SURVEY ON ROLE OF AI DURING THE PANDEMIC COVID-19 IN KERALA

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Abstract

This is an article which gives in depth description about how the Artificial Intelligence played the role in the Covid-19 pandemic. Mainly the aim of this paper to highlight the situations and the lessons experienced in the state of Kerala during the spread of virus. The state was well noticed globally in the first stage of Covid-19 by the planned and calculated control strategies. But gradually, the state went down when the second wave of cases reported and detected. The second stage of positive cases started around May 2020.This article also attempted to give a report on how the state Kerala succeeded in the initial stage with the limited technologies and then taken the Second phase of transmission. It also examines about what the factors were made a situation to face a community-spread of this disease. Later by close observation Kerala found out near connections with other countries and the migrations, the range disease spread had a rapid growth. This shows how clearly the local has an inevitable part in the global.

Keywords : COVID-19, Neural networks, Cluster, Slices, Radiological information's.

I INTRODUCTION

Considering India which has a wide geographical area, Kerala is considered to be a small state. Still the state has marked its identity in its efficiency and the effective response to the covid-19. The Health Minister and the Government worked hard particularly in the interior part of the state and outback places, academics, offices and authority systems, also among the female associations. The state designed a flow-chart to the society about the spread of disease and the people's responsibilities on it. This helped the society to be aware about their own health and issues. This organized planning and implementation had shown the unity of the state to other state.

A novel corona virus disease 19, has become gradually a serious pandemic in the state and also worldwide. This is an infectious disease, which affects mainly the respiratory system. It then results serious illness that affects chest. Covid-19 disease so can also be called as SARS which means Severe Respiratory Syndrome. Covid-19 mainly spreads from person to person, by the effect of viral infection. The reason for the spread has been reported by the result of droplets from the lungs when people coughs, sneezes, breathes or talks. The symptoms shown by a virus effected person are dry cough, extreme body temperature, body pain, tiredness and breathing problems. Some of them will lose the sense of taste and smell.

However, gradually the virus had spread all over the state and daily new cases reported rapidly. All on a sudden, this wiped out the success shown by the State in this pandemic. The state was able to control the spread locally. But the Government found it difficult to handle when the people from other states and countries started arriving and it overwhelmed. This high rise in the population from outside the state, made the administration to work hard. On this hard time, this made the state to think of the newly developed technologies like Artificial intelligence – based tools, especially using AI algorithms, machine learning techniques. Although these are computer techniques, it helps and can be used in hospitals especially by radiologists. This is used to

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screen the corona virus, in the initial stages without having a direct contact with the person. And that's how it played a remarkable role in reducing the workload of the health workers, doctors in improving the detection more accurately and efficiently. This made them to give a timely response and accurate test results which helped in better treatment for the peers affected by corona virus.

II SCOPE OF THE STUDY

This article discusses about the various role played by the technologies and how to utilize the AI based tools in controlling the pandemic in Kerala. This paper also discusses the role of Government's prevention and how to control effectively and the measures to be taken in this wide spread of infection rate.AI can also help to develop an optimal model of spreading of disease and the effective strategies to prevent and control the virus.AI has various methods like drug repurposing ,which can be used to detect the drugs that helps a person to get cured from disease.AI has the ability to perform a robot using a computer or a digital machine, instead of a human. This plays an important role in this pandemic by keeping human away from the contact of virus. AI can also use to implement applications like virus detection, identification, screening and diagnostics. Also techniques for drug repurposing or repositioning prediction and in forecasting. This study also offers the use of newly emerging technologies and tries to show the potential in handling the issues, by fast screening and diagnosis. These applications helped the state in controlling and diagnosing the disease.

III STATEMENT OF PROBLEM

The past two decades the state has faced several diseases mainly viral infections like Nipah and Bird flu. But this time it came out with an entirely different disease shock. It was the serious and fast spreading Corona Virus. The root cause or the first effected person was found in China in 2019, by the end of the year. Five months later Kerala also had reported the first case of this virus. Later the state had reported around 50000 confirmed cases of the virus by the month of October 2021. The state also had reported around 260042 deaths. At the same time recovery rate of around 98%, which was very impressive. Compared to fatality rate of COVID-19 also shows differences according to age like those people who comes under the category of senior citizens have to be given more care and concern, In addition people who are suffering with the common health issues or those under medications for years , especially lung or chest infections also found to be affected easily. As a good part, it is still not found out that the virus can spread from a pregnant lady to her child. However the spread of virus is less among the children too.

IV SIGNIFICANCE OF THE STUDY

The Corona virus was found to be a serious issue which mainly spreads from human to human. It is happened during coughing or sneezing when they are in contacts and through indirect contact or regularly touched surfaces. The virus can remain active from several hours to days. It is also found that the virus has ability for air – born transmission. So we have to be careful if we are spending hours in a hospital area, especially buildings which have Covid wards. The affected persons experienced the common symptoms of a viral infection, like fever, cough, tiredness and difficulty in breathing. A very less people experienced headache or gastric issues. But in some people the symptoms like pneumonia was also observed, and later which had been went serious in them. This presentation tried to find out the major problems faced by Covid patients and to detect their virus effect using the AI based technologies. Also tried to recommend much more effective methods which can be used. Thus this study will provide suggestions to implement more technologies in AI and plan for the future.

V REVIEW OF LITERATURE

Many studies and reviews were done regarding Covid-19 cases also,as if the state has done many times in the

situation of various other infectious situations.But more than doing it with any other technologies or using other methods, in this fast moving era the set of newly developed technologies in AI helps researchers and doctors to quickly use the literature. During this pandemic period Government had promoted the importance of hand hygiene, keeping a limited distance between the people, awareness about using masks through a campaign "Break the Chain' title.

1. **Denkinger C (2021):** In his study, he stated that people can be grouped as ages,as this virus shows more symptoms in aged people. Then depending on the age categories, they were asked to fill different questionnaire and various interviews were conducted. He tells this helps to find out the patients showing symptoms and those who are not having any symptoms.

2. **Maheswari Suresh M (2021):** She researched problems about this disease and the management towards the covid-19 in a low-income society, which seems to be little hard to manage. People in such countries found difficult in finding proper vaccinations or the correct awareness. She also suggested a design using AI model that can be used by citizens in several regions.

3. **Mamuni Das (2020):** In his study it analysis that AI-enabled drug helps in discovery that it to arrive at combinations of existing drugs that may prove better positive changes in Covid patients. He and his team analyzed that Hydroxycholoroquine or Chroloquine,an anti-malaria drug that is being prescribed and it worked better.

4. **Amanat F (2020):** His studies offers that if enough data are presented more clarifications can be attained by various AI models. He suggested AI can be used as a real good searching aid to find the virus affected persons. Commonly they share patterns with similar data. By using AI and deep learning process they have tested a vaccine by conducting various tests on multiple molecules.

5. **Gomes:** He used machine learning methods in the proposed system. This was for improving the function of DNA .In his study this was all about making more minor DNA sub molecules sequences by dividing the actual DNA molecules. As a result these minor sequences will overlap. Then the statement was the diagnosis of corona virus molecules can be done faster with specific and scientific models. He used many algorithms in Data Mining like Bayes Classifier Theorem, Support Vector Machine algorithms and some of machine learning concepts.

6. **Cady:** He suggested methods to measure antibodies in human body because of Covid-19. For that he used biosensor platform which uses fluorescent plasmonics. The algorithm techniques in machine learning was used to analyze and detect the antibodies. Later the measures concluded that the antibodies against the virus in human body were found to that dried blood spot samples were 88% sensitive.

7. **Kukar:** His studies were to differentiate the covid effected patients from other people with some other infectious virus. For that he used neural network techniques and algorithms and the methodology used was routine blood tests. For the blood test sample study he used parameters like hemoglobin concentration, the blood count, sugar content in blood and the normalized activity percentage. The sensitivity and specificity of these parameters were found and rated respectively. The model helped to find out the early symptoms by the virus, which commonly missed in RT-PCR tests.

8. **FangJiang:** He reviewed through the clinical characteristics of the virus. The reviews had six publications. The clinical characteristics study had also

provided a brief overview on treatments due to the virus.

During the pandemic time, many scientists and researchers had conducted various tests and studies regarding the medicines to stop the virus spread and its effect. When the vaccine was developed then the study was about much more possible drug combinations and through drug repurposing approaches.

In conclusion, at a point where the basic mechanisms had identified, the studies also discovered various new techniques like deep learning, AI and machine learning tools can be used. These algorithms will help to find out the human behavior patterns which are never stable during the pandemic infected period. Also these tools can be used for monitoring people having common issues like cough, wheezing, and distance recognition by using data collected by IoT devices.

VI OBJECTIVE OF STUDY

- A survey is being conducted on different AI applications used or designed for future in the fight against COVID-19.
- It is also tried to classify these applications according to the field of use with that a situation where AI has not implemented.
- This study is also tried to assume this corona virus will continue to show the symptoms in future. This was done by collecting possible data and analyzing them.

VII RESEARCH METHODOLOGY

Sources of Data:

The present study depends mainly upon primary data. This data were collected by interviewing Covid patients in the Panchayats, Kerala. However, secondary data was obtained from the Social workers at Government Hospital, Ernakulum and Medical college .Also from Journals, Newspapers, magazines and Articles. This data collection and analysis was conducted from 50 families from the blocks under panchayats in Kochi, Kerala. The data were then analyzed.

Sampling Design:

Kerala is once again on the spotlight. As on October 2021, Kerala had sent 37379774 samples for testing. In addition, more than 40000 samples were taken from high-risk people like those in the group of health workers, senior citizens, and so on. Of the 18,000 active cases in Ernakulum as on October 5, the number of those in home isolation is 15,958. The number of patients admitted in hospitals 1,184. Around 360 patients are in domiciliary COVID care centers. Nearly 180 people are in second-line treatment centers. The number of patients in intensive care units has also come down compared to the figures last month. Nearly 220 patients are in ICUs, as per the latest estimates as against 300 and above in September.

However, according to the study estimates pointed out that the number of breakthrough infections was only 10, 490 as against the 4.1 lakh cases reported in the last seven months (2.5%).

Tools Used:

Kerala was explicitly noted and appreciated globally. The state had shown an exemplary performance during the virus period from the initial months of 2020. This performance can even be considered as mode of reference to other states and even to other countries. This model primarily gave importance in the behavior pattern of the virus in human body. Kerala had also given directions and models to health care department and communities which described mainly about the responsiveness. This strategy gave a strong impression about the administration capability of the state as an example for other states and countries. With the available data sets, it is found that AI can analyze more effectively the immune response of the host and about the status of the person in disease complications.

Presently this article has analyzed properly the documents existed with the applications of AI for the Covid positive patients. These data were from the people who admitted in ICU.

VIII ANALYSIS AND INTERPRETATION

The current review which is been done systematically has shown that the state does not contain more technologies in AI based applications especially at hospitals or medical applicability. Thus it is analyzed that an important improvement in the AI field and applications could help to control the pandemic from spread of virus. Using of more new AI tools specific guidelines into research would help the state to fight this virus and other future pandemics. Researchers of the state have decided to focus on collaborating more with the developers in AI field and the experts in health systems.

Robots instead of doctors to serve Covid -19 patients in Kerala

A government hospital in Kochi has tried installing a robot. The aim to serve food or medicines to virus affected people instead of the humans. The intention was to decrease the risk of infections which spreads among doctors and health workers, due to continuous interactions with the patients.

Fig.1.Robot

AI technologies can be applicable to design efficient systems to support the government researchers and then to the society. Using AI techniques the human behavior patterns during affected condition compared to healthy condition can be studied. For instance the voice signals will show a variation in a person when he was in perfect health than that of virus affected time.

Such applications will help in precise detection, analysis, diagnosis, treatment procedures, development of drug and also the failure occurred during trials. AI can also be used more effectively when embedded with IoT devices through Big Data processing.

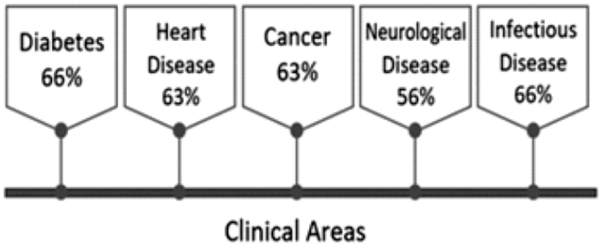

Fig.2. Major clinical areas where AI and ML hold the most promise

Important forms of AI:

AI has different forms of applications. Among them Machine learning is the most form used, which contains various roles like diagnosing a patient, the attributes, suggestions and advices about treatments with more effective visuals of the disease affected cells, and the medicine precisions. AI with the form of ML can also include algorithms in neural networks in which more diagnosis and detection.

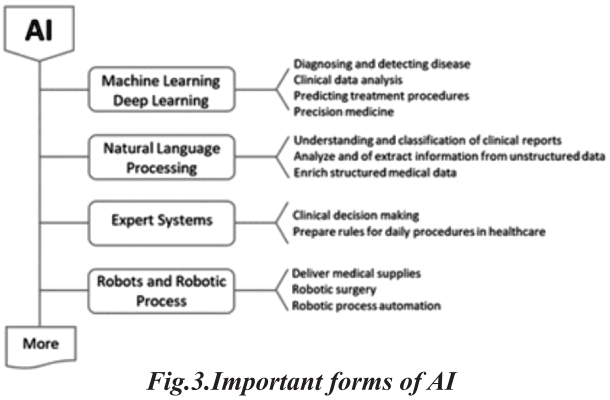

Fig.3.Important forms of AI

IX FINDINGS OF THE STUDY: PREDICTION AND FORECASTING THE OUTBREAK

In this study, it is noted that AI can be used for keeping an analysis on people's data and then by making predictions about how the corona virus spreads. The aim of the many findings and discussions on the topic was to develop a model which can be helpful to the society in implementing the control strategies on the virus spread. Then this was useful for the future purposes. This is also done by using neural networks algorithms and models to learn about the patient characteristics parameters were found out in the first CT-scan. Then used various classifiers and algorithms in data mining techniques. These classifiers helped to distinguish the covid-19 patients according to their clinical symptoms. At last with all these data a model is designed using neuro networks with some data in radiology analysis to assume the Covid patient's performance status.

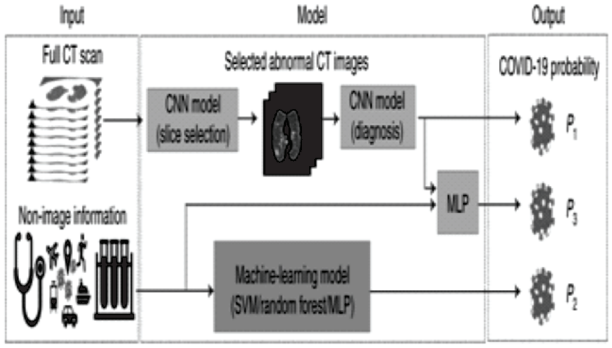

Fig. 4.AI models

AI models can be designed to find the people to be probably gets positive by Covid attack. Generally it has three models be suggested. First is to find the CT scan data, second to collect the samples and reports of chest analysis. Finally the third is to use the combined data infection analysis. For evaluation of CT reports the data have been analysed by the slice algorithms used in Machine learning which is focused to find any abnormalities. This is mainly used to find out the lung slices from chest CT.

From all these data, the highest ten reports are given priorities to the second storage diagnosis. Probably the people with these ten samples will show the chances to be Covid positive. Clinical data references of the patient, like age, gender, the history of the patient's exposure to the society, disease symptoms shown were al collected and grouped. This is then put into the machine learning algorithm procedures which mostly turns the result to be Covid positive. And these data are classified using the classifier algorithms.

A dataset was collected from a lot of patients who were found Covid positive, it included patients of different ages like toddlers to seniors and included nearly 400 men and 200 women. All these analysis were done with the reports from the chest scan and displayed using the kernel operating system with a window of lung. A rare number of around 500 positive Covid cases were displayed during the RT-PCR tests.

The AI models were evaluated, tested and compared the performance with the help of radiologists results. Both results found similar with the same symptoms shown by AI model and the radiological tests.

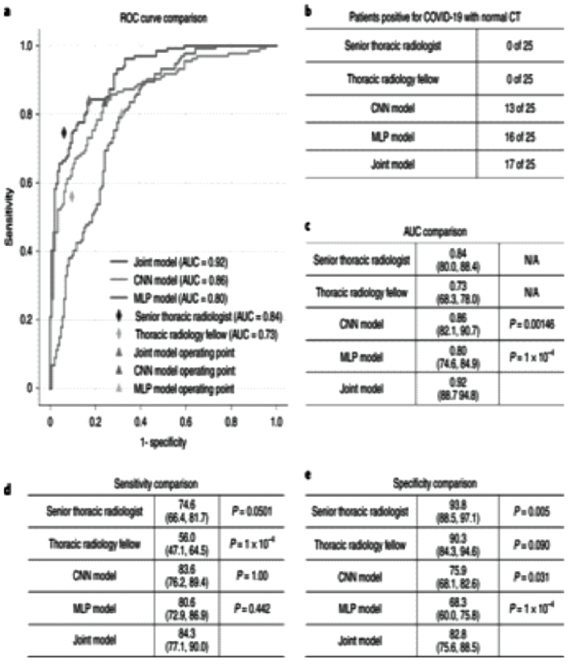

Fig.5.Comparisons of AI model, CNN model and ML model

The figure shows the comparisons of AI model, CNN model and ML model. All the data were summarized by the usual CT scan reports, clinical symptoms and so on.

A chest CT study can be obtained and interpreted much more quickly than RT–PCR. While chest CT is not as accurate as RT–PCR in detecting the virus, it may be a useful tool for triage in the period before definitive results are obtained.

AI models in use:

The RT–PCR virology test used to distinct whether the person to person is Covid positive or Covid negative. These test reports are used to design an AI model during the pandemic period. The model designing procedure had three stages or three model. In first model the chest scanning results were used to develop a deep learning model. Then used various algorithms to design a machine learning process. Commonly used the random vector machine techniques. Finally combining the radiological and clinical information's a neural network model was designed.

Convolution neural network model based on AI

A neural network model was proposed using the chest scan reports. Then compared the abnormalities found in the patients data who were with symptoms. These comparisons with similar nature from different patients were taken and diagnosed as slices using the data mining techniques. This helped to have a deep evaluation. The developed neural networks model helped to predict the sample data from the people, whether they are tested positive or negative, which were not detected in common viral detective test like RT-PCR. Thus this algorithm helped to find more clear status about a patient.

Image pre-processing

Neural network algorithm implementation contains many images. In this case, primarily the processing had to start with images from CT scan. The processing of such chest images will contain details of tissues and their abnormalities. These images were segmented as body part and then lung. Body part segmentation will contain large compounds and were represented using large pixels intensity. Whereas pixels having intensities less than 160 were represented as lung segmentation images. And this contains only smaller regions. The algorithms was written to proceed as to discard the images with size of lung less than 15% when compared to the size of the body part.

X PROPOSED MODEL

With the development of AI models using patients' data, the promise was made to have further more control on the spread of Covid-19. The model will work clearly with much more amount of data. So the efforts and effective methods in collecting data may facilitate in much more improved AI model and its performance. Limited size of sample will show difficulties in model training too. To solve this another method discussed was to choose the sample slices and use the keywords in the slices. Then to represent a three dimensional CT scan which represents much clearer visual. This will help to explain more prediction. There are some examples which displays the AI model using the radiologist's data.

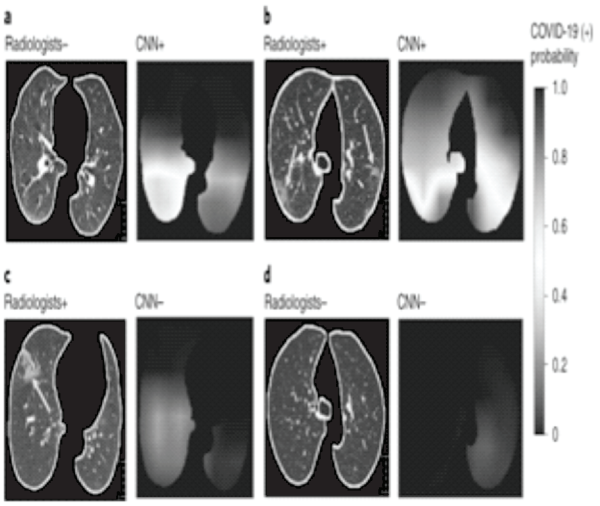

Fig.6. CT Images of Lungs

For those pair of images the left shows the CT images of lung. Then the right images which is used to analyse the infected performance. As a case study a 49 year old female was taken. She had fever and was exposed to Covid also. The case showed abnormalities in the right lobe. Also another person of around 52 with fever and cough were also presented. Then another female around an age of 60 with fever and high productive cough. All these three cases showed variations in the images more clearly.

XI LIMITATIONS

Some limitations have also found for the proposed model. The major limitation found is AI model works perfect only with large sample size. But as these are all connected with patient's personal history data, it is difficult to collect a large sample of data with accurate information. Another issue is the biased nature in the data, where patient's with Covid positive shows the same symptoms with those of people having respiratory diseases. So this may create complexity in designing a perfect AI model algorithm.

XII SUGGESTIONS

In the future suggestions for more accurate research can be done with a larger dataset collection. Different approaches can be claimed in neural networks, 3-D image processing algorithms, clustering and slicing algorithms and deep learning models. All these have to concentrate on the robustness also.

XIII CONCLUSION

In summary, this studies explained the highly recommended chances of using AI techniques in pandemic situation like Covid-19. Which will then help to control the vast speedy spread of the virus. This study also proven than the data analysed through AI techniques were the same that is been done using common radiology and clinical procedures. But with more accurate data and in less time without physical tests.

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