CoronaGo Website Integrated with Chatbot for COVID-19 Tracking

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Abstract

The first cases of a typical pneumonia of unidentified ailment were reported on December 30, 2019, from Wuhan, China. After many researches, severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) is found as the main reason of the ailment and the problem has been named as COVID-19. The rapid spread of this virus resulted in the worldwide pandemic state. This global pandemic has made a devastating impact on several domains like education, business and others. There are many problems that the people are facing in this situation. The medical department staff are facing problem in providing medical assistance to the people in need, providing awareness among the people has become difficult, there are many people who need financial help and the list goes on. As of now, there are some websites and mobile applications to help the people to fight these problems. Here in this work, we are proposing a website incorporated with a healthcare chatbot for assistance & tracking the COVID-19 situation.

Keywords

COVID-19, Website, SARS-CoV-2, Global Pandemic State, Tracking

1. Introduction

Recently, an outbreak caused by the virus named SARS-CoV-2 has impacted the lives of humans very badly across the globe. The very first occurrence of COVID-19 was enlisted in December 2019 in China. The infection may outspread from bats to people through another median host and cause extreme respiratory disorder, described by strong man-to-man transferal through the air [4]. From that particular day, there's a rapid growth in the number of cases being registered daily. And the many countries were under lockdown for almost 3-4 months. During this period, people face many problems financially, medically. This global pandemic has even made a negative impact on the economy of most of the countries.

This global pandemic has made a devastating impact on several domains like education, business, and others. There are many problems that people are facing in this situation. The medical staff is facing problems in providing medical assistance to the people in need, providing awareness among the people has become difficult, many people need financial help and the list goes on. We need to solve the COVID-19 crisis and help people using technology.

As a collective solution to all the problems, we are proposing a user-friendly, reliable web application that includes a COVID-19 tracker, COVID-19 prediction, a Chatbot, and many other features which are solutions to some problems faced by people. We are trying to integrate an efficiently developed Chatbot, which can assist people to surf the website and also accurately answer the COVID-19 related queries they have.

On the internet, there are many applications, websites that are designed and developed to predict the COVID-19 outbreak. The models used various machine learning algorithms, deep learning algorithms and a few have used some statistical methods to do predictions. All these models provide acceptable accuracy but the development of the model is complex in nature. To eliminate the hassle included in the development of the model, we tried to design a simple mathematical algorithm, called Generic hypothesis algorithm to make the predictions without compromising on the accuracy of predictions.

This paper aims to design and develop a reliable and easy to use the web application

through which help can be offered to the people in need. The flow of development starts with the requirement analysis, finalizing the design of the application followed by the Chatbot, COVID-19 prediction model development, and then integrating all the developed components.

2. Related Work

In a pandemic like this, providing timely information to the public is very important. So, the authors thought of developing a COVID-19 tracker. A stage like Corona Tracker will help the public authority & specialists to spread checked articles, give updates to the circumstance, & backer great individual cleanliness to the individuals. They used the data from the John Hopkins University (JHU) which is a trusted source [1]. They used Susceptible-Exposed-Infected Removed (SEIR) model to do the predictions of COVID-19 outspread.

In [2], authors propose a system which screens individuals for disease. They used artificial intelligence (AI), digital artificial intelligence (AI), digital thermometers, mobile phone applications, thermal cameras, web-based toolkits for developing this system. This system gives data on infection pervasiveness & pathology, recognizes people for testing, contact following, & confinement. It neglects to identify asymptomatic people whenever dependent on self-detailed side effects or observing of fundamental signs, includes significant expenses & requires validation of screening tools.

[3] proposes a system that helps in tracking the people who might get infected with COVID-19. The developed can identify and track people who may have come into contact with the tainted individual utilizing worldwide situating frameworks, constant checking of cell phones, and wearable intelligent gadgets. As the system identifies the people who got in contact with the infected person, we can contact them, and ask them to take tests, isolate them to stop the viral spread to some extent. There are few disadvantages to the system like it can't track the exposed people when the device is offline, there is a scope for cloud breach.

In [4], the authors proposed forecasting models with logistic and prophet model to predict COVID-19. The data is collected from JHU, which released a dashboard at the country

level. Data is first fed into the logistic model and then cap value is given to the prophet model for forecasting. This paper concludes that a hybrid logistic and prophet model has been good in predicting the epidemic trend and it is also capable of predicting the number of infections that might occur across the globe or in particular country.

[5] proposes a system that can identify and track infected people and implement quarantine. To develop this system, technologies like artificial intelligence, digital recorders, quick response codes, and mobile applications are used. It helps in stopping the communal spread of disease. It fails to track infected people who don't carry their devices and the system also violates civil liberties.

[6] proposes a model that diagnoses infected people, monitors clinical status and also predicts the required capacity to provide telemedicine, virtual care services. This can be achieved by using artificial intelligence (AI) and machine learning (ML) techniques can be used for providing telemedicine, virtual care services. Sometimes the system may fail in diagnosis of disease and development of system involves high costs.

[7] proposes a telemedicine service which can be accessed and used by the people in all locations. Using services like this can reduce the number of people coming out of homes and that directly impacts the outbreak of COVID-19. For the disease diagnosis, virtual checkups and care authors used AI. System helps to transport the medicine to the particular patient at immediate from online booking but the transportation time may be large for some remote areas, which makes the patients into danger.

[8] proposes a model for anticipating COVID-19 threatening movement with AI methods. The proposed model can be viably utilized for discovering the mellow patients who are anything but difficult to weaken into extreme/basic cases, so such patients get convenient therapies while reducing the restrictions of clinical assets. There's a scope for wrong predictions and this leads to the wastage of medical facilities.

Chatbots may be highly useful in pandemic situations like this because people want to know where, how and at what rate the infection is spreading. But information dissemination, symptom monitoring, providing mental health support are challenging tasks in the

development of these chatbots [9]. If the chatbots are designed and developed in an efficient way they can solve the problem of misinformation, which is one of the major problems in the pandemic situation.

In [10], authors proposed a forecasting model which can predict number of confirmations, recoveries and deaths registered because of COVID-19. Prediction models such as the PA, ARIMA, and LSTM algorithms were used to predict the number of COVID-19 confirmations, recoveries, & deaths over the next 7 days and acquired prediction accuracies of 99.94%, 90.29%, and 94.18%, respectively. Under this paper they also propose a diagnosis model using VGG-16 to detect COVID-19 utilizing chest X-ray images. The model allows the rapid & reliable detection of COVID-19, enabling it to achieve an F-measure of 99% using an augmented dataset.

[11] proposes a system that works for limiting the COVID-19 transmission, increase health care providers capability and capacity; prevent/predict the future outbreaks. For this system they used telemedicine, tele-critical care, tiered tele-mentoring. This system makes sure that the patient gets convenient healthcare from the comfort of their own home. This might be good for treating patients with small diseases like flu or general fever but are not efficient to treat people with some serious health issues.

Lately, social media is considered as one platform to share information to have maximum reach. To make use of this fact the authors have come up with an idea of bringing awareness and social control in the public using social media [12]. They used smart phone thermometers instead of the regular apparatus and they also used cough type detection using an extensive set of acoustic features applied to the recorded audio. This might not require huge investments but requires a lot of time to do all the campaigns and show visible results.

The authors [13] propose a system that can-do disease diagnosis using the radiology images. AI & deep learning are some of the techniques that they preferred to use in building this system. This system helps in decreasing the exposure of patient to radiation and it requires no preparation but it is more expensive compared to the radiography and provides basic anatomic information for only a few tissue densities.

As mobile partnership has widely increased in the recent years, the authors came up with the

idea of developing mobile applications to track their health. To do this they proposed usage of GRU neural network, SEIR model and other techniques [14]. The cost of development is high and it's a challenge to collect useful prospective data from social media.

[15] proposes a system that predicts the patient's health condition using XGBoost classifier, machine learning based CT radiomics models. The predictions are made based on the patient health records submitted. Having access to the health records helps in studying the case properly and treat them in the best way possible. Besides the advantages this model also has its disadvantages as the system requires large amount of private data.

In [20], authors suggested a model which will be very helpful to analyze the expansion of COVID-19 utilizing Multilayer perceptron, Linear regression & Vector autoregression approaches on a publicly available COVID-19 Kaggle dataset for COVID-19 cases in India.

[21] introduced a modified Random Forest model hybridized via the AdaBoost method for COVID-19 patient fitness forecast.

[22] tried to find out possible Statistical Neural Network (SNN) models along with their advanced methods for COVID-19 mortality prediction in Indian context & predict COVID-19 death cases.

3. Proposed Approach
3.1 Objectives

The main objective of the web application is to help every user in this crisis situation. The objectives are like giving government helpline numbers to the citizens, then finding top most affected places in India and Tamil Nadu, then to provide COVID-19 tracker to find state case details and also connect contributor and receiver in the crisis.

The chatbot assistant helps in getting every objective by means of chat. Then also helping users in providing every guideline provided by world health organization (WHO).

3.2 Architecture Diagram

The figure 1, presents the architectural diagram of the proposed system. In this approach the user will have to go to the CoronaGo website and there he will get a forum, which is linked various contributing & receiving units. The website is also having a

prediction & mask (3D) ordering system. A healthcare chatbot is incorporated in the website which is linked with the various helplines units for COVID-19, one can check

the hotspot places of India (specially Tamil Nadu) due to COVID-19, a COVID-19 tracker is also linked with the website.
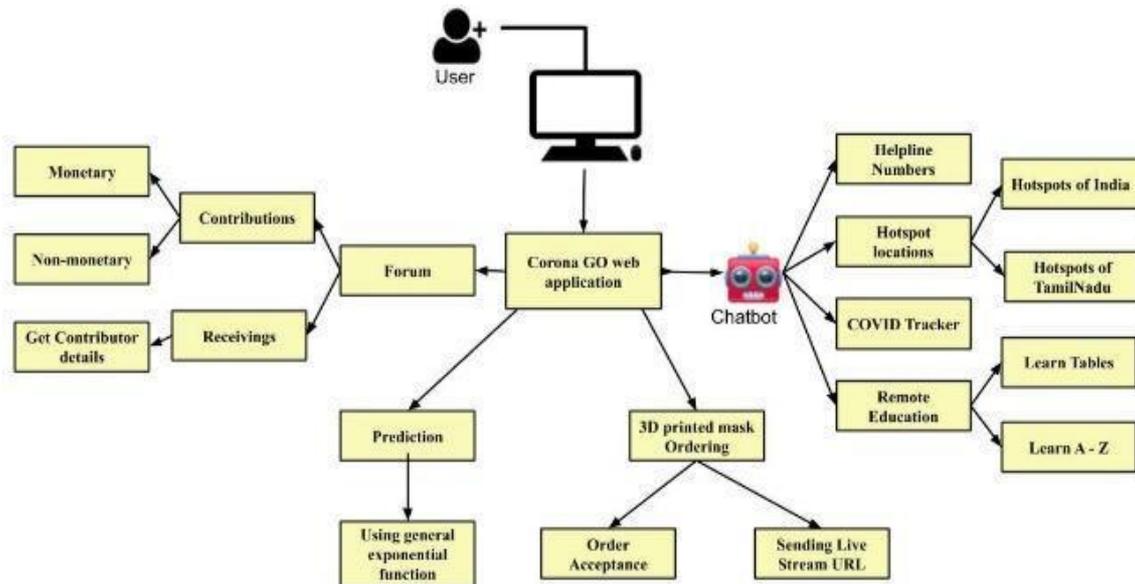

Figure. 1 Architecture diagram of our application

3.3 Methodology

We approached solution for the pandemic situation using web application development with 3 major functionalities like NLP Chatbot Integration, automating our 3D printer and sending live print stream using Raspberry Pi 3, forecast predicting the cases using exponential function and forum for more.

NLP Chatbot Integration

We built Chatbot using Dialog flow console works with the help of google cloud. This NLP chatbot is a fully automatic chatbot where input gets invoked and response trained are processed and sent by google cloud. The invoking phrases are trained, then the trained inputs processing can be manipulated using fulfillment coding using node.js program and the response for the input phrases are also trained accordingly.

The Chatbot in this application helps in getting,
- ❖ Government Helpline numbers
- ❖ Remote Education
  - o Learn A – Z (which for children under age of 6)
  - o Learn Tables (for above age of 7)
- ❖ Hotspot Locations and COVID-19 Tracker

India's states and union territories helpline numbers are trained, then by invoking state or union territory name we will get their state's helpline number as a response.

Remote education is machine learning based where the data are trained and used according to the node.js program we coded.

The Hotspot locations we get from the developed chatbot was developed by node-red console in that using world map node, we marked the Top 10 affected locations using their latitude and longitude coordinates by getting dynamic API which was developed by reusing the JHU's API.

The COVID-19 tracker is developed with the help of JHU API.

The Chatbot is integrated in web application as a widget by using Botcopy to make the widget as a script which connects with the google cloud directly to invoke the input phrases.

3D Printer automation using IoT

We used Raspberry Pi 3 to automate our 3D printer using octopi application and configured our 3D printer with that application. Then connecting Raspy Cam with Pi then enabling camera features in terminal. Later when we receive order from the web application, we will be sending the live stream URL of 3D printing

of their own order through mail and also in SMS. The streaming is prepared by coding the spaghetti detective plugin connection in Raspberry Pi, so that the customers can watch their mask printing lively and give feedback to us.

Forecast Prediction of cases

The forecast prediction of COVID-19 cases is prepared by using general exponential function. We used this mathematical function because the cases in America is increased exponentially, so rather for every country it applies. So, after getting 10 days of case details we will be dividing every 2 days total cases (2 points in a graph) the resultant will be its growth factor. For that 10 days we will be getting 5 growth factors and taking mean for that growth factors. Then using the exponential function $Y = abx$

where a is the current total cases, b is the mean of growth factor and x is the number of predication days we want to predict. By using this general exponential function, we got around 89 to 92% of accuracy in prediction.

Forum

In this which we used Laravel php framework to develop a contributor tab for contributing and receiver tab for needy, where contributor can contribute money to PM funds or non-monetary things like mask, dry ration or food by updating their region details. So, the receiver tab contains form asking for region and display the contributions present in that region and the needy can request the contribution the contributor will receive the request mail from our team and they will send the location to collect the contribution.
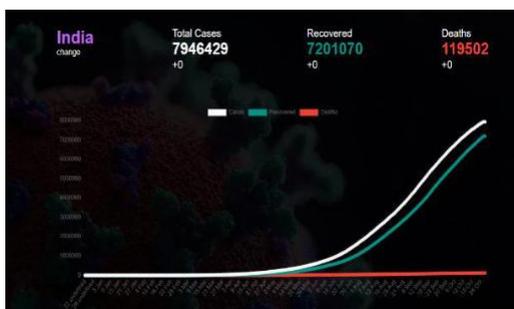
4. Result

Figure 2. Our proposed system

Figure 2 presents the result of the COVID-19 tracker we developed using JHU dynamic API, with HTML, CSS & JS coding. The result from this tracker will be more accurate because of the certified JHU API.

Figure 3 is the result of the Hotspot locations we developed; this result was developed using Node-red console with the help dynamic API of JHU, but the data we get from that API was coded accordingly for our idea to get only top 10 locations of India affected by Corona which also gives the coordinates and case count details within the location pin.

Figure 3. Hotspot Location

5. Conclusion

The advancement of the web technologies and techniques are used in this website. The planned requirements and functions are achieved in the development of this project. This project helps the user in getting most of the information's majorly needed during this pandemic situation. The proposed systems are mostly a single major feature application, but we combined everything together and made it work it as a light weight application. This is also has been developed in android for converting into a app.

In future we can make chatbot more accurate and efficient, the geofencing concept can also be added. Then in Android still more upgradations can be done. The deep learning predication can also be integrated in web application in future.

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