Covid 19 Case Prediction Using Deep Learning

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Abstract **- The dynamical nature of COVID-19 cases in different parts of the world requires robust mathematical approaches for prediction and forecasting. In this study, we aim to (a) forecast future COVID-19 cases based on past infections, (b) predict current COVID-19 cases using PM2.5, temperature, and humidity data, using four different machine learning classifiers (Decision Tree, K-nearest neighbor, Support Vector Machine, and Random Forest). Based on RMSE values, k-nearest neighbor and support vector machine algorithms were found to be the best for predicting future incidences of COVID-19 based on past histories. From the RMSE values obtained, temperature was found to be the best predictor for number of COVID-19 cases, followed by relative humidity. Decision tree models was found to perform poorly in the prediction of COVID-19 cases considering particulate matter and atmospheric parameters as predictors. Our results suggests the possibility of predicting virus infection using machine learning. This will guide policy makers in proactive monitoring and control.**

I.INTRODUCTION

Currently there are several research works undergoing in the country to prevent Covid-19 cases from rising. Previously our country was importing medical kits like PPE (Personal Protection Kits), mask from outside, but now it has been successful in developing these kits. Along with taking initiatives to fight this disease, our country has also taken steps to make people aware of the disease. The news and media have a great part in creating this awareness by informing the public about the preventive measures that can keep them away from infection. Awareness among the people to carry out all the preventive measures can immensely help to reduce spread of the virus. The country has created containment zones throughout the cities wherever Covid-19 cases have been reported to prevent further spread of the virus. These containment zones have been kept isolated from the outside public to ensure no contamination occurs outside. Coronaviruses are large, enveloped RNA viruses of both medical and veterinary importance. The envelope structures of SARS-CoV-2 are sensitive to physical and chemical conditions and can be destabilized or damaged by heat, ultraviolet (UV) light or extreme pH. The outermost structural protein of the SARS-CoV2 “Spike protein” showed active and inactive states at different temperatures. In such a way, regions that have low temperatures are more prone to infection than those with higher temperatures. The COVID-19 cases increased toward the Earth's poles with increasing latitude. It is more fatal as compared to other viruses as it can live for up to a few hours on several surfaces like iron, wool, plastic and steel, and copper for up to a few days [2]. There are various symptoms of this virus like high fever, cough, problems with breathing, and many more. A person who got infected by this virus can develop these symptoms within 2 weeks from the day of infection. Due to a very high rate of transmission from human to human, WHO declared COVID-19 infection as pandemic [3]. Till now, 35 million of humans got infected and greater than 1 million are dead, and this figure is still rising. Though 26 million people are recovered from this disease and vaccination is also in the process. But still, many new COVID-19 cases and deaths are being reported worldwide. The most affected countries are United States, India, UK, Brazil, and Russia.

II. LITREATURE SURVEY

1. Rashed, E.A. et al[“Machine Learning Prediction of COVID-19 Positive Cases with Meteorological Data and Mobility Estimate in Japan”]
   Authors suggest using deep getting to know methods to forestall the unfolding of Corona Virus keeping diverse factors in thoughts

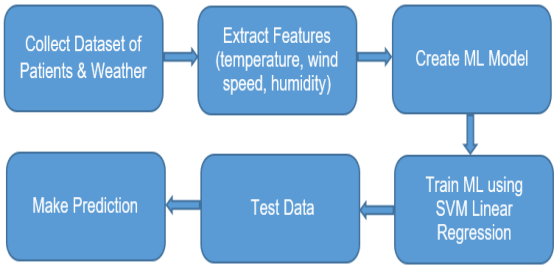
consisting of facts related to meteorological facts. The models proposed have been made the usage of neural networks on an extended and short time period recollection community. Multi-Layer and Paths had been skilled through time collection meteorological and open supply statistics. The final version tested the use of various time frames and the obtained outcomes were then as compared with Cloud Forecast by using Google.

2. Ogunjo et al["Predicting COVID-19 cases from atmospheric parameters using machine learning approach"]
   In this study, authors used previously obtained data of COVID infected people and the analysis of the climate at that time using PM2.5, temperature with different machine learning algorithms like Decision Tree, K-means, Support Vector Machine (SVM). Among them two algorithms were found to be the best suited for predicting the cases of COVID - 19.
3. S. Ghafouri-Fard et al["Effects of host genetic variations on response to, susceptibility and severity of respiratory infections Biomed Pharmacother Biomed Pharmacother"]
   Authors have suggested an analysis method for different variants of COVID-19. Determining the various respiratory patterns found in infected and non-infected persons through which the authors summarise the data as predictive measures. The authors has shown associate respiratory infection, distress sindrome and have complete focus on SARS.
4. D. Ivanov et al["Predicting the impacts of epidemic outbreaks on global supply chains: a simulation-based analysis on the coronavirus outbreak"]
   Authors have presented incipient research tensions on the impact of COVID - 19. Authors have deeply discussed about the long- and short-term impact of COVID - 19 outbreak on the society and people. The outcome of this study can be used in planning SC plans in such situations.
5. J. Sun et al["Forecasting the long-term trend of COVID-19 epidemic using a dynamic model"]

Authors have shown the long term reported cumulative collection of COVID - 19 effects in china from the month of January and February. This study was to predict the cases varying atmospheric effects. This module was able to predict the outbreaks over 7 days after the public report. They evaluated the model on officially reported attested cases from different regions in China.

III. SYSTEM ARCHITECTURE

ML is used in various fields, including medicine to predict disease and forecast its outcome. In medicine, the right diagnosis and the right time are the keys to successful treatment. If the treatment has a high error rate, it may cause several deaths. Therefore, researchers have started using artificial intelligence applications for medical treatment. The task is complicated because the researchers have to choose the right tool: it is a matter of life or death.



For this task, ML achieved a milestone in the field of health care. ML techniques are used to interpret and analyze large datasets and predict their output. These ML tools were used to identify the symptoms of disease and classify samples into treatment groups. ML helps hospitals to maintain administrative processes and treat infectious disease. The pandemic disease known as COVID-19 is a deadly virus that has cost the lives of many people all over the world. There is no treatment for this virus. ML techniques have been used to predict whether patients are infected by the virus based on symptoms defined by WHO and CDC. ML is also used to diagnose the disease based on x-ray images. For instance, chest images of patients can be used to detect whether a patient is infected with COVID-19.

Various ML techniques are used to predict and forecast future events. Some ML techniques used for prediction are Support Vector Machine, Logistic Regression. Each technique has unique features and is used differently based on the accuracy results. The model with the best accuracy during the model evaluation process is chosen for prediction or forecasting.

IV. CONCLUSION

In this study, we were endeavoring to soothsay the COVID-19 cases on the substratum of current weather conditions, and climate, and for that purport, we have made utilization of several machine learning algorithms k Most proximate Neighbor (kNN), Support Vector Machine (SVM), and Arbitrary Forest (RF), to compare the data of both positive and negative patient's amassed from sundry datasets and online sources. And the final result obtained from SVM algorithm was consummately slaking, hence at the cessation our base algorithm was SVM.

In this study, we investigated a machine learning approach that includes mobility information as well as meteorological data within a neural network architecture that is trained to predict future COVID-19 positive cases. A set of seven time periods, each of 28 days, for six different prefectures in Japan were used for the assessment of the proposed framework. The proposed framework provided more accurate and consistent estimations than that provided by Google Cloud. Moreover, the forecasting patterns were almost consistent with the actual data in terms of the spread/decay phases.

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