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DETECTION OF COVID-19 USING X-RAY IMAGES

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Abstract: An infectious condition called COVID19 is brought on by a recently identified corona virus. A significant number of lives have been tragically lost as a result of the pandemic. Numerous coronavirus vaccines are being produced, yet thousands of cases continue to appear in different parts of the world. So, prompt & efficient testing is required to stopthe pandemic. Chest x-rays have lately been revealed to be a highly reliable predictor of COVID 19, according to numerous studies. Although chest X-rays cannot be used exclusively to diagnose COVID 19, because the results are immediate, people with positive results may be quickly separated. In this study, we use image classification with Convolutional Neural Networks learning to determine from a chest X-ray image whether a person has COVID-19.

Index terms: Convolutional neural networks, COVID 19 virus, corona virus, machine learning, and deep learning

INTRODUCTION:

The worldwide impact of the COVID-19 patient population growth is catastrophic for healthcare systems. It will be challenging to test every patient with a respiratory ailment using conventional methods due to a lack of testing kits (RTPCR). While test results are being awaited, high risk individuals may benefit from being quarantined if probable COVID-19 infections are found on chest X-ray and CT images. Significant advancements in development of vehicle sensors, including object identification, localisation, tracking, and activity recognition for a variety of applications, have been reported recently. These developments have enhanced the autonomous driving systems' sensing and computing capabilities.

Despite this, AD needs more focus from business and academia due to its delicate nature and crucial role in lowering accident rates and saving lives. For instance, there are over 6 million car accidents in the United States alone each year, out of which about 3 million people suffer injuries and about 2 million sustain chronic harm. In addition to injuries, around 90 individuals pass away in car accidents every day.
Alcohol use (40 percent), excessive speeding (30 percent), and reckless driving are the top contributing factors in these collisions (33 percent). Similar to drunk driving, distracted driving causes a significant number of collisions.

According to a survey, distracted driving causes more than 9 fatalities every day in the USA. Similar to this, driver distraction causes more than 1060 injuries per year in car accidents. By utilising driverless car technology as a supplementary aid for drivers or in full automation, these collisions can be significantly decreased.
Additionally, this technology has a lot to offer the disabled community. The numerous advantages of AD have piqued the curiosity of governments and businesses all around the world.

LITERATURE SURVEY:

PCR (Polymerase chain reaction) tests are frequently used to perform COVID-19 tests. These tests search for the existence of infection-related antibodies.
This approach has some problems and drawbacks.

PCR Analysis:

With this assay, viral RNA is directly verified. This can be discovered even before the body produces antibodies or before any symptoms appear. Therefore, we can determine whether a person has a disease at an early stage or not.
Lateral flow test: These tests can be used to examine a variety of bodily fluids; in the instance of COVID-19, samples taken from the neck and back of the nose are examined. A sample of this liquid is then deposited on a little absorbent pad within the disposable testing kit once the swab has been placed into the liquid-filled tube.
Antibody testing: This procedure reveals the proportion of affected individuals. We cannot determine who is infected using this test. This is due to the fact that antibodies develop within 7 to 14 days, by which time the virus would have been eliminated from the body.
The test does reveal who has been exposed to the virus and who is immune to it.

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PROPOSED SYSTEM:

Chest x rays have lately been revealed to be a Highly accurate predictor of COVID_19, according to numerous studies. The rapid nature of the chest X-Ray testing allows for the quick isolation of those with positive results, even though the chest X Rays cannot be utilised exclusively to determine COVID-19. In our research,
we use deep learning's convolutional neural networks for image classification to determine from a person's chest X-ray image if they have COVID-19.

WORKING:

Dataset:

In this study, we trained our model using the COVID19 Radiography Dataset. It was obtained via Kaggle.com.A group of scholars collaborated to create dataset. These researchers came from the University of Dhaka and Qatar University. This collection of chest X-ray images was produced in collaboration with medical professionals. This dataset was created over time.

Each stage's amount of photos was increased. Systems Design Structure of the system: Chest x rays have lately been revealed to be a highly reliable predictor of COVID19, according to numerous studies.

The rapid nature of the chest XRay testing allows for the Quick isolation of those with positive results, even though the chest X Rays cannot be utilized exclusively to determine COVID. In our research, we use deep learning convolutional neural network for image classification to determine from person's chest X-ray image if they have COVID 19. To obtain
the findings, we employ two modules:

1) Data Pre-processor
2) Image Classifier

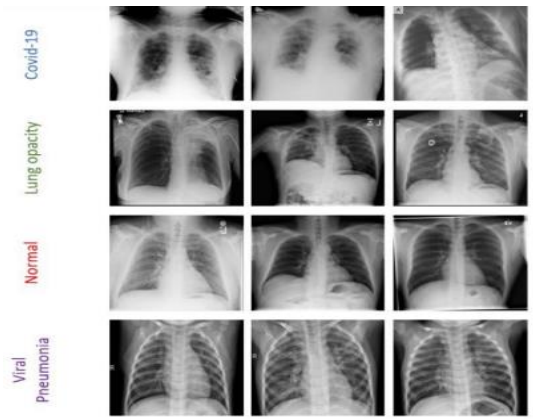
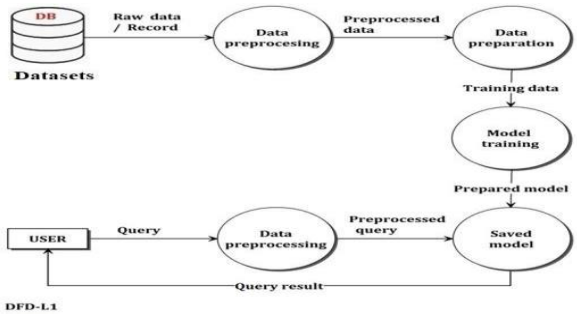


Figure 1) Sample depiction of the Dataset

MODULES:



Data Preprocessor: The module in charge of pre-processing the photos in the dataset is known as Data Preprocessor. To give the input the model requires, for instance, cropping and resizing the photographs to set resolution & format. The dataset is also divided into training and testing datasets by it. The module called "Image Classifier" is in charge of determining the class of every given chest x-ray image.

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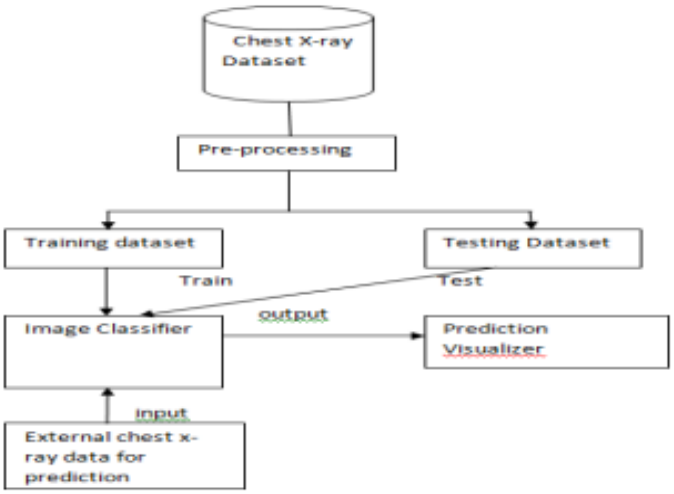
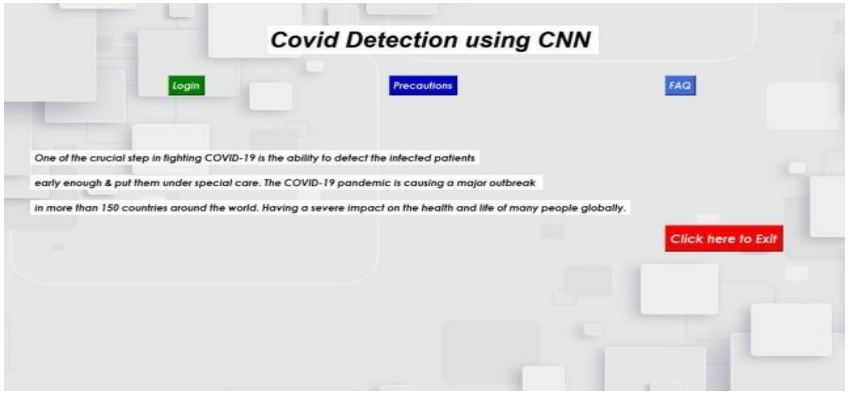
(i.e., to determine whether the patient on the x-ray is infected with COVID or not.) We want to experiment with transfer learning for this classification by changing and utilising cutting edge CNN models trained on ImageNet data, such as VGG16, InceptionV3, and others.



RESULTS:

A convolution layer outputs feature maps after convolutionally extracting the features from the input photos. It is made up of number of convolution kernels, which are fixed-size filters that are employed in convolution operations on image data to create feature maps. The following photos distinguish between typical x-rays and x rays that have been altered by covid between a standard x-ray and a covid.



Normal x ray image

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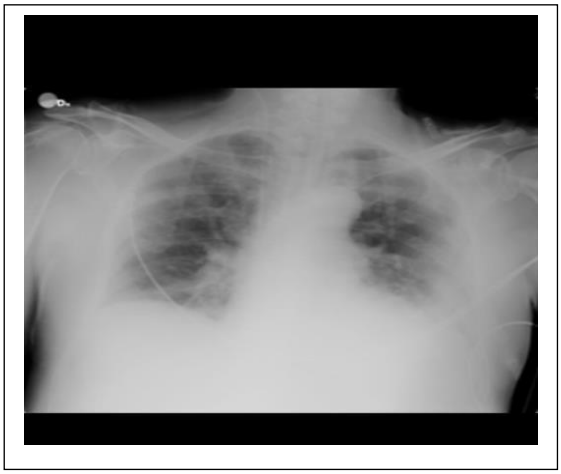
Pneumonia X-ray Image

Covid X-ray image



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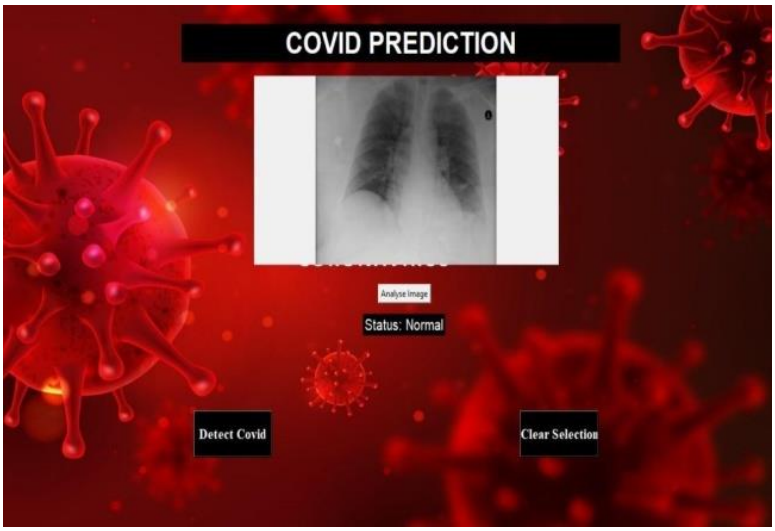

PREDICTION OF OUTPUT

Clinical practitioners' ability to identify SARS-CoV-2, the virus that causes COVID-19, as early as possible is essential. Since March 11th, 2020, the WHO has declared the COVID-19 pandemic Epidemic to be affecting individuals all across the planet. In light of this, it is imperative to identify those who are infected so that preventative measures can be taken to limit the spread of COVID-19 and to start early medical treatment. We think that using this computer-aided diagnostic tool will greatly increase the efficiency and precision of diagnosing COVID-19 cases.

This might be very helpful during a pandemic where resources are few & illness burden and the necessity for preventive actions outweigh each other. Deep learning has emerged as the method of choice for a range of challenging tasks, including object identification and image categorization. The Deep CNN model that has been proposed is more accurate and performs better. The outcomes reveal that transfer learning was a successful, reliable, and easily implementable method for COVID -19 identification.

Using chest X-ray radiographs, coronavirus Pneumonia infected patients can be identified with a classification accuracy of more than 85%. This computer aided diagnostic tool can greatly Increase the efficiency and precision of diagnosing COVID-19 cases.

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