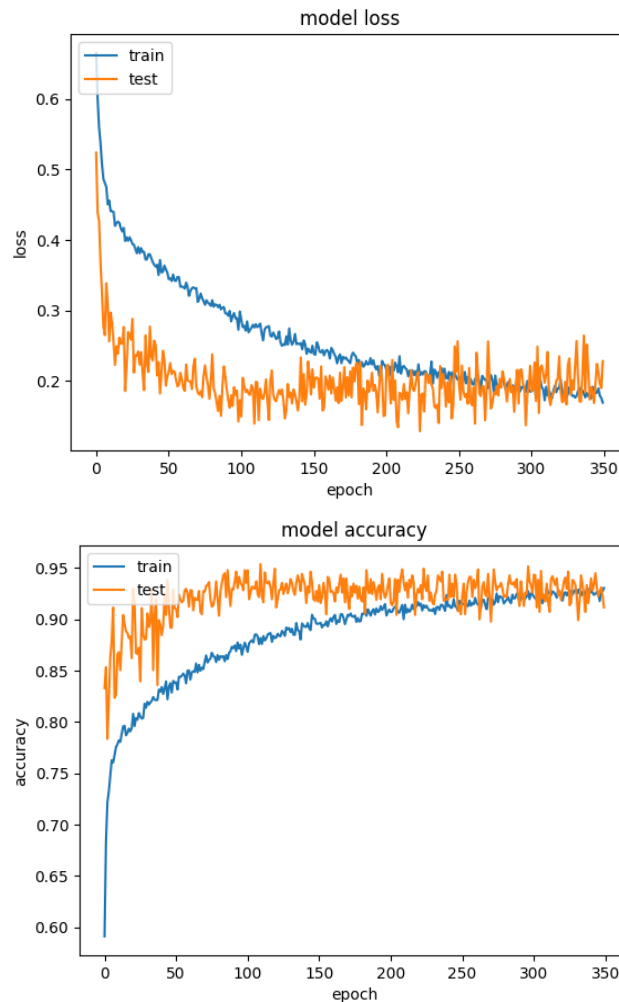
P=I, Using I System perform operations and calculate the prediction

REQUIREMENT

- Processor – Intel i5 5th Gen or Higher / AMD Ryzen 5 3rd Gen or Higher
- Ram – 8 GB or Higher
- Python 3.9
- Python Libraries:
 - Keras
 - OpenCV
 - Kinker
 - Matplotlib
 - Scikit Learn
 - Numpy
 - Tensorflow

TRAINING RESULT





SIGNS OF INFECTIONS

The COVID 19 virus has many symptoms which are most common like

- Fever
- Cough
- Tiredness
- Loss of taste or smell
- Shortness of breath

Which makes it difficult for a physician to determine if the person has common cold or if he is infected with COVID 19. Also for the symptoms to appear it takes 7-14 days which also delays the detection of the COVID and treatment.

CONCLUSION

We have successfully implemented CNN algorithm for the detection of COVID 19 using x-ray image of chest using this we were able to predict the infected patients with 95-98% accuracy within a few second. Compared to the conventional method of RT-PCR which takes 4 to 8 hours for getting the report while Rapid antigen test takes 15-30 minutes for the result in best situation but in case of pandemic and high volume of COVID cases the time taken by conventional method can take a 24-48 hours. Conventional methods are costly and labour intensive compared to the proposed solution. Still this solution is not 100% accurate and can lead to some of the potential infected patients getting unnoticed and they can further spread the infections.

However in future research if we can predict the infection with the more than 98.7% accuracy it can will be best alternative to the conventional method because as per research conducted by Centre's of Disease Control and Prevention department of United States of America the Rapid Antigen test is 98.7 – 99.5% accurate only.



FUTURE SCOPE

As we move along with training the model with feedback by providing more and more number of x-ray images the accuracy of the model can be further improved. This in turn will not only help to control the spread of the virus but allow us to identify patients in need of immediate medical attention.

We did not implement the VGG16 and CLAHE algorithm in this paper however as per the base papers it can further improve the quality of the output. Also it is suggested to use FCovNet method for the CNN algorithm as it proved to have the highest accuracy when it comes to predicting the infected patients compared to Resnet50, InceptionV3 and Xception methods of CNN.

Based on the above findings we conclude that the machine learning algorithms and methods have improved drastically and in future help us to with many other diseases identification in the field of medical science. This will help us save more lives as well as reduce the load on the medical practitioners so that the practitioners can focus on creating a cure for the disease rather than investing their time in identifying potential patients.

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