Journal of Data Acquisition and Processing
ISSN: 1004-9037
https://sjcjycl.cn/
DOI: 10.5281/zenodo.7739180

EFFECTIVE DEEP LEARNING MODEL BASED APPROACHES FOR PREDICTING COVID-19 DISEASE

[1]jaya Vanpure, [2]Dr.Nirupama Tiwari

[1]research Scholar, [2]Associate Professor

[1]Institute of advance computing, [1]sage University, Indore,India

jayavanpure233@gmail.com, nirupma.tiwari1974@gmail.com

Abstract- Officials all over the world are using different models to predict the spread of COVID-19 so that they can make well-informed decisions and take the right steps to control it. Authorities are paying more attention to simple epidemiological and statistical models, and they are popular in the media. The traditional models that are used to predict the global pandemic caused by COVID-19 include these models. It has been shown that standard models are not good at making long-term predictions because there is a lot of uncertainty and not enough important data. Even though there are a lot of different ways to solve this problem that have been found in research, the models that are currently being used still need to be improved in how well they can generalize and be resilient. Since the COVID-19 epidemic started, the whole world has seen a level of chaos that has never been seen before. This change has affected every part of our daily lives, including, but not limited to, business, education, transportation, and health care. Because COVID-19 is a pandemic that is spreading quickly, it must be found quickly in order to stop the virus from spreading. Pictures of the lungs can be used to tell if someone has a coronavirus infection. COVID-19 can be found with the help of images from computed tomography (CT) and chest X-rays (CXR). Deep learning algorithms have been shown to work well and do a better job than traditional methods in many applications involving computer vision and medical imaging. As the COVID pandemic continues to spread, researchers are using deep learning techniques to find cases of corona virus infection in lung imaging. In this study, a review of the current deep learning methods used to find coronavirus infections in pictures of the lungs is given. You can find these ways in the section before this one. This paper gives an overview of the different methods that can be used, as well as a list of public datasets, datasets that are used by each method, and evaluation metrics to help researchers in the future. All of the evaluation metrics that are used by the different techniques are compared in detail. Deep learning (DL) is a subfield of applications of artificial intelligence (AI). In the past few years, DL has grown quickly and gained new features that could help in the fight against the COVID-19 pandemic. Using these traits could help with efforts to improve public health. In this study, a deep learning model was also made so that X-ray pictures could be used to predict COVID-19. The model is judged against other models that are already out there, such as ResNet50, DenseNet, and DenseCapsNet. According to these studies, MobileNet

has reached a level of accuracy of 98.69%, which is higher than other algorithms that are thought to be cutting-edge.
Keywords: COVID-19 detection DL-Based COVID-19 detection Lung image classification Coronavirus pandemic Medical image processing

I INTRODUCTION

The most cases have been reported in the Americas, Europe, South-East Asia, and the Eastern Mediterranean since March 11, 2020, when the World Health Organization (WHO) declared a pandemic for the unique SARS-CoV-2 2019 virus (COVID-19) [1]. It's important to keep an eye on the number of cases and try to predict how and how fast the disease will spread so that public health awareness, preparedness, and response efforts can be made on a global, national, and sub-governmental level. There are a number of urgent problems that need to be solved by societies, such as how to find a balance between strict safety rules and the need to keep businesses running and a healthy economy. Other important issues include making sure there is enough personal protective equipment, thinking about whether the health care workforce and other resources are enough, and making sure there is enough personal protective equipment. When dealing with a brand-new infectious disease, it is very important to look at what has happened in the recent past to make predictions about what will happen in the future. Scientists [2], government agencies and the media [3] have recently paid a lot of attention to trying to figure out how many people would get sick during a pandemic and what that would mean for health care needs and resources. Because there are so many models, their accuracy is also coming under more scrutiny [4], and it is becoming clear that the models' parameters need to be changed as we learn more about how the disease spreads and what factors affect infection and transmission rates. The COVID-19 outbreak and the steps taken to stop it have caused a medical disaster on a global scale that has affected all parts of life he vast majority of people who got this virus were able to get better n the other hand, as time has gone on, the World Health Organization (WHO) has said that COVID-19 is an epidemic that is becoming a bigger threat to the lives of millions of people around the world, especially those whose health care systems aren't as good. There are two clear reasons why the virus is a threat: first, there is no foolproof way to give vaccinations, and second, the virus can only be spread through indirect or direct contact with a sick person [5]. By finding and isolating people with COVID-19 as soon as possible, doctors can stop the disease from getting worse and save many lives. The reverse transcription polymerase chain reaction, or RT-PCR, is one of the most common diagnostic tests. RT-PCR tests also take a long time and cost a lot of money, and they often need specific materials, pieces of equipment, and instruments. Also, most countries have trouble getting their hands on testing kits [6], which can be put down to budgetary and technical constraints. So, the need for quick detection and surveillance during the COVID-19 epidemic drove the use of Deep Learning (DL) technology for effective assessment and diagnosis with X-rays and CT scans [7]. The need for effective assessment and diagnosis with X-rays and CT scans led to this need for quick detection and monitoring. But in the last few decades, Artificial Intelligence (AI) has been talked about as a possible way to help find diseases and help doctors make correct diagnoses in less time [8]. [Note: Machine learning (ML), which is one of the most popular approaches in artificial intelligence (AI), is a way to describe how smart computers are [9]. Deep Learning (DL) is an improved and scalable machine learning extension that was made to improve the structure of learning algorithms and make them easier to use [10]. Since DL is a part of ML, it has been used a lot to build complex models using very large amounts of data in a more straightforward setting. Because of this, DL systems could be used to solve the COVID-19 challenge. But because they don't apply to real life, their use in therapy has been limited [11]

Even though these approaches show promise, the predictive performance of these DL-based systems depends heavily on how much data is available. As a direct result of this, we put a lot of weight on how important datasets are to the process of getting results from methods. In the field of computer vision research, DL is often used with Convolutional Neural Networks (CNNs), and it is one of the most common ways to find out if someone is sick he biggest benefit of DL is that it can make it easier to process huge amounts of data during the learning process [12]. As a result, there is a big chance that accuracy will improve experts can quickly figure out what the results mean by looking at and understanding the predictions of a DL model. This gives important insights into the data that goes into the model and how it learns, which is needed to do so [13]. Edge technologies, on the other hand, like the Internet of Things (IoT), webcams, drones, smart medical equipment, robots, and so on, are very helpful in any situation involving epidemic.These pieces of equipment help make infrastructures that are more complicated and well-organized. This makes it easier to fight epidemics. Transfer learning, or TL, has been used a lot to train models efficiently with small data sets. This has helped researchers get around both financial and time constraints. It makes it possible to train models quickly and accurately by finding relatively useful spatial features at the start of the training process [14] from large datasets in many different domains. So, TL could be a way to combine the needed computing power and encourage more effective ways of deep learning, which could help solve a number of problems [15]. This might be helpful. Image processing is a technology that has gotten a lot of attention in all areas of health care. Since this was the case, these methods were a great choice for the COVID-19 investigation. Even so, there is neither a complete nor a detailed assessment of how DL methods are used in the COVID-19 domain. The goal of this study was to give an in-depth look at all of the modern systems that are possible because of these technologies. To do this, the research focused on the successes, detection, and diagnosis of DL and medical image processing methods to fight the COVID-19 epidemic, predict death, estimate health equipment, and other related topics. Given the recent reviews of the different DL applications that have been built to find and treat COVID-19 disease, this review's most important contribution is that it looks at the most interesting area of research. During this study, a procedure called a Systematic Literature Review (SLR) was used to find, analyze, and combine the results of previous studies. Also, we divide the DL methods that were used in COVID19 into seven main groups. These are Long Short Term Memory Networks (LSTMs), Convolutional Neural Networks (CNNs), Self-Organizing Maps (SOMs), Generative Adversarial Networks (GANs), Recurrent Neural Networks (RNNs), autoencoders, and hybrid approaches. Hybrid approaches can use methods like Multilayer Perceptrons (MLPs), Radial Basis Function Networks (RBFNs), Restricted Boltzmann Machines (RBMs), and Deep Belief Networks (DBNs). For each type of DL method used in COVID-19, we looked at its benefits, problems, datasets, uses, security, and transfer learning (TL). These properties were looked at at the same time as the methods. This article talks about a wide range of diseases that can happen anywhere and at any time. It also shows how and where DL approaches are used in COVID-19.

II LITERATURE SURVEY

Before this, the real-time RT-PCR method was used to diagnose COVID-19 (reverse transcription-polymerase chain reaction). When the CT and X-ray scans are done, the information gathered is used to make a prediction about COVID-19. Early research shows that the method being evaluated gives wrong results. However, the results will get better once the process is tweaked in different ways using artificial intelligence. It is possible to use computer tomography to screen for COVID-19 with sensitive lung diagnosis diagnostic equipment [16]. After radiation therapy, it was found that there was a lot of COVID-19 in the lungs of the people who got it. After 14 days, the most serious respiratory illness started to show up. A lot of false-negative test results have been given to doctors to help them figure out what's wrong with people through medical tests or chest CT scans. Both medical tests and CT scans of the chest can show these results. At the start of the COVID-19 epidemic, CT was used to figure out what was wrong in places like Turkey, where the number of cases was low. It is thought that comparing the results of clinical imaging and laboratory testing will help find COVID 19 early on. Radiographs can help COVID-19 patients figure out what's wrong with them. In the preclinical studies, chest x-rays and CT scans were used, and the results seemed to show that there was a chance the condition could get better before COVID-19 was given. Other researchers who worked on the COVID-19 imaging study also made important steps forward. Kong et al. talked about ground-glass opacity on the right side of the COVID-19 box.

In the days after [17] proposal of the COVID Net deep learning model, which puts groups into regular, non-COVID, and COVID-19 categories with an accuracy of 92.4%, the groups were called regular, non-COVID, and COVID-19. 224 COVID-19-verified images were used to create and use a deep learning pattern. The authors [22] took pictures of the chest, and ResNet50's analysis of X-ray signals showed that 98% of CO2 signals could be found.

[18] was to compare the CNN model for a COVID-19-positive patient. This method doesn't take much time or effort, and it works to find and identify patients who are infected with the Corona virus. In their work, where they compare the CNN and COVID-19 models, this is also looked into and looked into more. [19] Wrote a medical and technical research article to help virologists, AI researchers, and politicians who are working on the COVID-19 epidemic. The focus of the paper is an extra method used in the COVID-19 study. During the investigation, it was found that a number of artificial intelligence (AI) techniques had been suggested as ways to fight the COVID-19 pandemic. These AI techniques included a number of ways to find problems early and make image-based diagnoses, as well as models that help explain COVID-19 outbreaks and predict where future outbreaks will happen. Radiography and other areas of medical imaging that have changed recently are becoming more important to doctors as possible sources of predictive diagnostic methods that can be used with machine learning. Expertise in a certain area of artificial intelligence (AI) makes it easier to build end-to-end algorithms that can accurately predict outcomes by using input data without the help of human intelligence. There have been many different ways to find COVID-19. Some of these ways are CNN, COVID Screen, and COVINet. A more advanced way for computers to learn has been

put forward for consideration. Different high-quality, reliable, and time-saving ways were used to take CT scans and X-rays with this method. [20] Made the support vector machine (SVM) model with the help of an X-ray image feature set. ResNet50 and SVM were the best ways to classify things in this particular research project. Several different deep learning methods were used in the most recent COVID-19 tests.

[21] Have used AutoML to look for patterns and have come to the conclusion that the COVID-19 pandemic will start in India. [22] used X-ray images from COVID-19 to figure out what was wrong with the 7 CND models in COVIDX-Net. So, they suggested a network of 7 CND models, one of which would be COVID-19. The methods they used for deep learning were talked about in the last sentence. One of the three people who took part in the study by Yoon et al. was found to have a nodular opacity in the lower left lung area. The first person didn't show any signs of something being wrong, but the other two did. There was a difference in how hard the fourth and fifth parts of their lungs were. [23] Also found that about one-third of chest CT images can tell the difference between sharp pulmonary illumination and non-sharp pulmonary illumination. All of these highly trained Deep Learning approaches to solving problems have been used to solve specific problems, such as finding arrhythmia, diagnosing skin cancer, finding breast cancer, diagnosing pneumonia during surgery, segmenting the fundus, and segmenting the lungs. Because the COVID-19 pandemic spread so quickly, it has shown how important it is to have specialized knowledge. In recent years, there has been a rise in demand for automated detection systems that use different AI-based strategies. The fact that there are usually only a few radiologists at each institution makes it hard for specialist clinics to use this new technology. Because of this, it will be much easier to solve this problem by giving patients quick, accurate, and easy-to-use AI models. Even though being able to use AI for radiological purposes is a clear benefit, radiological applications are still important because they have worked in the field for so long. Also, using AI methods helps get around problems caused by a lack of RT-PCR test kits and the high cost of doing tests. Also, researchers in healthcare [24] and vehicle communication [30] are coming up with different protocols to protect the information that is sent from one device to another.

Mubarak A. Alamri et.al. 2022 The COVID-19 pandemic, which was caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), has put a lot of stress on the global health system. This has not only caused a lot of illness and death, but it also makes future pandemics more likely. This situation makes it important to try to come up with new treatments for SARS-CoV-2 and other new viruses in general. This study looks at how SARS-CoV2 RNA-dependent RNA polymerase (RdRp) mutations found in Saudi Arabia affect the structure and function of proteins. Several computational and biophysics-based methods were used to compare the Saudi SARS-CoV-2 RdRp sequences with the reference Wuhan, China RdRp sequences. The results showed that three mutations—A97V, P323I, and Y606C—may affect how stable a protein is and, by extension, how the structure of a protein affects how it works. Compared to the mutants, the apo wild RdRp is more stable and has secondary structure elements that are closer together. Also, both the conformational dynamics and the interaction network with remdesivir were stable in the wild type. The wild-type RdRp is more stable than the mutants because its net binding energy with remdesivir is -50.76 kcal/mol. The results of this study could give us useful information about how to develop treatments for the mutant RdRp, which could help us learn more about the biology of SARS-CoV-2[25]

III PROBLEM AND OBJECTIVE

Since the COVID-19 outbreak started, many tech companies, governments, and research institutes have made urgent announcements urging researchers to use AI applications to help stop COVID-19.Researchers think that artificial intelligence can help fight COVID-19 on some levels, such as the population level (for example, by predicting and forecasting future infections) and the patient level (by diagnosing COVID-19 at an early stage).Since this evaluation only looks at the use of DL against COVID19, the reader is encouraged to look at full surveys and lectures about the AI field [26].In particular, patient data can go through many steps like analyzing, segmenting, augmenting, scaling, normalizing, sampling, aggregating, and sifting to get accurate predictions that help the healthcare ecosystem and the rest of the public health stakeholders. This is done so that accurate predictions can be made that help the healthcare ecosystem and the other people who care about public health. With the help of AI, a lot of datasets can be changed and processed. In recent years, there has been a rise in the number of DL studies that look at the COVID-19 pandemic and/or try to find a way to stop it .On the other hand, most of these investigations done during the COVID-19 epidemic are in different places. A good summary will help new researchers understand what role DL is currently playing in the fight against COVID-19. This will give researchers new ways to continue their work and build on what has already been reported in the research community. Here, we give a brief overview of how DL technologies were used to solve problems related to COVID-19. [27] Previous research report on strategies that have been used to lessen the effects of COVID-19 that use artificial intelligence. The methods that have been described are done in the style of systematic reviews or surveys. They focus on the many uses of AI, such as diagnosing patients, keeping an eye on diseases, researching drugs and vaccines, and so on. Even so, a huge number of research articles are always being written, which means that the electronic databases are always full. Because of this, it is important to do an updated evaluation with a focus on DL and how it is being used in the COVID-19 pandemic.

IV DEEP LEARNING MODELS

The current standard for dealing with medical photos is called "deep learning." It is meant to help radiologists make more accurate diagnoses by giving a quantitative analysis of potentially worrying lesions and making the clinical workflow go more smoothly. The goal is to get both of these benefits. Deep learning has already shown that it can do better than humans at tasks like recognition and computer vision. The structure of the deep learning algorithm is much more complicated than the structure of the standard method (machine learning). Pre-processing, enhancement, and inference are the three main steps that make up DL architecture. Pre-processing is the first step in DL architecture. In the second stage, different methods are used to pull out the characteristics of the input. In the third step of the procedure, the process of classifying each input based on a number of different classifiers is looked at. that a deep learning model doesn't need much help from a person, can deal with complex data that can be hard for machine learning, and gives correct results in a relatively short amount of time [28]. Most of the research that was done to find COVID-19 used Convolutional Neural Networks

(CNN) and Transfer Learning. This is because these two techniques are the most important ways for deep learning to deal with medical images.

CNN Architecture- CNN is an example of a DL architecture. It is usually used to solve problems with how pictures are organized, and it is very good at managing DL technology. The CNN was built on top of the artificial neural network (ANN) that has been used for a long time. The main goal of the ANN is to apply repeating patterns to a wide range of subfields in the industry of image modelling. Hierarchical neural networks are better than traditional feed-forward neural networks because they use a hierarchical method, which reduces the number of structural pieces needed (the number of artificial neurons). CNN uses both a feed-forward method and a very good way to find things. The network is easy to put together, and the user doesn't have to do much to set up the training settings. As an example, think about how much progress has been made in detecting things thanks to CNNs. On the other hand, problems that are often caused by a model that is hard to understand or has a lot of weights are greatly reduced. CNN has been shown to have a basic structure with five layers: an input layer, a folding layer with a setting function, a pooling layer, a completely related layer, and a SoftMax layer [29].

VGG16-VGG16 is an independent complex model projected by K. Simonyan and A. Zisserman from the University of Oxford in their paper "Deep communication networks for large image recognition". The model realizes an exam score of 5 for 92.7% on ImageNet, which has a database of more than 14 million images in 1,000 categories.

ResNet50-ResNet is not like other network topologies such as AlexNet, Over Feat, or VGG. ResNet is an example of a "exotic architecture" that is based on a micro-architecture model, also referred to as a "in-network architecture."

InceptionV3 - First presented the “creative” horizontal. In his 2014 paper Going Deeper with Convolutions: The goal of start-up model is to function as a “multi-feature explorer” by calculating 1 × 1, 3 × 3, or 5 × conflicts. 5 in the same model of the network- these the filter results are applied according to the dimensions of the channel. To improve the capacity of deep neural networks before use, the most direct way is to increase the depth of the network. However, as the depth of the network width increases, there are too many internal dimensions, which results in more resource consumption. Therefore, in order to overcome these problems, Szegedy et al first introduced the Inception model into the GoogLeNet architecture. 35 And completed an impressive performance and read record as the winner of the ImageNet ILSVRC Challenge. The first model consists of an upper water-supply layer and a corresponding plate. The sizes of the mixed layers were 1 × 1, 3 × 3, and 5 × 5, which were combined. Between two matching 1 × 1 layers, the maximum reduction is used to reduce the dimensionality and a tandem filter is required to combine the different layers. In addition, by removing the 5 × 5 convolutions and introducing two 3 × 3 convolutions to modify the initial model change, it was widely used in later network configurations.

MobileNetv2-The Mobile Net model is built on a tangible deep convolution, a type of broken convolution that converts a regular convolution to a deep complexity and a one-to-one complexity termed an effective convolution point. Convolution filters each communication channel in Mobile Nets using a single filter. After that, the wise complexity performs a one-to-one convolution to combine the deep convolution advances. Traditional convolution not only filters use, but combines the use of a series of new products in one process. The single column divides it into two layers, one for filtering and one for mixing. This deletion has an effect on the calculation of the calculation and the size of the model.

DenseNet - One of the recent breakthroughs in neural networks for the recognition of visual objects is referred to as DenseNet. DenseNet is quite similar to ResNet, although there are a few key distinctions between the two. DenseNet concatenates (.) the output of the previous layer; whereas ResNet employs an additive approach (+) that combines the identity of the layer that came before it with the identity of the layer that will come after it. Through the utilization of composite function operation, an output from the layer below functions as an input for the layer above it. The convolution layer, the pooling layer, the batch normalization, and the non-linear activation layer are the constituent parts of this composite procedure. Because of these links, the network has an absolute maximum of L(L+1)/2 direct connections. The number of levels in the architecture is denoted by the letter L. The DenseNet has different variants, such DenseNet-121, DenseNet-160, DenseNet-201, etc. The digits represent the number of layers that are present in the neural network.
GoogLeNet The convolutional neural network known as GoogLeNet consists of a total of 22 layers. You have the option of loading a network that has already been trained, and it can be trained using either the ImageNet [1] or Places365 [2] [3] data sets. The network that was trained on ImageNet is able to classify images into one thousand different object categories, including things like a keyboard, mouse, pencil, and a wide variety of animals. The Inception architecture is the foundation for the GoogLeNet variety of convolutional neural network that Google developed. It does this through the utilization of Inception modules, which provide the network the ability to select from a number of different convolutional filter sizes in each block. These modules are layered one atop the other in an Inception network, which also includes some max-pooling layers with stride 2 now and then to reduce the resolution of the grid by one half.

V DATASETS AND METHODOLOGY

The information came from the website https://www.kaggle.com/code/therealcyberlord/coronavirus-covid-19-visualization. Even though epidemiological models need to know about changes in social distance, there are no assumptions that need to be made when machine learning is used in the modelling process. One of the most important things that must be there for analysis to happen is a dataset. This research has also used a set of X-ray images to try to figure out who will get sick from COVID-19. Images have a lot of features, but only some of them are needed for the study at hand. This means that the features must be extracted from the images before any prediction or classification can be made. The process of extracting features is an important part of how image analysis works, and this is how important features can be found. The main focus of this work will be on extracting features. To do this, capsule networks with many convolutional layers will be used. The collection has X-rays of 2,000 patients, which are split into normal, pneumonia, and COVID patients in different amounts. Images are put into one of these three groups based on how similar or different they are. Table 1 shows a collection of pictures that represent different types. [30] gave the idea for the method that has been used. They put the algorithm to work on the dataset that has the CT scans. In this work, the approach is put to use with the X-ray dataset. Before doing the analysis, the CT-CAPS method had already done the process of extracting features. A network has been set up so that features can be extracted, and then the extracted features are sent through the max pooling layer and the fully connected layer so that predictions can be made.

Table 1: Image collection of different classes.

Class name	No. of collected images
Covid	500
Normal	500
Viral Pneumonia	1000

VI TRAINING AND EVALUATION PHASES

The first step is called "Basic Training," and it involves training all of the layers of the complex from the bottom up. We can either randomly set up all of the layers or start from scratch and train them. This kind of training takes a long time to get right, but in the end, the results are very accurate. The letter B will stand for this stage of getting ready. Fine Tuning In this training process, we don't change the overall weight of the given picture in the convolutional layer. To put it simply, we just mix up the weights of layers that are close to each other. Then, training brings all of the layers together at the junction. It is important to remember that the dense layer is taught based on the weights that were chosen at random, while the convolutional layer is taught based on the net weights of the picture that is being trained on. This method is called "FT," which stands for its initials. With this method, the CNN's convolutional layer is never trained at any point during the learning process. Instead, we will keep the weights that were taught when the picture network was created. Here, you can only train with thick layers of weights that are set up in different ways.

During the training process, we make use of the algorithms known as Stochastic Gradient Descent with Momentum (SGDM), Adaptive Moment Estimation (ADAM), and Root Mean Square Propagation (Rmsprop). Research aims necessitate the observation of performances. During this stage of the procedure, we will begin training all of the layers of the complex from the ground up. We choose to either randomly initialize all of the layers or train them from scratch. This type of training takes a very long time to converge, but it ultimately results in fairly accurate results. Approaches based on SGDM and its many offshoots have proven to be the most successful in helping students overcome severe learning obstacles (including deep learning). The accumulation of momentum is a process that can either contribute to the quickening of the SGD through the control route or the dampening of oscillations. It was decided that the working time would be 0.9. As a direct consequence of this, momentum is built up at a faster rate, and oscillations end up being more tightly packed.

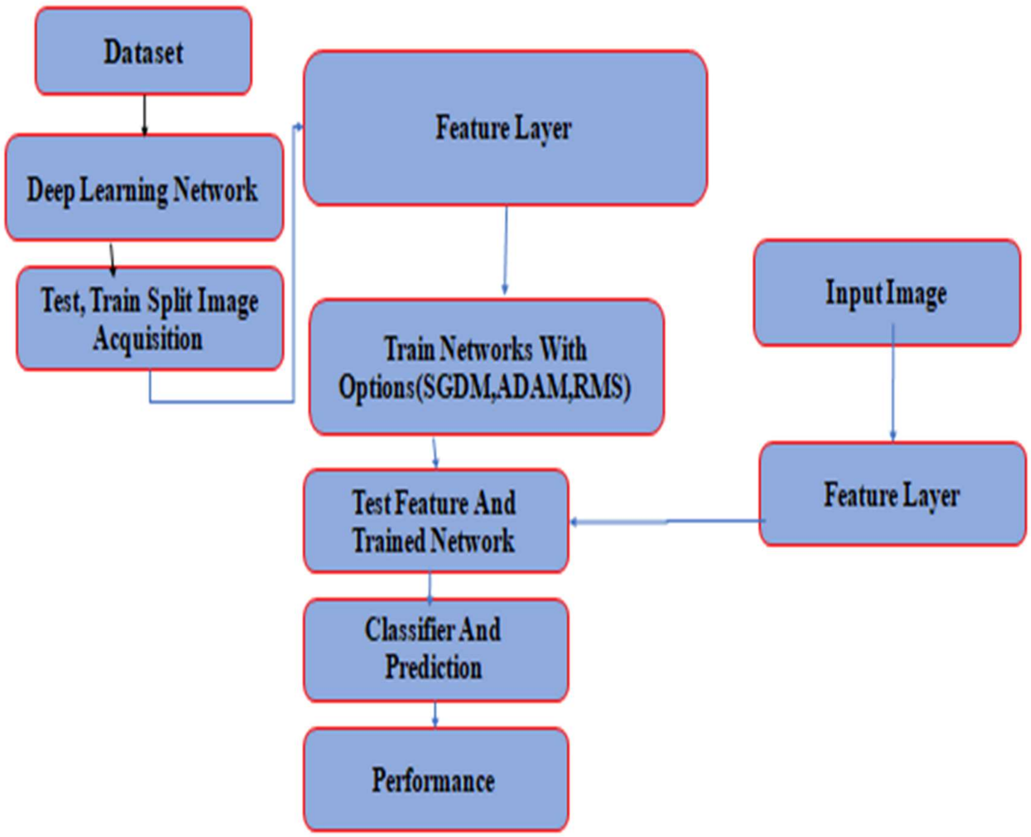

Fig.1 training and testing flow of proposed system

The ADAM algorithm is an example of an algorithm that helps to improve something. It could take the place of the stochastic gradient ancestor when the network value is being updated. This method is used to figure out the right learning rate for each parameter .Adam also remembers how much damage gradients have usually done in the past, which is the same thing as momentum. The Adam algorithm is used a lot in the field of deep learning because it can produce high-quality results in a short amount of time. A learning rate parameter is given to RMSProp, which is then changed based on the average of the most recent light weight magnitude. This shows that the method can be used to solve problems that have nothing to do with the Internet. RMSprop divides by dividing the learning rate by the average amount of damage that comes from a square gradient. [31]

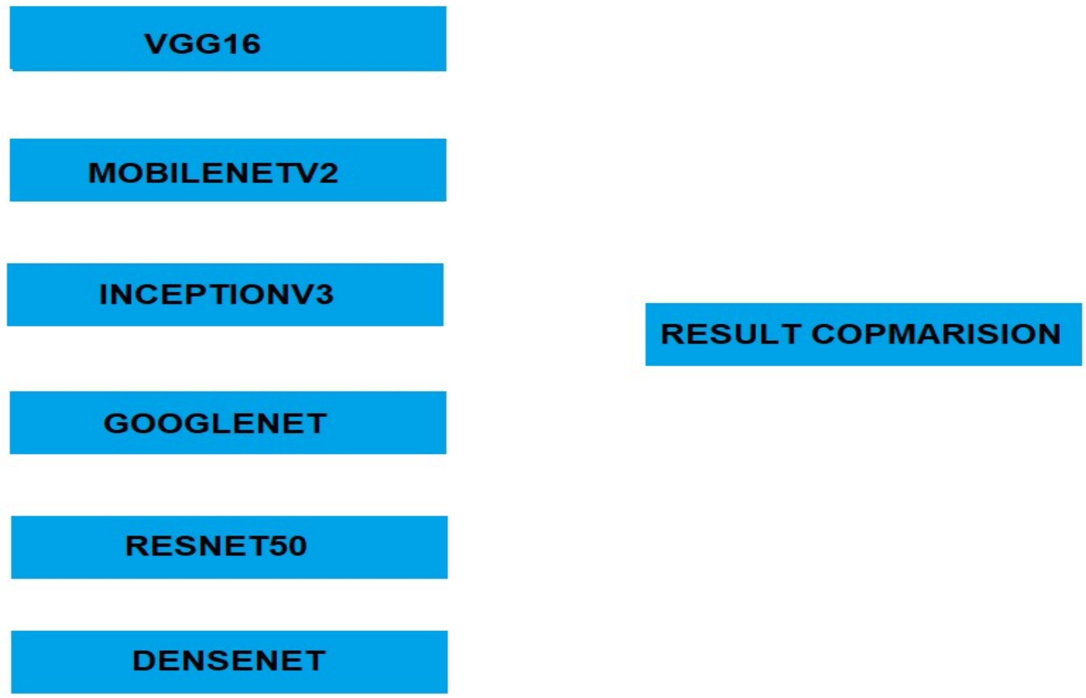

Fig.2 proposed pre-trained deep learning models

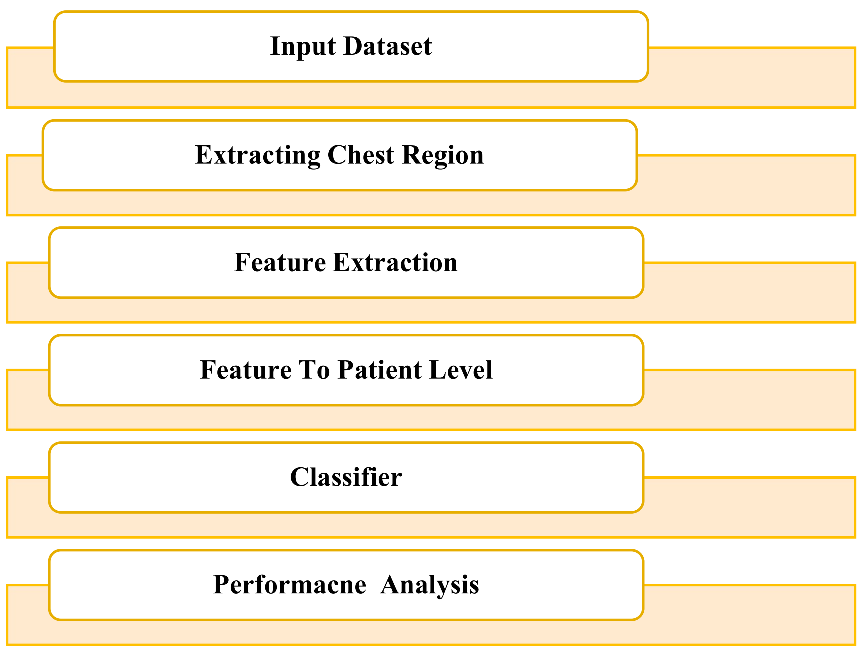

Fig.3 proposed executing flow diagram

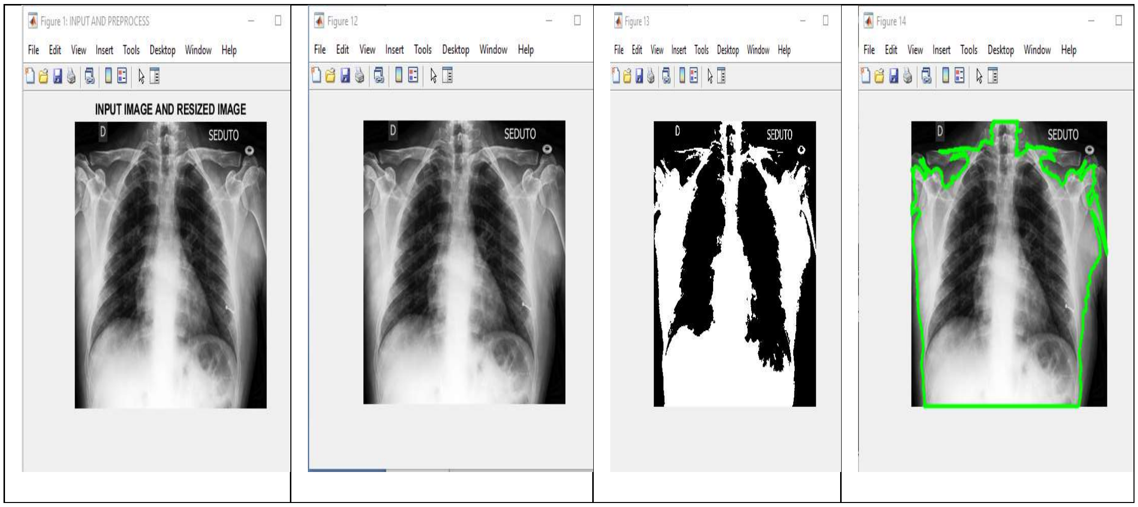

Fig.4 result of Covid dataset

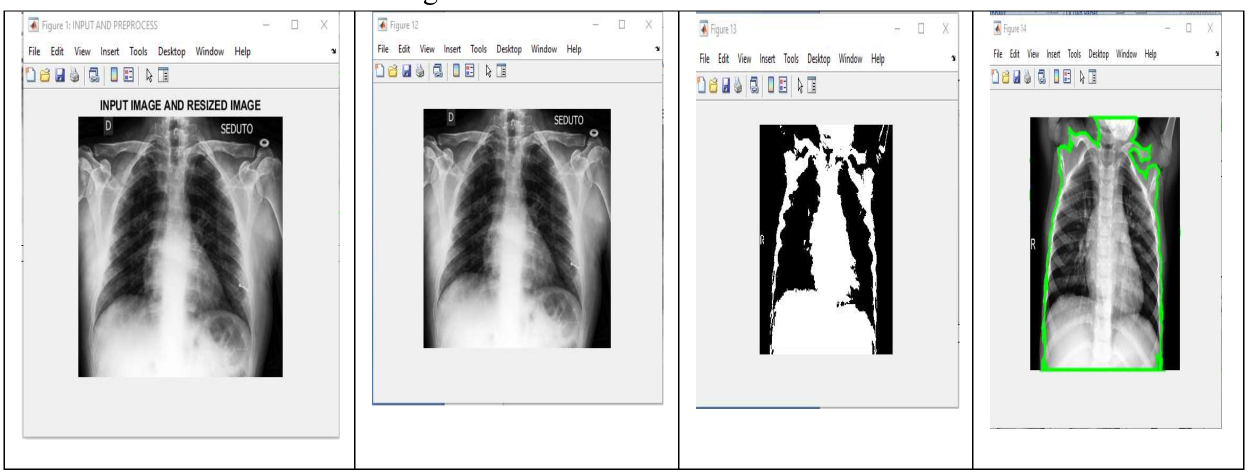

Fig.5 Viral Pneumonia

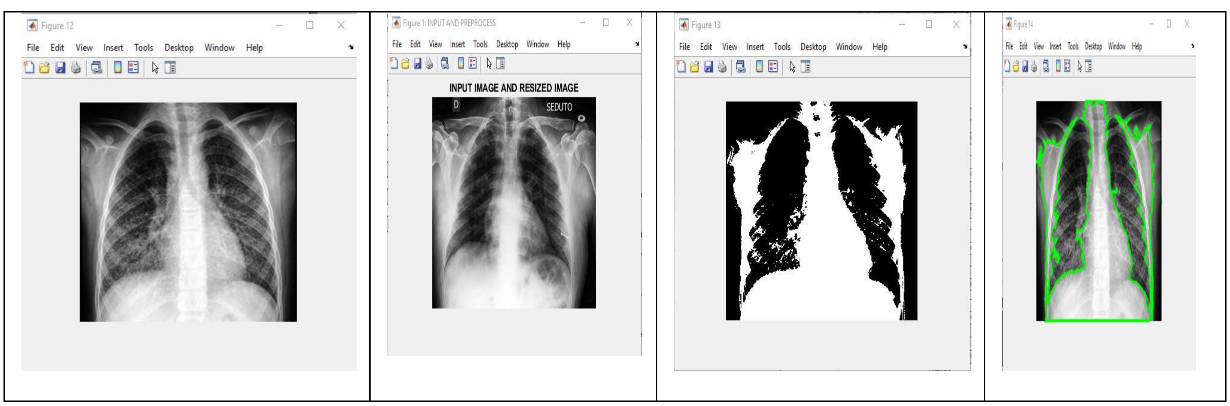

Fig.6 result of normal dataset

VII EXPERIMENTS AND RESULTS

We used DL algorithms on the dataset of COVID-19 patients that we got to figure out how bad the symptoms were. We used the programming language Python to make the deep learning algorithms we chose, which were Inceptionv3, Vgg16, Resnet50, DenseNet, GoogLeNet, and Mobilenetv2, so that we could put the dataset into groups. As you can see in Table 2, we used precision, recall, f1 score, and accuracy as metrics to show how well and reliably each approach worked. Where accuracy is defined as the ratio of true positives to the total number of true positives plus false positives. The sensitivity is found by taking the average of the recall and accuracy scores. The recall score is the number of real positives compared to the total number of positives and negatives, including false positives and false negatives. The accuracy score is the number of correct answers. When putting patients' cases into groups based on the long-term conditions they had, these algorithms gave us enough information. In Table 2, the results of each method are shown, along with their ratings for accuracy, precision, recall, sensitivity, specificity dice coefficient and jaccard coefficient score.

Table 2: Comparison of Pre-trained models

Pre-Trained Model	**Learning Techniques**	**Training Techniques**	**Validation Accuracy(%)**
Inceptionv3	Baseline Learning	RMS Propagation	90.22%
		SGDM	95.25%
		ADAM	80.21%
VGG 16	Baseline Learning	RMS Propagation	93.48%
		SGDM	65.58%
		ADAM	94.91%
ResNet50	Baseline Learning	RMS Propagation	93.11%
		SGDM	89.80%
		ADAM	95.36.%
DenseNet	Baseline Learning	RMS Propagation	92.12%
		SGDM	96.32%
		ADAM	94.56%
GoogleNet	Baseline Learning	RMS Propagation	89.15%
		SGDM	90.25%
		ADAM	96.23%
MobileNetv2	Baseline Learning	RMS Propagation	98.69%
		SGDM	95.56%
		ADAM	90.25%

Table 2 shows the results, which show that the baseline learning technique and the Inceptionv3 model with SDGM training method have an accuracy of 95.25%, ADAM has an accuracy of

80.21%, and RMS Propagation has an accuracy of 90.22%. The SDGM training technique gave a 93.48% accuracy for the vgg16 model, the RMS Propagation method gave 94.91% accuracy for the ADAM model, and the RMS Propagation method gave a 93.48% accuracy. Using the SDGM training method, the resnet50 model has reached 89.80% accuracy, the ADAM model has reached 95.3% accuracy, and the RMS Propagation model has reached 93.11% accuracy. Using the SDGM training method, the DenseNet model's accuracy has reached 96.32%, the ADAM model's accuracy has reached 94.56%, and the RMS Propagation model's accuracy has reached 92.12%. Using the SDGM training method, the GoogleNet model's accuracy has reached 90.25 percent, the ADAM model's accuracy has reached 96.32%, and the RMS Propagation model's accuracy has reached 89.15 percent. The accuracy of the MobileNetv2 model trained with the SDGM training method has reached 95.56 percent, the accuracy of the ADAM model has reached 90.25 percent, and the accuracy of the RMS Propagation model has reached 98.69 percent.

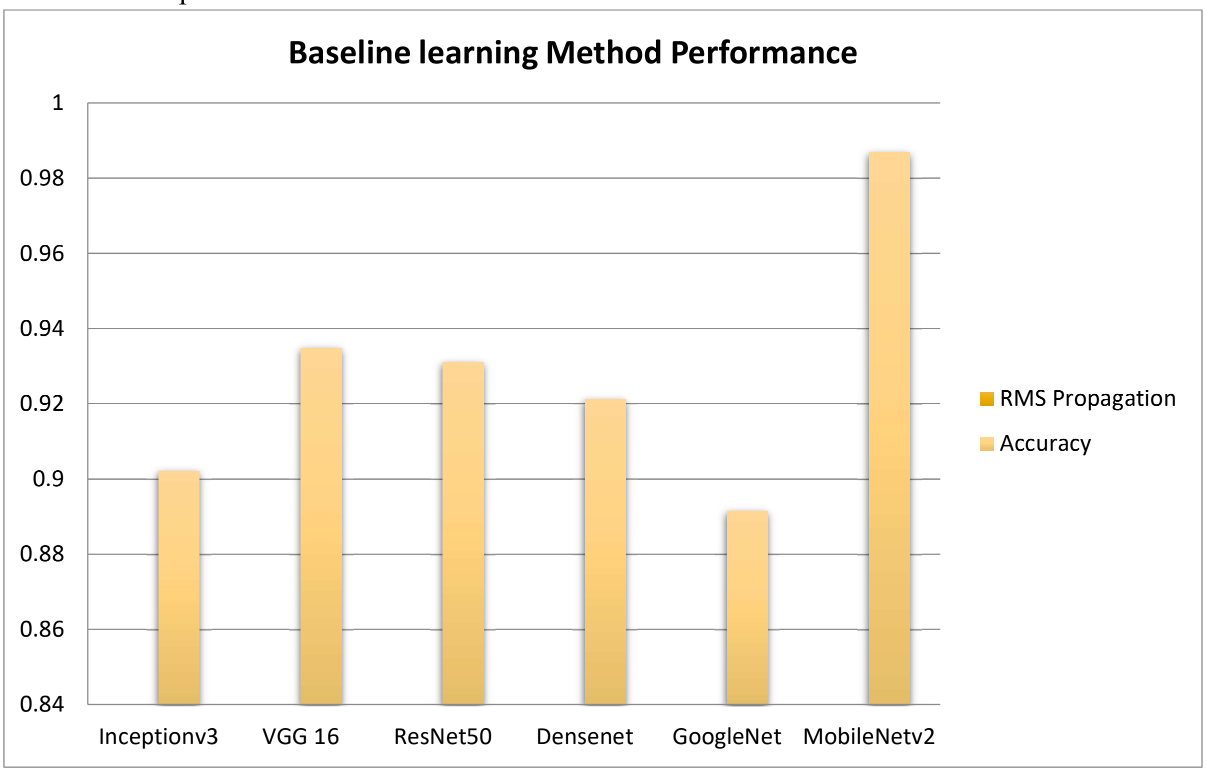

Fig.7 baseline learning and RMS Propagation Training Method performance

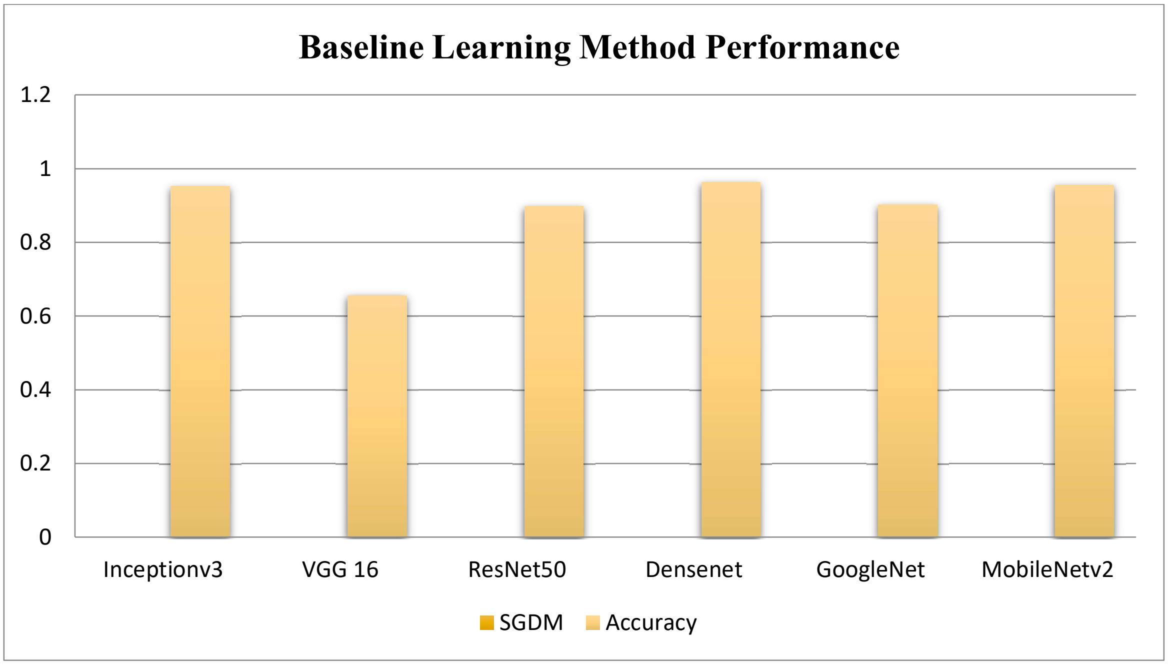

Fig.8 baseline learning and SGDM Training Method performance

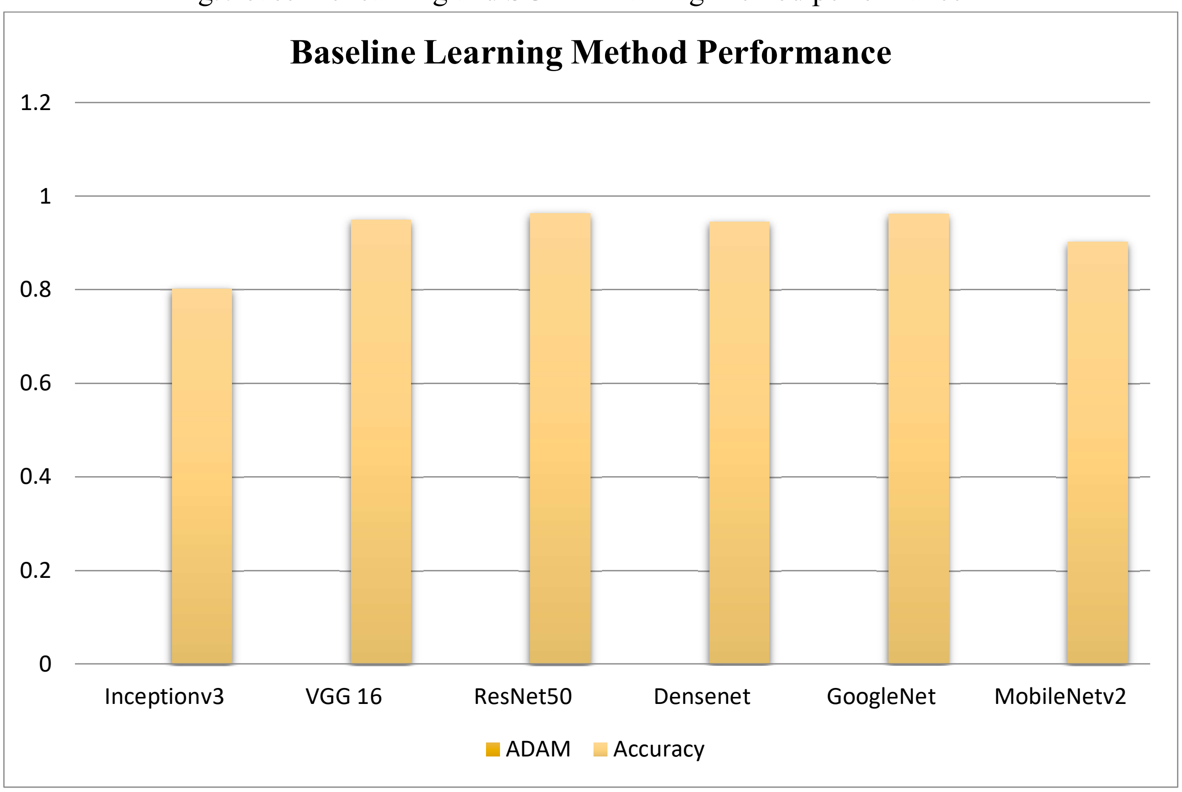

Fig.9 baseline learning and ADAM Training Method performance

Table 3 classification and segmentation performance for SGDM Training Techniques

Pre-Trained Model	Sensitivity	Specificity	Precision	Recall	Jaccrad Coefficient	Dice Coefficient

InceptionV3	95.23%	94.78%	91.90%	95.89%	93%	92.10%
VGG16	93.90%	91.80%	94.13%	93.14%	89.12%	97.14%
ResNet50	92.16%	96.45%	90.10%	92.56%	87.74%	99.67%
DenseNet	97.10%	89.74%	90.25%	91.78%	86.78%	92.45%
GoogleNet	92.20%	95.41%	96.13%	92.45%	86.45%	95.21%
MobileNetv2	86.90%	98.20%	95.18%	91.99%	8.34%	96.15%

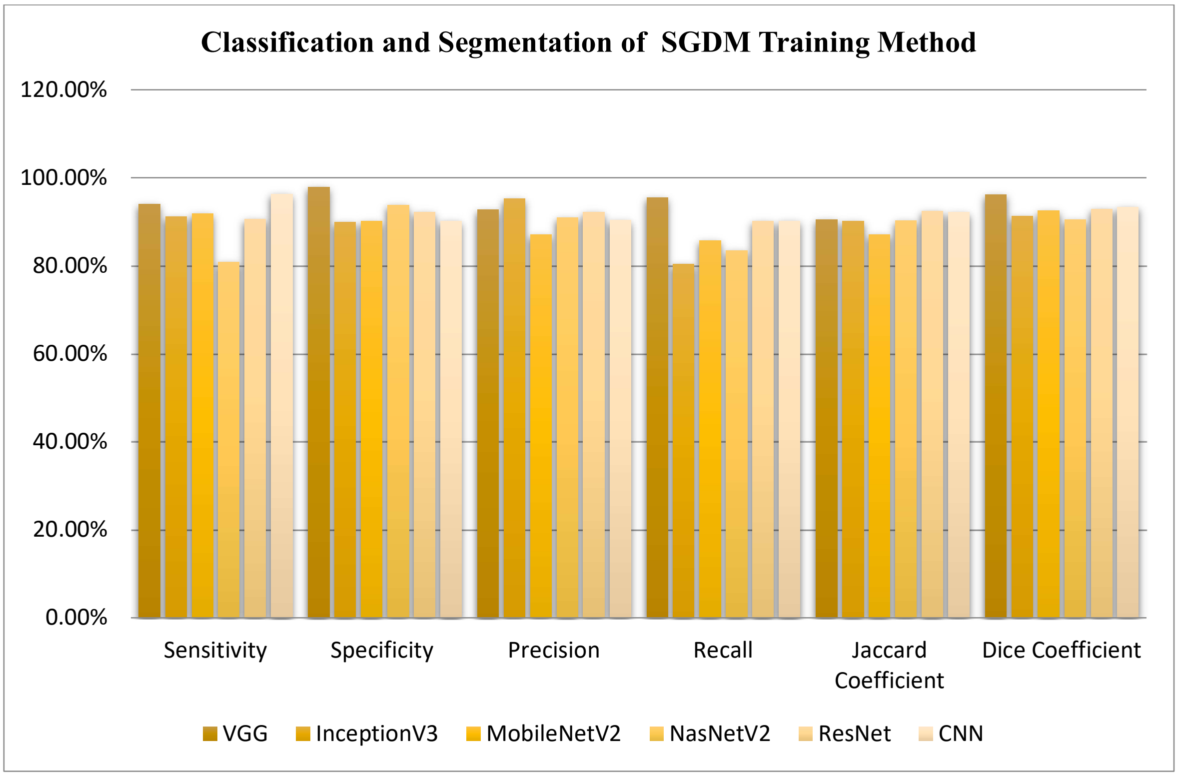

Fig.10 showing the classification and segmentation performance for SGDM Training Method

Table 4 showing the classification and segmentation performance for ADAM Training Method

Pre-Trained Model	Sensitivity	Specificity	Precision	Recall	Jaccrad Coefficient	Dice Coefficient
InceptionV3	92.45%	90.44%	94.25%	94.67%	95.78%	89.45%
VGG16	92.80%	92.82%	92.23%	92.55%	90.20%	98.78%
ResNet50	78.89%	92.10%	93.12%	91.25%	85.23%	93.11%

DenseNet	80.90%	93.44%	90.13%	96.78%	90.99%	90.56%
GoogleNet	92.11%	90.85%	93.11%	94.45%	91.23%	89.90%
MobileNetv2	96.32%	92.45%	94.53%	93.10%	90.12%	78.78%

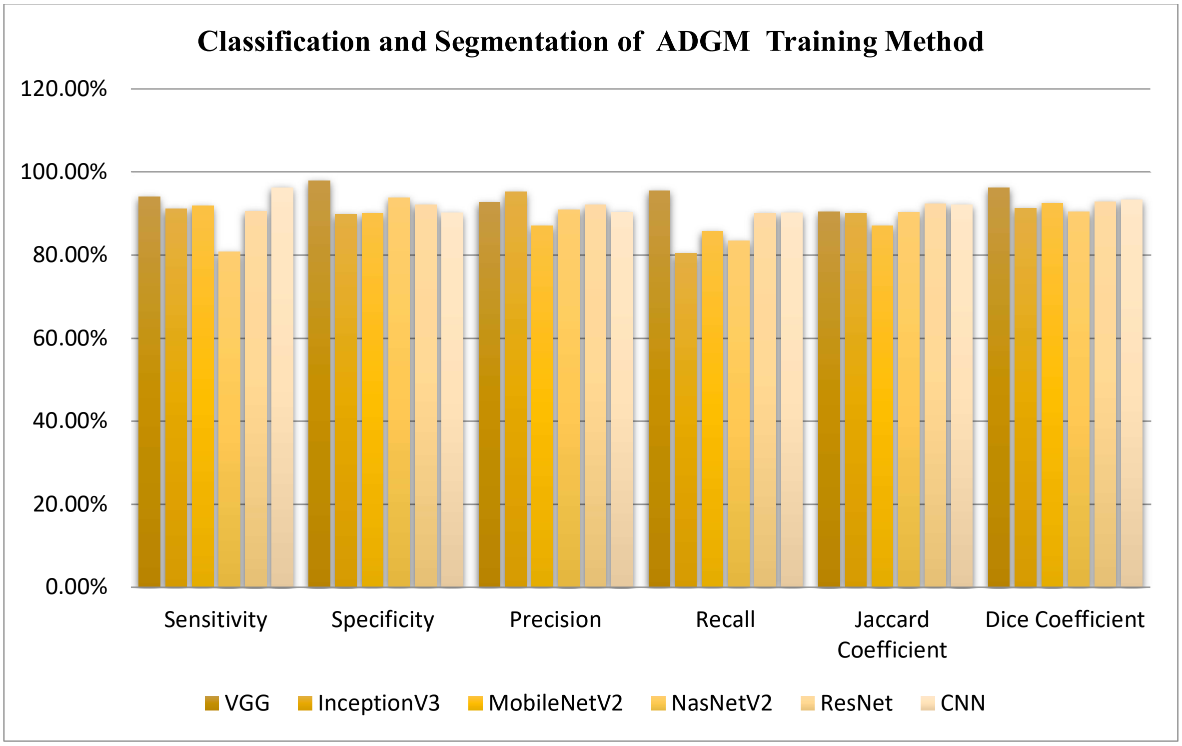

Fig.11 showing the classification and segmentation performance for ADAM Training Method

Table 5 showing the classification and segmentation performance for RMS Propagation Training Method

Pre-Trained Model	Sensitivity	Specificity	Precision	Recall	Jaccard Coefficient	Dice Coefficient
InceptionV3	94.25%	95.90%	93.71%	98.31%	95.54%	95.20%
VGG16	91.15%	80.89%	95.23%	86.40%	90.14%	91.33%
ResNet50	91.85%	94.12%	87305%	84.23%	84.12%	92.50%
DenseNet	85.78%	94.78%	90.98%	84.45%	90.33%	90.32%
GoogleNet	94.60%	95.12%	92.12%	94.13%	94.43%	92.45%
MobileNetv2	96.32%	91.14%	90.32%	94.12%	96.14%	93.25%

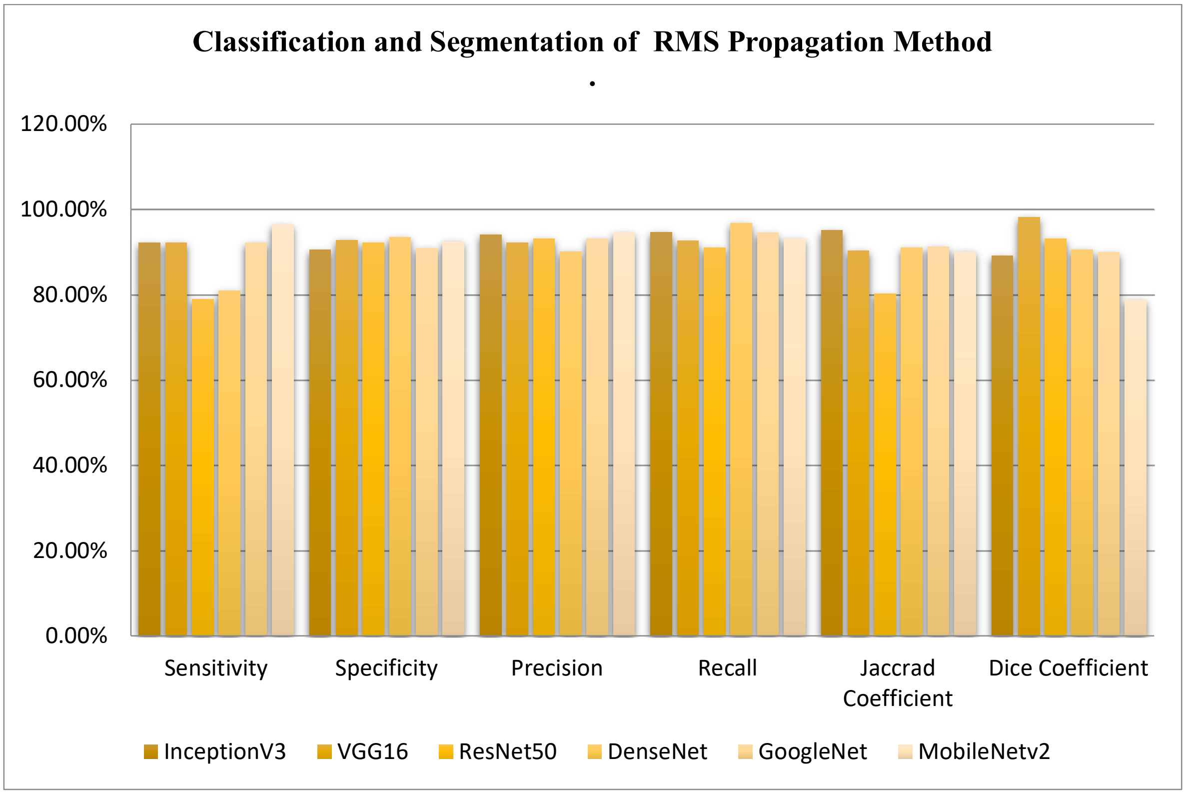

Fig.12 showing the classification and segmentation performance for RMS Propagation Training Method From Table 3,4,5 Showing The RMS Propagation SGDM,ADAM Training Method realize the best performance in terms of accuracy, precision, specificity, sensitivity, Recall,Jaccard Coefficient Dice Coefficient and with values Showing In The Table 3,4,5

Studies	DL Models	Accuracy
Oh et al.[1].	ResNet-18	0.88%
Waheed et al.[2]	CovidGAN	0.95%
Rajaraman et al.[3]	Customized	0.95%
Makris et al.[4].	VGG-16	88%
Phankokkruad et al.[5]	Xception	87%
Proposed Pre-Trained Models	Inceptionv3	95%
	Vgg16	94%
	Resnet50	95%
	DenseNet	96%

	GoogLeNet	96%
	Mobilenetv2	98.69%

Table 8: proposed Pre-trained models comparison with existing techniques

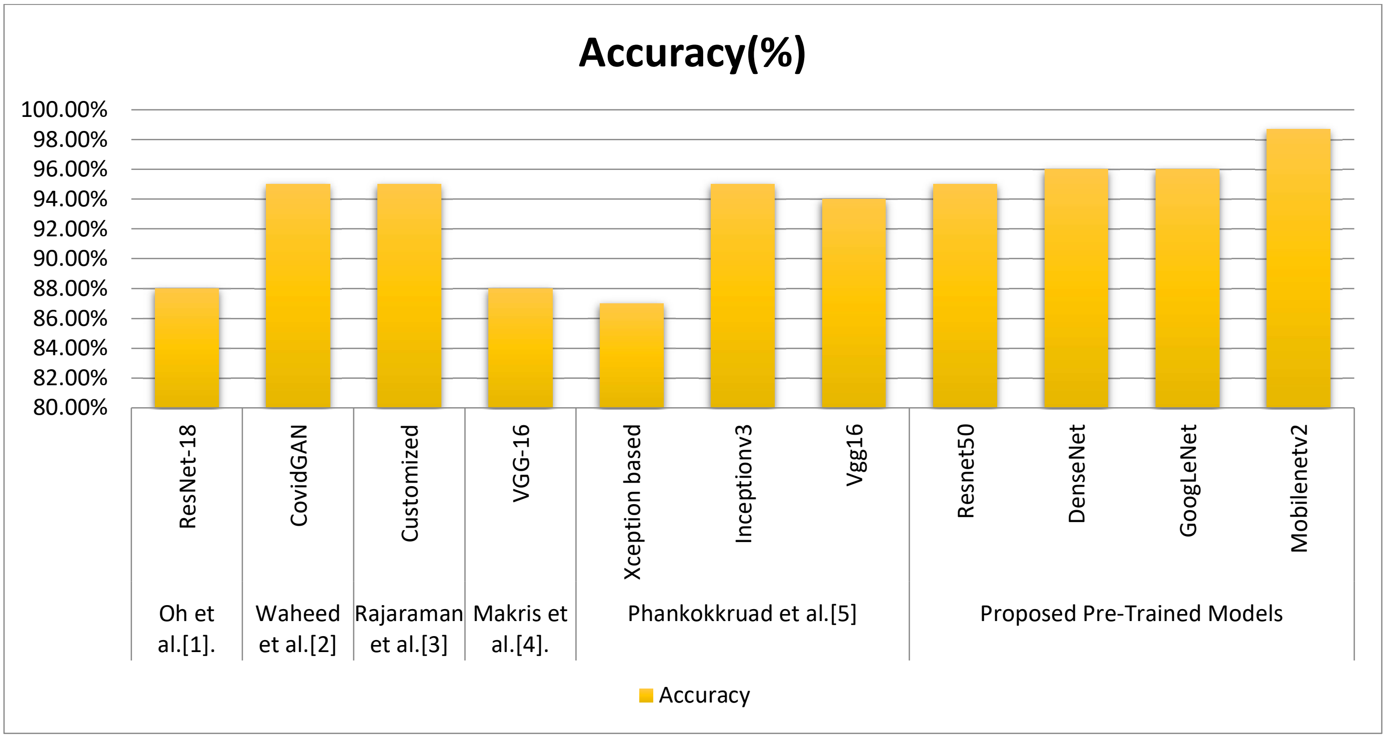

Fig.13 proposed Pre-trained models comparison with existing techniques

VIII CONCLUSION

The Corona virus has spread to every part of the surface of the earth. As of August 31, 2021, more than 4 million people have died because of it. Many scientists and researchers worked hard to find ways to fight this disease. DL tactics were one way to fight the virus when it was first spreading. In this study, we used DL algorithms to predict how bad viral symptoms would be, especially for people who already had a chronic condition. We ran the Inceptionv3, Vgg16, Resnet50, DenseNet, Mobilenetv2, and GoogleNet algorithms on the COVID-2000 patient dataset that we got from Kaggle. When we put the cases of patients into groups based on the diseases they had had their whole lives, we got good results. Our suggested system, which used five different DL algorithms, was able to successfully classify the dataset (Inceptionv3, Vgg16, Resnet50, DenseNet, Mobilenetv2, and GoogLeNet). When it comes to performance, the Inceptionv3, Vgg16, Resnet50, DenseNet, Mobilenetv2, and GoogLeNet families are better than the rest. To reliably find infections caused by the coronavirus, a quick, accurate, and easy-to-use programme that can run on hand-held devices needs to be made. Most designs that are written about have more than one layer, which means that a very large number of parameters need to be stored and calculated. The only ways to stop the COVID-19 pandemic, which is a unique pandemic caused by the coronavirus, are to stay away from other people and to find out about it early. Deep learning models are being taught to recognize and sort pictures of lungs so that the disease can be found early and spread can be stopped. Since the COVID-19 pandemic only started to spread in the last quarter of 2019, there isn't much data that can be used to train deep learning models. To get around the lack of data, researchers used a number of different sites to build their own datasets. Deep feature extraction using a deep learning architecture and hierarchical classification methods are two of the methods that can be used in the study. Other methods include using baseline learning on well-known architectures, using baseline learning on the ImageNet dataset with new architectures, and using other methods. Transfer learning works the best out of all the available methods, and out of all the designs, Inceptionv3, Vgg16, Resnet50, DenseNet, Mobilenetv2, and GoogleNet, Mobilenetv2 gets the most accurate results, while Resnet50 and DenseNet get the most accurate results overall. When using deep learning methods to find coronaviruses, using photos at an earlier stage can help. More improvements can be made to work that will be done in the future to get more accurate results. For deep learning approaches to work best, they need a lot of data to learn from.

Reference

1. Y. Oh, S. Park, J.C. Ye, Deep learning COVID-19 features on CXR using limited training data sets, IEEE Trans. Med. Imaging 39 (2020) 2688–2700, https://doi. org/10.1109/TMI.2020.2993291.
2. A. Waheed, M. Goyal, D. Gupta, A. Khanna, F. Al-Turjman, P.R. Pinheiro, CovidGAN: data augmentation using auxiliary classifier GAN for improved covid19 detection, IEEE Access 8 (2020) 91916–91923, https://doi.org/10.1109/ ACCESS.2020.2994762. S.
3. Rajaraman, J. Siegelman, P.O. Alderson, L.S. Folio, L.R. Folio, S.K. Antani, Iteratively pruned deep learning ensembles for COVID-19 detection in chest X-rays, IEEE Access 8 (2020) 115041–115050, https://doi.org/10.1109/ ACCESS.2020.3003810.
4. A. Makris, I. Kontopoulos, K. Tserpes, COVID-19 detection from chest X-ray images using deep learning and convolutional neural networks, ACM Int. Conf. Proc. Ser., Ass. Comput. Mach. (2020) 60–66, https://doi.org/10.1145/3411408.3411416.
5. Phankokkruad R. Sethi, M. Mehrotra, D. Sethi, Deep learning based diagnosis recommendation for COVID-19 using chest X-Rays images, in: Proc. 2nd Int. Conf. Inven. Res. Comput. Appl., ICIRCA, 2020, pp. 1–4, https://doi.org/10.1109/ ICIRCA48905.2020.9183278, 2020.
6. M. Qjidaa, Y. Mechbal, A. Ben-Fares, H. Amakdouf, M. Maaroufi, B. Alami, et al., Early detection of COVID19 by deep learning transfer Model for populations in isolated rural areas, in: 2020 Int. Conf. Intell. Syst. Comput. Vision, ISCV 2020, Institute of Electrical and Electronics Engineers Inc., 2020, https://doi.org/ 10.1109/ISCV49265.2020.9204099.
7. R.G. Babukarthik, V. Ananth Krishna Adiga, G. Sambasivam, D. Chandramohan, A. J Amudhavel, Prediction of covid-19 using genetic deep learning convolutional neural

network (GDCNN), IEEE Access 8 (2020) 177647–177666, https://doi.org/ 10.1109/ACCESS.2020.3025164.

8. S.R. Abdani, M.A. Zulkifley, N Hani Zulkifley, A lightweight deep learning model for COVID-19 detection, in: 2020 IEEE Symp. Ind. Electron. Appl, ISIEA, 2020, p. 2020, https://doi.org/10.1109/ISIEA49364.2020.9188133.
9. X. Wang, X. Deng, Q. Fu, Q. Zhou, J. Feng, H. Ma, et al., A weakly-supervised framework for COVID-19 classification and lesion localization from chest CT, IEEE Trans. Med. Imaging 39 (2020) 2615–2625, https://doi.org/10.1109/ TMI.2020.2995965. S. Hu, Y. Gao, Z. Niu, Y. Jiang, L. Li,
10. X. Xiao, et al., Weakly Supervised Deep Learning for COVID-19 Infection Detection and Classification from CT Images, IEEE Access 8 (2020) 118869–118883, https://doi.org/10.1109/ ACCESS.2020.3005510.
11. Z. Han, B. Wei, Y. Hong, T. Li, J. Cong, X. Zhu, et al., Accurate Screening of COVID19 Using Attention-Based Deep 3D Multiple Instance Learning, IEEE Trans. Med. Imaging 39 (2020) 2584–2594, https://doi.org/10.1109/TMI.2020.2996256.
12. Y. Li, D. Wei, J. Chen, S. Cao, H. Zhou, Y. Zhu, et al., Efficient and effective training of COVID-19 classification networks with self-supervised dual-track learning to rank, IEEE J. Biomed. Heal Informat. 24 (2020) 2787–2797, https://doi.org/ 10.1109/JBHI.2020.3018181.
13. Z. Wang, Q. Liu, Q. Dou, Contrastive cross-site learning with redesigned net for COVID-19 CT classification, IEEE J. Biomed. Heal Informat. 24 (2020) 2806–2813, https://doi.org/10.1109/JBHI.2020.3023246.
14. M.J. Horry, S. Chakraborty, M. Paul, A. Ulhaq, B. Pradhan, M. Saha, et al., COVID19 detection through transfer learning using multimodal imaging data, IEEE Access 8 (2020) 149808–149824, https://doi.org/10.1109/ACCESS.2020.3016780.
15. S. Roy, W. Menapace, S. Oei, B. Luijten, E. Fini, C. Saltori, et al., Deep learning for classification and localization of COVID-19 markers in point-of-care lung ultrasound, IEEE Trans. Med. Imaging 39 (2020) 2676–2687, https://doi.org/ 10.1109/TMI.2020.2994459.
16. J.P. Cohen, P. Morrison, L. Dao, K. Roth, T.Q. Duong, M. Ghassemi, COVID-19 image data collection: prospective predictions are the future, J. Mach. Learn Biomed. Imaging 2020 (2020) 2–3.
17. S. Ahir, D. Telavane, R. Thomas, The impact of artificial intelligence, blockchain, big data and evolving technologies in coronavirus disease-2019 (COVID-19) curtailment, in: Proc. - Int. Conf. Smart Electron. Commun, ICOSEC, 2020, pp. 113–120, https://doi.org/10.1109/ICOSEC49089.2020.9215294, 2020.
18. M. Jamshidi, A. Lalbakhsh, J. Talla, Z. Peroutka, F. Hadjilooei, P. Lalbakhsh, et al., Artificial intelligence and COVID-19: deep learning approaches for diagnosis and treatment, IEEE Access 8 (2020) 109581–109595, https://doi.org/10.1109/ ACCESS.2020.3001973.
19. T. Singhal, A Review of Coronavirus Disease-2019 (COVID-19), Indian J. Pediatr. 87 (4) (2020) 281–286.

20. L. Caly et al., Isolation and rapid sharing of the 2019 novel coronavirus (SARS- CoV-2) from the first patient diagnosed with COVID-19 in Australia, Med. J. Aust. (2020).
21. R. Nair, A. Bhagat, A Life Cycle on Processing Large Dataset - LCPL, Int. J. Comput. Appl. 179 (53) (2018) 27–34.
22. R. Nair, S. Vishwakarma, M. Soni, T. Patel, S. Joshi, Detection of COVID-19 cases through X-ray images using hybrid deep neural network, World J. Eng. (2021), https://doi.org/10.1108/WJE-10-2020-0529.
23. S. Heidarian, et al., Ct-Caps: Feature Extraction-Based Automated Framework for Covid-19 Disease Identification From Chest Ct Scans Using Capsule Networks, 2021, pp. 1040–1044.
24. W. Ji, W. Wang, X. Zhao, J. Zai, X. Li, Cross-species transmission of the newly identified coronavirus 2019-nCoV, J. Med. Virol. 92 (4) (2020) 433–440.P.
25. Mubarak A. Alamri Muhammad Tahir ul Qamar Alhumaidi B. Alabbas,Safar M. Alqahtani,Manal A. Alossaimi, Sikandar Azam, Muhammad Harris Hashmi, Muhammad Shahid Riaz Rajoka 2022 Molecular and Structural Analysis of Specific Mutations from Saudi Isolates of SARS-CoV-2 RNA-Dependent RNA Polymerase and their Implications on Protein Structure and Drug–Protein Binding Volume 27 ,Issue 19 10.3390/molecules27196475 , Molecules 2022, 27, 6475. https://doi.org/10.3390/molecules27196475
26. K. Haque, A. Abdelgawad, A Deep Learning Approach to Detect COVID-19 Patients from Chest X-ray Images, AI 1 (3) (2020) 418–435.
27. M. Saqib, Forecasting COVID-19 Outbreak Progression Using Hybrid PolynomialBayesian ridge Regression Model, Applied Intelligence, 2020.
28. A. Senapati, A. Nag, A. Mondal, S. Maji, A novel framework for COVID-19 case prediction through piecewise regression in India, Int. J. Inf. Technol. (2020) 1–8.
29. K. Shyam Sunder Reddy, Y.C.A. Padmanabha Reddy, C. Mallikarjuna Rao, Recurrent neural network based prediction of number of COVID-19 cases in India, Mater. Today Proc. (2020).
30. B.R. Tabar, J.F. Rendon-Sanchez, Forecasting COVID-19 Daily Cases Using Phone Call Data, 2010, 02252. ArXiv. 2020;abs/.
31. O. Torrealba-Rodriguez, R.A. Conde-Gutierrez, A.L. Hernandez-Javier, Modeling and prediction of COVID-19 in Mexico applying mathematical and computational models, Chaos, Solit. Fractals (2020) 109946.
32. S. Tuli, S. Tuli, R. Tuli, S.S. Gill, Predicting the growth and trend of COVID-19 pandemic using machine learning and cloud computing, Internet Things 11 (2020) 100222.