

## Primeval Diagnosis of Novel Coronavirus

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**ABSTRACT** – This research paper focuses on how to identify the patient is infected by novel coronavirus or not. At present the current available diagnostic is PCA (Polymerase Chain Reaction) test which is developed by CDC (Centers for Disease Control and Prevention), whose test result vary from day to day because the amount of virus in body can change throughout the course of illness. But if there are lot of patient's then it would be difficult to identify and treat them efficiently. So, in this paper, we will understand how to identify the infected patient quicker, so that the doctor will treat the patient accordingly and more efficiently.

**Keyword**– Novel Coronavirus, Artificial Neural Network, Convolutional Neural Network, --Recurrent Neural Network

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### I. INTRODUCTION

In today's era, we are not able to identify that the person is infected by novel coronavirus or not just by one test. May be it can negative or positive, by the current available diagnostic test which is PCR(Polymerase chain reaction) test developed by the CDC(Centers for Disease Control and Prevention), which looks for RNA(Ribonucleic Acid) from the virus in which the novel coronavirus can have test results that vary from day to day because the amount of virus produced by body can change throughout the course of illness. But what if there are a lot of patient's then it would be difficult to do test all of them on one single day and all the patient should not be put in one single room because if he/she is infected by virus then there is maximum possibilities that the other patient will also be infected because coronavirus spread through air, touch also. Nobel Coronavirus refers to a family of viruses that cause a spectrum of diseases ranging from the common cold to severe the life-threatening diseases [1][2]. Through this paper we will come up with a solution to identify that the patient is infected by novel coronavirus or not, quicker.

### II. LITERATURE REVIEW

In today's research scenario, there are many techniques used to build neural network which have been given by many researcher's but not all the neural network techniques are useful for our application.

Neural Networks are modelled after the human brain to recognize patterns. They can adapt to changes and generates the optimal result without

redesigning the algorithm or the criteria of output. The three main neural networks which are useful in our research are:

1. ANN (Artificial Neural Network)
2. CNN (Convolutional Neural Network)
3. RNN (Recurrent Neural Network)

**Artificial Neural Network:** An artificial neural network is an interconnected neuron unit. Every neuron is interconnected by the synapsis. Each neuron performs the simple task of information processing by converting received inputs into processed outputs. Each synapsis is updated is the predicted classified output is different from actual output for better accuracy and optimal classification. In today's scenario, Artificial Neural Network (ANN) is used for Medical Diagnosis etc [3].

**Convolutional Neural Network:** Convolutional Neural Networks are feed-forward Neural Networks in which each neuron is covered in such a way that it responds to overlapping regions in the visual field. Convolutional Neural Networks (CNNs) are class of multi-layer neural networks which is designed for the use of two-dimensional or three-dimensional data such as images and videos. It consists of convolutional and pooling layers which are grouped into modules. It takes image as input directly and the input is followed by several stages of convolution and pooling. In today's scenario, Convolutional Neural Network (CNN) is used to classify Brain tumour, Cancer etc [4].

**Recurrent Neural Network:**In Recurrent Neural Network (RNN), the hidden layers consist of recurrent cells whose output states are affected by

both previous and current input with feedback connections. The recurrent layers can be organized in various architectures to for different RNNs. Therefore, RNNs are mainly distinguished by the recurrent cell and network architecture. In today’s scenario, Recurrent Neural Network (RNN) is used to predict early detection of heart failure etc [5].

### III. METHODOOGY

For identifying that the patient is infected by coronavirus quicker. We have analysed all the methods to give the optimal result and found out that ANN (Artificial Neural Network) and CNN (Convolutional Neural Network) is the best algorithm to get the optimal result. Both the algorithm has similar approach but give result on different inputs:

- ANN (Artificial Neural Network) will take input in the Natural Language (English) Form. It will give result on the symptoms upload by doctor to our application.
  - CNN (Convolutional Neural Network) will take image as input. It will give result on the image (like X-rays) upload by doctor on our application.
- The way to make it possible is by taking symptoms of the patient which are taken by the doctor at the hospital.

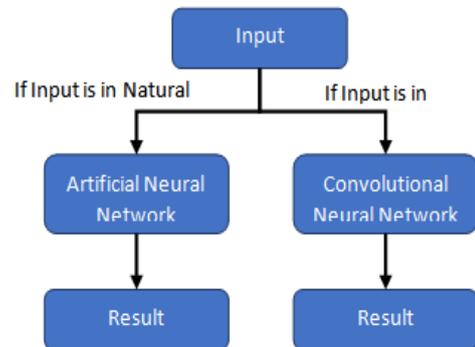
After this the symptoms data will be uploaded on the system. Now, our algorithm will work and we pre-process the data in which we would take out some key symptoms from all those symptoms of the patient by using Feature Extraction and Feature Selection. Now we can use deep learning model which is trained by the previous patient results for which we can use neural network model to predict the results. The symptoms of all the patient affected by coronavirus is similar but each patient has n number of symptoms so neural network based classification model is a better option to use. By neural network classification n number of features can be tested as the symptom which is more likely to be more favourable of a particular disease to be treated.

At last the patient symptoms are given to the neural network classification model which start the search for similar features(symptoms) and at last give the result [6]. This process is more useful from identifying that the patient is infected by coronavirus or not. This solution is not that much efficient and accurate but can predict the result at faster level for distinguishing the patient and start the most appropriate treatment instead of waiting for multiple test results.

### IV. SYSTEM OVERVIEW

Our application works on two cases which are illustrated in Figure-1. Case-1: If Input given in Natural Language (English) and Case-2: If Input

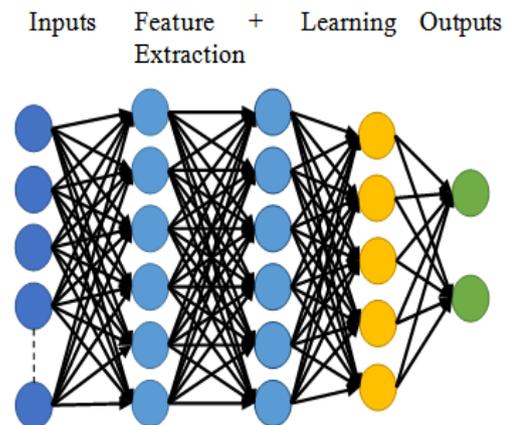
given in Image Form. First the data is input by doctor on the interfaces of the application then if input is in form of Natural Language then ANN (Artificial Neural Network) algorithm work and if input is in form of Image then CNN (Convolutional Neural Network) algorithm work.



**Fig 1.** Application Work Flow

**Case-1:** Now, applicability of this algorithm will depend on nature of the input supplied that is Natural Language (English). This Algorithm contain three steps illustrated in Figure-2 which identify the input and give result are:

1. Input
2. Hidden Layer
  - a. Feature Extraction
  - b. Learning
3. Output



**Fig 2.** Artificial Neural Network processing input and output

At step-1 the input is taken and then that input is processed to step-2 which is divided into two sections, Feature Extraction and Learning. First the input is processed through the feature extraction section in which data is pre-processed and only necessary features (symptoms) which are important are taken for further processing. After feature extraction, the next step is the learning section where the model processes the features (symptoms) and classifies the features on

the basis of training of model and process the classified output to step-3 Output layer which give the result to doctor that the patient is infected by coronavirus or not [3][7][8].

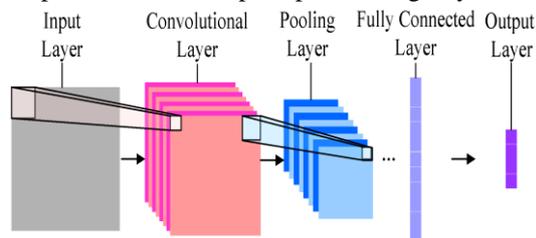
**Case-2:** applicability of this algorithm will depend on nature of the input supplied that is Image. This algorithm contains five steps illustrated in Figure-3 which identify the input and give result are:

1. Convolution Layer
2. ReLU Layer (Rectified Linear Unit)
3. Pooling Layer
4. Flatten Layer
5. Full Connection Layer

At step-1 Convolution Layer which contain three elements:-

- a. Input Image
- b. Feature Detector
- c. Feature Map

In this layer first the image (like x-ray) is taken as an input then the feature detector matrix is generated from the input image matrix of size 3x3 or 5x5 then the feature detector matrix is compared with the x-ray and store the count of matches in the feature map matrix. Thus, Multiple feature maps are generated by this step by which multiple feature is extracted from the X-ray image for further identification process. Now in next step, step-2 ReLU Layer, by the use of rectifier function all the negative values are removed from the feature maps, feature maps only contain positive values which then process to next step, step-3 Pooling Layer,



**Fig 3.** Convolutional Neural Network processing input and output

In this layer, from 2x2 or 3x3 portion of featured map the maximum numerical value is taken and store into the pooled feature map, then the pooled feature map is given to next layer as input, step-4 Flatten Layer which convert matrix into vector which then taken by ANN (artificial Neural Network) as input, step-5 Full Connection Layer which is a Artificial Neural Network that classify the vector value generate the result that the patient is infected by coronavirus or not [4][7][8].

## V. CONCLUSION

In this paper, we presented the complete process of identifying that the patient is infected by novel coronavirus or not in much faster and

efficient process. Effective virus identification, prior to propose and undertake the proper treatment measure. By following the stated method, we can start treatment on the basis of approximate results that is generated from the algorithm. A larger amount of data is required for this application and some experiments need to be performed with these for training data which is filtered from all the data collected to achieve better accuracy. This application is extremely sensitive because the result given decide person's life. Also, we can use Graphics Processor Unit to improve the performance and reliability of the application.

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