IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 2, February 2022
Impact Factor: 6.252

Artificial Intelligence Application for COVID 19 Pandemic

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Abstract: *Since the last few months the world is experiencing an outbreak of COVID-19 pandemic that generally follows a similar path consisting of following phases: the first phase involving a very few people suffering from the infection and only a limited number of response, which is then followed by the next phase involving a take-off in the epidemic curve along with a national lockdown done in order to flatten the curve. Amidst all this, governments across the world are burdened by the question as to when and how to manage de-confinement.*

Keywords: Artificial Intelligence

I. INTRODUCTION

COVID 19 pandemic is testing the resilience and administrative capabilities of both developed and developing nations. Throughout the pandemic, a lot of emphasis has been placed on the sharing (or lack of it) of the most important information across different countries particularly from China — regarding the spread of the disease. However, a very little information has been gathered related to the better management of the COVID-19 by making use of the advanced data technologies that are being used to transform the businesses over the past 20 years. Now it's time for governments to leverage those technologies in managing this pandemic.

Utilising Power of Personalised Prediction Model

- **Alternative Approach:** The time has come for the policy makers to make use of an alternative approach to battle COVID-19 and this new approach is based on the technology which makes use of Artificial Intelligence (AI) for making personalized prediction and this technology has been used over the years for transforming many industries. Using AI (Artificial Intelligence) and Machine Learning technology, the data-driven companies (from top "Big Tech" companies to financial services, travel agencies, insurance companies, retail sectors, and media) used to make personalized recommendations in order to know what the customer needs to buy, and practice personalized pricing using dynamic pricing tools, risk, credit, etc. by making use of the data that they have gathered about their customers. For instance, Companies such as Netflix analyses the past choices and characteristics of the consumers in order to make future predictions regarding their interests and what they would like to watch next. This same type of approach could also work for the Covid 19 pandemics.
- **Effective Risk Analysis:** While making use of data gathered from multiple sources, the training of different machine learning models could be done so that the clinical risk of suffering with severe outcomes associated with an individual could be measured as it would be of great help if the individual gets infected with COVID-19. It would become easy to identify the probability that the individual will require intensive care if he/she gets infected from this virus, for which there are only limited resources available? How much is the possibility that it will result in the death of the individual? Thegathered data could include the basic medical history of an individual (as in case of Covid-19, the seriousness of the symptoms is likely to increase with the increase in age of a person and also with the presence of co-morbidities such as diabetes, asthma, cardiac issues or hypertension) as well as other data, such as the individuals' household composition. For example, an individual who is young, healthy and might be classified as a "low risk" patient suffering from COVID-19, the same person would be considered as at "high risk" if he or she has been suffering from comorbidity or lives within firm people who would most likely require an intensive care if they get infected.
- **Customizing Policies for Resource Allocation:** The predictions made regarding clinical risk could then be

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used for the customization of different policies and allocation of resources at the individual level or the household level, which thus accounts for standard medical liabilities and risks. It could, for example, help the authorities in targeting social distancing between the people and protecting the individuals with high clinical risk scores, while allowing the individuals having low risk to live more or less comfortably and normally. The criteria to assign different individuals in high and low risk groups would definitely needs to be identified, taking into consideration the resources that are available, medical liability risks, and other risks involved, but the data science approaches for this are standard and used in various applications. There are multiple benefits of using personalized approach. It may help in building herd protection or immunity with lower rate of mortality. It would also help in better and fairer allocation of resources, for example, allocationof scarce medical equipment (such as ventilator, protective masks, test kits and beds in the hospitals) and some other resources.

Delineating De-confinement Strategies

- **Easy Classification:** AI technology can play a very important role in the later stage of this pandemic which requires implementation of de-confinement strategies as the next key step in the whole process. The process of de-confinement can be considered as a classification problem which involves making decisions regarding which people should be confined first. The approach of de-confinement has already been used by some of the governments and the age has been considered as major risk factor in this process. However, it misses potentially high-risk individuals and performs a relatively crude classification. It does not classify people who are healthy and young but living with "high-risk" elderly people. In this case, if AI technology is used, then it would be helpful in making safe de-confinement decisions. The use of prediction models can be very helpful to make safe decisions at the community level and thus it can prove less costly both for the individual and the economy.
- **Safe De-confinement:** One of the most important features of COVID-19 is that the rate of transmission of the virus is exceptionally high, but severe symptoms or mortality rate is relatively low. The data of infected people collected indicates that more than 90% of the people who are infected with this virus are either asymptotic or found to have mild symptoms when infected. In case, if a reliable prediction could be made about these 90% individuals, then they could be de-confined safely so that if these individuals were supposed to infect each other, then the de-confinement could prevent them from having severe symptoms and also from dying or would not overwhelm the medical system. The de-confinement of these low clinical risk 90% people would also help in the rapid building up of high herd protection or immunity which could thus protect the remaining 10% from getting affected and thus they could also be de-confined.
- **Limited Fallout:** In case if the prediction score obtained with help of prediction model used were to prove wrong, then the consequences obtained would only be restricted to the "safest" individuals (those individuals who were the first to be released from the confinement). The management of those people could be done with the help of the medical resources available and this would not be overtaxed due to the treatment of the remaining 10% people or people who are at high-risk who remained under confinement. Thus, de-confinement should be practiced more gradually and it should be started firstly from the clinical groups who are at low-risk and then building up herd protection or immunity from time to time.
- **Scalability:** Given the fact that there is lack of perfect clinical risk prediction models, there is a need to make the models that are more robust. But the models that are already available should also be considered and used to make predictions. The medical tests done to detect the virus are very costly, scarce and very slow in deployment. Unlike these medical tests, the personalized approach that makes use of clinical data can be applied fastly and can be scaled easily. Using the right personalization prediction model could enable the authorities to do de-confinement safely and at a rapid rate than current best practice (testing-tracking-isolation) being used to fight against Covid-19. According to this practice, the people who are infected and the other people who came in contact with the infected person are put in confinement and this is done even if those people are at a very low risk of suffering from virus or showing any serious symptoms.

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- **Harnessing Data:** In the current situation, the data that is required to assess the clinical risk of an individual so as to know their chances of contacting with the virus are not accessible easily. The governments of different countries can ramp up the gathering of the health data nationally by creating comprehensive medical records electronically, but there is a limitation to its use as it require more time in the emergence of patterns between the data gathered (medical records of people) and the impact that the virus can put on its victims.
- **Need for Shared Prediction Model:** In the case of pandemic through which millions of people could get affected globally, the most appropriate approach that could be used is to create a prediction model that can be shared with other countries. The model could be trained using the data obtained from an initial breakdown. The dataset consisting of thousands of individuals affected seriously by the virus (people who require ICU) and people who are less affected by virus (people exhibiting only mild symptoms), can be used to make personalized predictions. The data of other individuals could be added so as to improve the quality of predictions made using the model.
- **Common Data Standard:** A model once selected and started running can be shared with different countries of the world at an early stage when the virus starts spreading. This is due to the reason that the medical records of the people including the basic physiological ang biological data do not have much difference when compared (each and every person grow old and also the co-morbidity such as diabetes is same in Wuhan, China as it is in New Delhi, India). If the two countries having resemblance in population gets hit by a virus, then the outcomes of that virus are most likely to be the same in both countries. With this information, it can be said that the two countries, without sharing the actual medical records/history of people of a country, could share the same model for making predictions. The model could be trained with their own data instead of the data of the other country. The data patterns of people of one country may vary from the other, for instance, say demographics (there are more number of old people in Japan than in India) and also due to the differences in culture or lifestyle (Grandparents in India are more involved with their child than in America). But the data analysts could work on the model again to make accommodations for these variations so that the prediction model could work for that particular country.

Challenge of Privacy

In order to implement the new technological innovations, there will be a requirement of making changes in the policy. The policies which are existing already covers cyber security and data privacy alongwith their respective and different interpretations across other countries. These policies prohibit the management of this type of personalized pandemic. This is because of the reason that the currently implemented policies do not do any differentiation between the input data, prediction models and the output data. The input data is used to train a model and the output data is used to make predictions using the input data from the trained model. When a policy prohibits sharing of data, either implicitly or explicitly, or requires storing of data on the servers within any country, it covers all the information that can be considered as data which also includes the models and their parameters. Thus, it is pertinent for the policymakers to consider the difference between the sharing of data and sharing of models.

Use of AI to identify detection of disease at an early stage

AI is being used for identification of 24 different types of abnormalities in a chest X-Ray and among these one indicates COVID-19 infection (done by Mumbai-based Qure.ai, health tech startup). This technology can help to analyze the irregular symptoms so that the health authorities could be informed about these patients.AI provides help in the diagnosis of the infected cases using imaging techniques used in medical field like Computed tomography (CT) scan, Magnetic resonance imaging (MRI) scan which helps to scan the human body parts.

Use of AI to develop new drugs and vaccines

AI can be used to carry out a research for developing a vaccine for COVID-19 on the basis of data available. Drug testing speed could also be increased with the help of this technology. It can provide a great help in carrying out the clinical trials required at the time of developing the vaccine.

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Use of AI based drones

Drones could be used to deliver medical supplies and for making other deliveries in order to prevent the disease to spread further. It could be used for the surveillance purpose also so as to avoid people to people contact and thus maintaining social distancing between people. Drones can also be used to broadcast messages especially in rural areas where open communication channels are not available.

II. CONCLUSION

The need of the hour is that the governments of the nations must agree on a protocol so as to determine the point when the data sharing between the countries could be done. For example, the WHO or UN has made a declaration that the normal privacy laws could be suspended by using the particular outbreak turned into a pandemic as a trigger. This would allow the sharing of data between the nations. In fact, during these situations, the people of a nation provide their data willingly so that it could be used through any secure and appropriate channel. This data could be used to train the prediction models so that the results obtained from these models could be used to make some policies and decisions regarding the life of the people and also for the economy of a country. If this new technology involving use of AI and data science is used, then there is a great chance that it would help to mitigate the fallout resulted from this pandemic and not only this, it will also help us to deal with and limit the impact of such type of pandemic, if occur in future.

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