COVID Detection using X-ray

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ABSTRACT

As we know about the Covid-19 virus that has shaken everyone around the globe. People get affected to this deadly virus physically & mentally and due to bad medical facilities in some countries it has become difficult to handle this large crowd of patients rushing to the hospitals. COVID-19 tests kits were hard to come by, there are simply not enough of them and they cannot be manufactured fast enough, which is causing panic. When there's panic, there are nefarious people looking to take advantage of others, namely by selling fake COVID-19 test kits after finding victims on social media platforms and chat applications. Since COVID-19 attacks the epithelial cells that line our respiratory tract, we can use X-rays images to analyze the health of a patient's lungs. And given that nearly all hospitals have X-ray imaging machines, it could be possible to use X-rays to test for COVID-19 without the dedicated test kits. This project uses TensorFlow and Keras and deep learning using CNN algorithm to train the model.

Keywords— Covid-19, TensorFlow, Keras, Deep Learning, CNN

1. INTRODUCTION

[5] According to WHO, Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. So the main issue is the respiratory problem which causes the Covid-19 to be a concern. With lack of oxygen supply in some places people have to lose their life.

This project uses a dataset which contains X-rays of normal and Covid-19 +ve to train model. These trained models can be used test real-time X-ray images of a patient and tell if he is Covid-19 +ve or -ve. This project will be helpful not only in the case of Covid-19 patient but can also be trained to detect different detectable diseases in an X-ray by following the same procedure. We will be using a deep learning algorithm known as CNN (Convolutional Neural Network) which is best known for image classification. Some other tool used in this project will be TensorFlow and Keras which work as a back-end to this project and make this project easier to understand.

2. LITERTURE SURVEY

2.1 Study by Dr. Joseph Paul Cohen PHD

[2] Dr. Joseph Paul Cohen is a researcher and pragmatic engineer. He currently focuses on the challenges in deploying AI tools in medicine specifically computer vision and genomics. He maintains many open source projects including Chester the AI radiology assistant, TorchXRayVision, and BlindTool – a mobile vision aid app. He is the director of the Institute for Reproducible Research.

Dr. Joseph has a interest in application of deep learning in medical field such as medical imaging in radiology, histology etc. After the news of Covid-19 detection in X-ray, led him to collect X-ray images of Covid-19 cases. These images may seem normal to human eyes but algorithms in neural network can detects difference in images. These differences can further be used to treat different diseases.
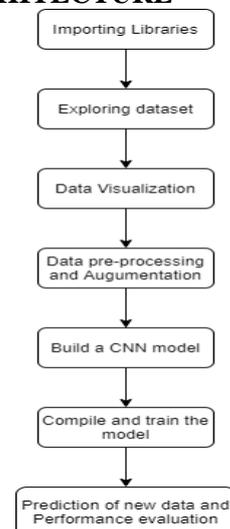
3. SYSTEM ARCHITECTURE

Fig. 1. Workflow of System

In this paper we use an algorithm of deep learning known as CNN (Convolutional Neural Network) which is used for image classification etc. This algorithm is preferred over other algorithm is because it need less pre-processing. Fig 1. shows the basic workflow of how the system works. This workflow can be used to build different project. First, we need import necessary libraries and required dataset. This dataset will contain different data so we need to classify and visualize them. The pre-processing helps in clearing any issues in the data like noises, missing values, an unusable format which cannot be directly used etc. An image is nothing but only a matrix of pixel values so we can flatten it into a single array like structure and use the data to differentiate. These all was done manually but after the CNN algorithm, they have the ability to learn these filters/characteristics. These models will help in training the dataset.

After the result we can evaluate it to find the best result. These results will help us in prediction the new data. Fig 2. shows that the X-ray images will consist both normal and Covid-19 positive images.
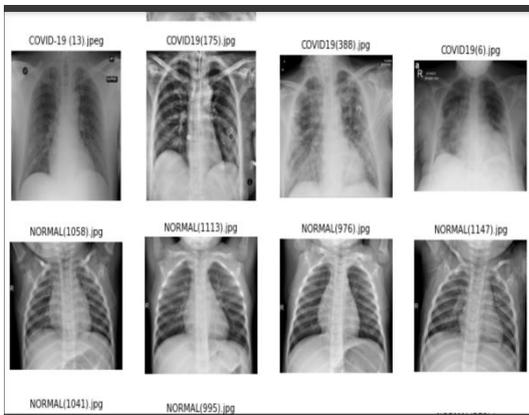

Fig. 2. X-ray images

4. REQUIREMENT ANALYSIS
The proposed system will be able to:
- Read X-ray images as inputs.
- Classify them into Normal and COVID +ve images.
- The system shall be able to predict if the image is COVID +ve or -ve.

5. TECHNOLOGY DESCRIPTION
A. TensorFlow
[6] TensorFlow is a very powerful and open source library for machine learning. It is used in range of task but mainly used in the field of neural network. It was developed Google in 2015. The flexibility in its architecture allows for the easy deployment of computation across CPUs, GPUs, TPUs, etc.

B. Keras
It is also an open source library which provides a interface for neural network in python. It acts as an framework for

TensorFlow. It contains libraries such as sequential, layers etc which help in building a CNN model.

C. Colaboratory
It is a TensorFlow Jupyter notebook environment that requires no setup to use. It already comes with TensorFlow, all we need to do is import necessary libraries. It has its own GPU and CPU and cloud storage to make our computation easier.

6. CONCLUSION AND FUTURE SCOPE
This project is a base for detection a disease through X-ray image and like this many more diseases which can be differentiated in a image can be found out. In future we can build many more projects considering different diseases and analysis them. This project aims to detect the virus at a faster rate which in turn will lead to faster results.

Deep learning has a lot of scope in near future as there is a need to automate most of the things in medical field. The percentage of error can be reduced by automation. This decrease in percentage of error can be blessing for someone. As the virus is having different variants now, it will become a hectic task to differentiate between different variants. So, we may have to modify the model in future.

7. ACKNOWLEDGEMENT

8. REFERENCES
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