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REVIEW OF AI/ML TECHNIQUES ON COVID-19

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Abstract— **COVID-19 has caused severe worldwide threat by taking away over 6 million lives. Artificial intelligence and machine learning methods are used significantly for fighting against this pandemic. For solving different problems of COVID-19, different AI/ML techniques are required. This article provides comprehensive review on different AI/ML applications on COVD-19. For classification, prediction, and diagnosis AI/ML methods have huge contribution. AI/ML methods for risk assessment of COVID-19 have also been narrated.**

Keywords— **Covid-19, Health care, AI, ML, Features.**

I. INTRODUCTION

In December 2019 novel Coronavirus was defected in Wuhan, China and gradually spreading as a pandemic [1]. It is still considered as a burning topic to investigate how it is transmitting into animal reserves & others [2]. Until beginning of the year 2021, there was no medication, vaccination against Covid-19. Though some restrictions like social distancing was emphasized as the most effective prevention control [3]. The COVID-19 has impact not only on life but also on economic stability of the nation [4]. Artificial intelligence (AI) machine learning (ML) [5] is well known efficient methods in the healthcare sector [6]. Healthcare generates a huge amount of data and this is the requirement of different analyzing tools increases. The various analyzing tools of AI continuously adapt their methodologies to adjust their behaviors. At the beginning, AI/ML identities the relevant keys and then remove redundant features. It uses different models of machine learning like Random forest and gradient boosted models & then measure the relative influence of the variables In [7], it is seen that air pollution has deep impact on COVID-19 fatality In [8] COVIDetectioNet was propose from the convolution and layers of AlexNet architecture, features are being generated. This consists of pre-learned in-depth features ensemble, feature selection & classification. For classification purpose support vector Machine (SVM) is used. Before classification it uses relief algorithm for the purpose of feature selection. For accuracy calculation, tenfold cross-validation method is used. For the prediction of COVID-19 cases from time series data, deep learning models are used. Different models such as long short-term memory (LSTM) are used for time-series data. Convolutional neural network (CNN) integrated with long short-term memory (LSTM) is used for the detection of COVID-19 [9]. For the objective of prediction on COVID-19 (SVM), LSTM and bidirectional LSTM and autoregressive integrated moving average (ARIMA) are being applied [10]. For feature extraction convolution neural network is used. Mean absolute error, R^2 score, root mean square error are the various performance matrices for measuring the performance of the models. In [11] it is disused that over fitting causes the reduction of accuracy. For discovery of new medicines as well as for the use of X- rays and Computational tomography (CT) scan, AI tools have been used. Using AI embedded thermal cameras and Smartphone; infected person can be detected [12]. For transportation of food and related helping aid to the affected areas, robots & drones are the inevitable solution [13]. For drug &vaccines related research role of AI is important [14, 15]

The rest of the paper is organized as follows. Importance of AI/ML approaches are explained in section II and cconcludingremarks are given in section III.

II. IMPORTANCE OF AI/ML APPROACHES

For Classification, Prediction, and diagnosis and for other type of warning message generation AI/ML techniques are used. Almost 50% models used ResNet for solving classification Problem. CNN models also have been used by researchers for classification. SVM and RF methods are useful tools for classification. For Prediction purpose the use of Regression analysis is noticeable. SIR model shown in Figure 1 and SEIR model shown in Figure 2 are the popular mathematical models. In SIR model [16] There are three compartments Susceptible (S) , infected (I) and recovered (R). An extra Compartment exposed (E) is added in SEIR model. For diagnosis purpose SVM and RF techniques are used. For Predicting risk status LSTM is used. In [17] Obaid et al. used LSTM. Using RF and

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regression method [18] the severity of disease can be predicted. In [19], a time series forecasting model was discussed. Table 1 [24] shows the AI/ML techniques for disease predictions.

To assess the risk of the pandemic AI/ML models play a significant role. To forecast the duration of the disease DL based models are used [23]. For disease transmission and prediction also DL based models are used. If risk assessment can be done early then the mortality of COVID-19 patients can be reduced.



Fig. 1. SIR Model

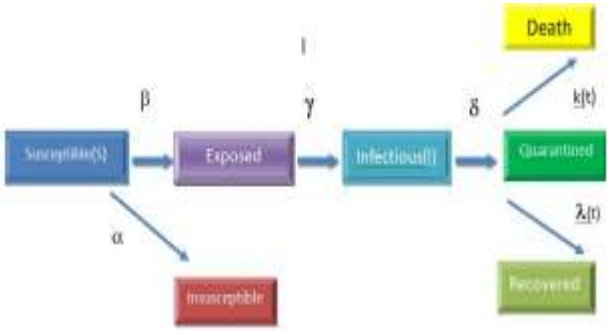


Fig. 2. SEIR Model

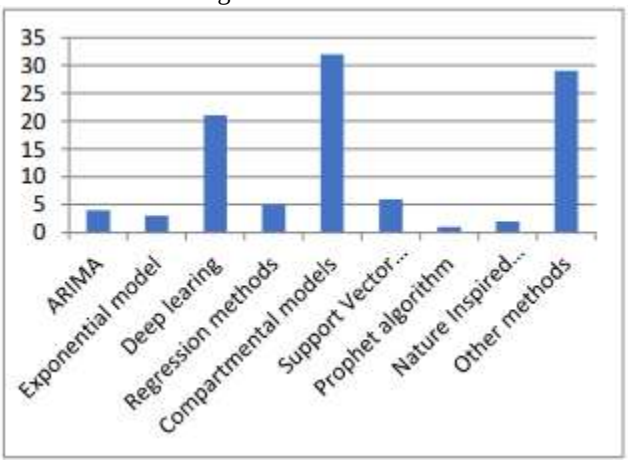


Figure 3 depicts the contribution of different approaches todetermine COVID-19 confirmed cases.

Fig. 3. Percentage of contribution of different solution approaches applied in the forecasting of COVID-19 confirmed cases

Table -1 AI/ML techniques in disease predictions

Study	Disease	AI/ML Method
[20]	Dengue	CTree
[21]	H1N1 Flu	Neural Network
[22]	Influenza	RF

Table – 2 AI/ML methods for risk assessment of COVID-19

Study	Objective	AI/ML technique
[23]	Predict the duration of the disease	LSTM
[25]	Transmission prediction	LSTM,RNN
[26]	Community-level risk assessment	GAN

Table 2 [24] depicts the methods for risk assessment of COVID-19. For providing alerts and warnings for COVID-19, AI tools are used widely. For predicting the outbreak of disease AI assisted bots are used [27]. "Health Map" bot that is developed in USA provides alarm for disease outbreak [28].

III. CONCLUSION

Artificial intelligence and machine learning methods are used significantly for fighting against COVID-19. For solving different problems of COVID-19, different AI/ML techniques are required. This article provides comprehensive review on different AI/ML application on COVID-19. For classification, prediction, and diagnosis AI/ML methods have huge contribution. AI/ML methods for risk assessment of COVID-19 have also been narrated.

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