A Study on COVID-19 Infection Forecasting Techniques

Yogini Jawale[1], Akshay Thakare[2], Aaditya Shinde[3], Govind Waghmare[4], Mrs Archna Shinde[5]
[1,2,3,4]*Computer dept., Aissms Ioit, Pune*
[5]*Guide, Computer dept, Aissms Ioit, Pune*

Abstract **- The rapid increase in Covid-19 infections has been highly problematic for a lot of individuals as it led to various governments imposing lockdowns and curfews all over the world. This situation has led to massive losses for the majority of the companies and a lot of them have also been shut down due to these losses. The epidemic has also been filled with suffering and pain as a large number of people got infected which led to overcrowding of hospitals and other medical institutes. These problems have been caused due to the inability in predicting the future course of the virus and preventive measures. Therefore, a collection of researches based on the prediction of the virus infection spread have been detailed in this research. The related works on the forecasting of the infection spread have provided valuable insight into the process of forecasting using machine learning approaches. The methodology for the covid-19 forecasting will be discussed in much more detail in the upcoming editions of this research.**

Index Terms **- Machine Learning, Prediction, Fuzzy Classification.**

I.INTRODUCTION

Health is one of the primary concerns for survival and fulfilling life for a human being. Health is essential as it allows the person to achieve and perform at the maximum potential. There has been an increase in the number of individuals that have been facing a lot of health problems. This is primarily because, in recent years, a large majority of individuals have been ignoring their health. This has led to an increase in the number of diseases and ailments that have been problematic and caused a lot of pain and discomfort.

The rising number of diseases and viruses reached an epitome this year when the Covid-19 virus hit a large number of people. It was declared a pandemic which led to millions being dead and infected to a large number of individuals being in extreme pain and suffering for a long time. The hospitals and the medical institutions were crippled with the increase in the flow of the patients and were unable to keep up with the increasing demand. This is an extremely problematic occurrence as it has led to an increase in the fatality of the disease considerably.

Most of the countries across the world have been affected by this pandemic. There has been a series of lockdowns and curfews to prevent the spread of the virus. The virus is highly infectious and is responsible for aggravating the health conditions of individuals with diabetes and other respiratory diseases, such as allergies or asthma. These individuals have been the worst-hit victims of the Covid-19 virus along with the elderly individuals. The Covid-19 virus attacks the respiratory system and compromises the immune system at the same time.

The Covid-19 infection is largely symptom-free or asymptomatic, in this state the patient transmits the virus without having any indication of infections. This is the reason why there was a need for extensive lockdowns that led to the severe crippling of the economy as flights and international travel, along with public transport were banned. A large number of people were displaced and away from the homes when the lockdown progressed, leading to a severe shortage of essential goods and their transport, which led to widespread problems. Therefore, to prevent such an occurrence, there is a need for an innovative system that can predict or forecast future levels of infection spread in the populous.

The prediction or forecast of the pandemic is necessary as it would allow the governments and other agencies that are designed to effectively control the pandemic and prevent it from becoming widespread enough that could lead to the crippling of the various essential services. The predictions through machine learning would also allow for better preparedness of the citizens of the country and brace for the upcoming conditions beforehand.

To enable an effective and accurate prediction of the covid-19 infection spread, the paradigm of machine learning is envisioned. The dataset containing the

covid-19 infection spread is utilized along with the Artificial Neural Networks and Fuzzy classification to identify the future of the Covid-19 virus infection spread accurately. This research article discusses the related works in this regard to assist in the formulation of the technique in the future editions of this research. This literature survey paper dedicates section 2 for analysis of past work as a literature survey, and finally, section 3 concludes the paper with traces of future enhancement.

II RELATED WORKS

P. He narrates that prevention and control of the COVID 19 is one of the major challenges for all the countries. The decision-making is classified as grade 1(high risk), grade 2 (medium risk), and grade 3 (low risk). [1] Three major aspects are to predict the possibility of the epidemic through the risk analysis and forward the prevention and control strategies. The very first thing is the collection of the information and to detect the problem accurately. The model establishes the approach using the correlation function technique which includes a unique research technique for controlling public health security and risk prevention.

A. R. Alsaeedy introduces the new technique to predict areas with high human density and mobility which are at risk for spreading COVID-19. COVID-19 pandemic outspread by the people in the crowd with proximity. Handover and cell (re)selection (UE) used to maintain seamless coverage for mobile end-user equipment are the existing cellular network functionalities. UE is operating by two essential protocols: handover (HO) and cell (re)selection (CS) [2]. HO/CS rates can also be used to predict spot areas with potentially high viral transmission. Further monitoring and risk mitigation is analyzed by using inferred at-risk regions.

R. F. Sear explains doctors and scientists will win a victory over COVID-19 will depend on developing a vaccine. In the proposed paper they have used machine learning to quantify COVID-19 content among online opponents. [3] The online anti-vax community is implementing a more diverse and hence more broadly adaptable discussion around COVID-19 than the pro-vax community. As it provides the first step to either replacing or non-scalable attempts of human moderators tasked to detect the online misinformation. The researcher used the LDA algorithm, recognize plausible topics within collections of posts from online communities.

R. Sethi points the eruption of coronavirus disease in December 2019 in China spread rapidly across all parts of the world by January 2020. Later World Health Organization (WHO) declared COVID as pandemic on January 30, 2020. Around 7 million confirmed cases are there globally, and it is increasing day by day. Fever, cough, dyspnea, breathing problem, and viral pneumonia are the general symptoms of COVID-19 patients.[4] There are many cases where individuals are asymptomatic but there is positive while pathogenic tests or while chest CT scans. In the proposed paper they implemented CNN-based architectures and it has potential for diagnosis of COVID-19 disease.

S. Hu elaborates on the outbreak of the coronavirus which started from Wuhan in China which subsequently became pandemic around the world. In the proposed paper the author introduces a reverse transcription-polymerase chain reaction (RT-PCR) test the disease can be confirmed. [5] There has been a tremendous success in the field of medical data analysis by using deep learning-based artificial intelligence (AI) technology. Fast and fully automated detection and classification of COVID-19 is done by using a supervised deep learning framework. As it results in high accuracy, precision, and AUC for the classification.

Y. Oh explains to analyze chest X-ray (CXR) image for COVID-19 diagnosis and patient triage is becoming important in this case they have used artificial intelligence in the global pandemic of COVID-19. It is caused by the severe acute respiratory syndrome coronavirus 2. 3.3 million confirmed cases and 238,000 deaths has occurred till May 2nd, 2020, has it been declared as a global pandemic in less than four months since it was first case reported. The authors' addresses it is difficult to manage large data set for deep neural network training due to the emergent nature of the COVID-19 global pandemic. [6] The proposed network was trained stably with a small data set, provided comparative results with the SOTA method.

S. Rajaraman develops detecting pulmonary manifestation of COVID-19 with chest X-rays by using deep learning. Coronavirus was caused in Wuhan in the Hubei province in China and later it was spread worldwide. On March 11, 2020, Novel

Coronavirus disease was declared as the outbreak of a pandemic. [7] Difficulty in breathing has been revealed as an early indicator along with hyperthermia in the COVID-19 contaminate population. To detect the presence of the virus Reverse transcription-polymerase chain reaction tests are performed. In the proposed paper visualization studies are performed to validate the pruned model localization performance and the salient ROI used in classifying the input CXRs to their expected categories.

J. Kelly takes a trans-disciplinarian approach. The proposed paper was for all centralized office-based knowledge laborers in the Republic of Ireland to work from home as a result of the Global Covid-19 pandemic. It provides a very distinctive chance to test the impact of a shift to a completely distributed workforce. [8] The proposed research is very beneficial in the current Covid-19 pandemic environment. Open Science combination beyond that of the Republic of Ireland which could be used to hold up public sector and private sector organizations to provide more productive and learning workspaces after the Covid-19 pandemic.

A. Waheed expresses coronavirus (COVID-19) is a viral disease caused by severe acute respiratory syndrome coronavirus. To diagnose this infection chest X-ray and some certain health symptoms are combined. The proposed paper says that the accuracy of COVID-19 patient detection through the use of chest X-rays. [9] A substantial amount of training data is required for deep learning networks like convolutional neural networks. The proposed CNN architecture is used to classify the two classes there are COVID-CXR and Normal-CXR. 85% accuracy is gained by the proposed paper.

Y. Li describes coronavirus disease is highly contagious and has infected over 14.4 million people worldwide. Several researchers have reported insufficient sensitivities (that are high false-negative rates of RT-PCR for effective early diagnosis and subsequent treatment of presumptive patients. Exhibit respiratory is the symptom of most COVID-19 patients. [10] To help diagnose COVID-19 positive patients the non-contrast thoracic computed tomography (CT). The sequential selection may cause an expensive computation as the number of selection increases, and it is only evaluated on the binary classification task it will extend the method to the multi-class classification problem in the future.

III CONCLUSION AND FUTURE SCOPE

The related works to forecast the future infection rates of the covid-19 infection are analyzed in this research article. The recent epidemic of the covid-19 virus has been very critical. There have been increased infection rates of the Covid-19 virus that has proven to be highly fatal. The fatality is specifically targeted towards high-risk individuals, such as people with diabetes, elderly individuals, and persons with a history of respiratory illnesses. The infection spread has led to the medical institutes and hospitals working at maximum capacity. This has been problematic due to the sudden nature of the epidemic as it became highly fatal and infectious in a short period. As the governments and the medical professionals were not ready or prepared to face such an epidemic, it grew to monstrous levels. Therefore, to provide a solution to this problem a machine learning-based approach for prediction of the covid-19 has been intended. The technique utilizes Artificial Neural Networks and Fuzzy classification for the predictions. The methodology for the forecasting will be explained in much more detail in the upcoming editions.

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