COVID-19 INDIA Symptom Checker
International Conference on Machine Learning (ICML 2020)

Anonymous Authors[1]

Abstract

It is by now clear that the global COVID-19 pandemic has had a wide-ranging impact on the world. Owning to the fact that symptoms of COVID-19 do not appear immediately upon contraction (and can take up to 14 days after exposure), and that the disease is highly contagious, the rate at which cases are increasing day-by-day is exponential. Only if people had been made more aware and precautious if they were susceptible to the disease so that they had practiced social distancing and had not spread the virus to other people through them, the situation would have been a lot better, which is why, it has become all the more important now to build this awareness, thereby not aggravating the situation further. To this end, the author proposes **COVID-19 INDIA - Symptom Checker**, a chatbot prototype designed specifically for Indian residents, that identifies whether a user is likely to contract the disease or not by asking a few multiple choice-based questions.

1. Introduction

Coronavirus disease 2019 (COVID-19) is a contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (1). It has been a global concern after first being reported in Wuhan, China in December-2019. On 11 March 2020, with more than 118,000 coronavirus cases in 114 countries, and 4,291 people losing their lives, WHO Director-General characterized COVID-19 as pandemic (2). As of 8 June 2020, more than 6.98 million cases have been reported across 188 countries and territories, resulting in more than 401,000 deaths. However, more than 3.13 million people have recovered (3).

[1]Anonymous Institution, Anonymous City, Anonymous Region, Anonymous Country. **AUTHORERR: Missing \icmlcorrespondingauthor.**

Preliminary work. Under review by the International Conference on Machine Learning (ICML). Do not distribute.

Table 1. COVID-19 INDIA Statistics

DATA SET	NAIVE
CORONAVIRUS CASES	257,486
DEATHS	7,207
RECOVERED	123,848
DISCHARGED	117,655

Table 1 shows the statistics regarding COVID19 cases in India as of 8 June 2020, 02:34 GMT (4). Figure 1 depicts the number of coronavirus cases with time (4). Figure 2 depicts the number of confirmed cases per million residents across different states in India (Wik, 2020).

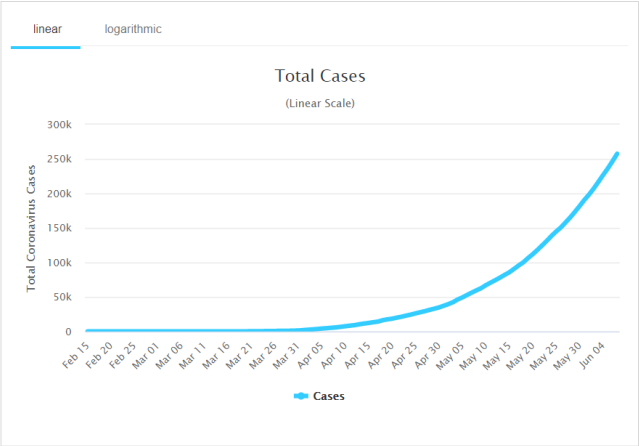

Figure 1. Coronavirus Cases in India with time

Researchers have been drawing comparisons of this highly contagious virus with the SARS coronavirus (SARS-CoV), to find out reasons to why this virus is spreading at such a massive rate. Dr Nivedita Gupta, Indian Council of Medical Research (ICMR) says that coronavirus can spread easily between people in close contact of within six feet with one another (Swa, 2020). Dr Surya Kant, Professor and Head of Department of Respiratory Medicine, King George's Medical University (KGMU) Lucknow has said that a person can easily transmit to other people once he/she becomes a

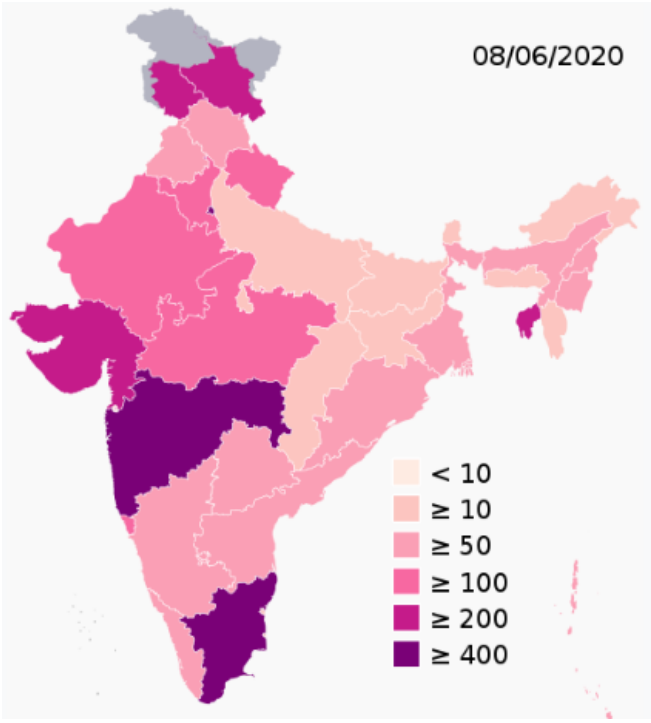

Figure 2. Confirmed cases per million residents across different Indian states

carrier of the virus. These affected people can then further spread to other people, leading to a pyramid effect (Swa, 2020). It is also known that COVID-19 symptoms may take as long as 14 days to appear after exposure to the virus (CDC, 2020d).

In such a case, only if people are made more aware of the symptoms earlier, and consequently advised to take precautionary measures and practice social distancing, can we try reducing the growth in cases, thereby alleviating the pandemic. To make people aware of the likelihood of contracting the disease, the author has designed COVID-19 India Symptom Checker – a chatbot prototype that identifies whether the user is susceptible to coronavirus or not, by asking a series of rule-based multiple-choice questions on how the user feels in time and his/her medical history.

Indian residents, especially poor people and those from rural areas are more likely to suffer from the pandemic because of the following reasons:

1. They may not be able to gather updates about the pandemic because of lack of resources.
2. They may not be able to buy protective equipment like masks and sanitizers because of lack of money.
3. There may not be a testing centre in rural areas, or it may not be able to accommodate many patients.

These reasons can lead to a low recovery rate, and such cases may result in unfortunate deaths, which is why, the application aims to help Indian residents around such problems, to be made more aware of their susceptibility. At the same time, such people may not know to read in English language but only in their regional language and so the application is made available in multiple languages written and spoken in India.

The application runs in regional language (based on user's location where the application is run) of the user automatically as soon as the application is launched. At the end of the questionnaire, the application lists details of a testing centre in his/her state and also details of testing centres available in India, according to Indian Council of Medical Research (ICMR) (Cur, 2020).

2. Literature Review

A number of preparedness tools have been designed by the Centers for Disease Control and Prevention (CDC) to battle COVID-19, some of which are:

COVID-19 Surge Tool (CDC, 2020e): It is a spreadsheet-based tool that hospital administrators and health officials can use to estimate the sudden increase in demand for health-related services during the COVID-19 pandemic. The tool can be used to determine the number of COVID-19 patients that need to be hospitalized, requiring ICU care, and requiring ventilator support, which can then be used to compare with hospital capacity.

Hospital Preparedness Tool (CDC, 2020a): To prepare for increasing number of patients affected with COVID-19, thereby maintaining healthcare services during the pandemic, all hospitals are required to adapt the COVID-19 Hospital Preparedness Checklist to meet its unique needs and circumstances. This checklist serves as a tool for hospitals to assess and improve their preparedness for responding to an outbreak like COVID-19, and also to evaluate current plans or developing a comprehensive preparedness plan.

Non-COVID-19 Care Framework (CDC, 2020b): Although CDC recommend that healthcare systems prioritize visiting patients and delay elective care to mitigate the spread of COVID-19 in healthcare settings, there has been an under-utilization of critical medical services for patients with non-COVID-19-related urgent and emergent health needs. This tool serves the purpose of providing healthcare systems with a framework to deliver non-COVID-19 health care during COVID-19 pandemic.

Innovaccer's COVID-19 Management System: With virtual care being all the more critical as the number of COVID-

19 cases continues to rise, Innovaccer's COVID-19 Management System provides automated assessments, education, remote patient monitoring, treatment, and most importantly, a safer environment for healthcare workers with teletherapy and dedicated customer support.

3. Method

The author has used the open-source code made available by Mr Dylan Kuo on Github (Kuo, 2020) as the starting reference for the work. The open-source code is a general COVID-19 Symptom Checker based on COVID-19 Protocol used with CDC Coronavirus Self-Checker (CDC, 2020c) available in English language and has details of testing sites in Massachusetts.

The author has used this work to customize it for India specific case by adding the following additional features:

1. Making it available in multiple languages written and spoken in the country
2. Identifying the location of the user using his/her IP address and accordingly running the application and his/her regional language
3. Based on user location, determining a testing centre nearby his/her region and listing its details if concluded susceptible
4. Adding details of testing sites in India

The file device_tracker.py consists of three functions with the following purposes:

1. display_ip: Function to print GeoIP Latitude Longitude using Requests – HTTP Library for Python.
2. find_location: Based on latitude and longitude coordinates found through the above function, this function identifies the State of India to which those coordinates belong. This is done by searching for every state in the text string and considering the one in which it is found.
3. find_lang_id: Based on the state found through the above function, this function identifies the prominent language spoken in the state and consequently finds its language id for the Googletrans python library. For languages which are not available in Googletrans package, the application will be run in English which is kept as a default language.

The file **covid19-checker.py** uses the above python script to identify the language in which the application should be run based on user's location. A series of multiple-choice based questions with three options (1 – Yes, 2 – No and 3 – Not Sure) are asked to the user. Based on user's responses and COVID-19 Protocol by CDC, the application concludes whether the user is likely to contract the disease or not, and accordingly advises to either visit a nearby centre at the earliest or practice self-isolation.

To list the details of a nearby testing centre, the application uses the user's location to identify his/her state that he/she lives in and accordingly lists the Name, Address and Contact-Number of a testing centre available in that state.

Lastly, the application also lists details of all testing centres in India, to make the user aware of available testing centres in India. Though the list is not exhaustive, it highlights information of at least one testing centre in each state, according to the Indian Council of Medical Research (ICMR).

4. Experiments and Human Studies

According to Census 2011, roughly 69 per cent of the country lives in rural areas. The National Health Profile 2019 data shows, of India's 26,000 hospitals, approximately 21,000 were in rural areas and 5,000 in urban areas. This means that 73 per cent of the country's government hospitals are located in rural areas (DelhiMarch 6 et al.). Although a majority of hospitals are located in rural areas, not all of these are made COVID-19 testing centres. Furthermore, there is only up to a certain extent that such centres can accommodate patients.

Different type of face masks available in India are (16, 2020):

1. Cloth face masks
2. Medical (non-surgical) masks
3. Surgical masks
4. Filtering facepiece respirators such as FFP and N95 masks

Out of these, N95 masks are the costliest while surgical masks are the cheapest with prices ranging below Rs. 5/mask. Although surgical masks or cloth face masks are quite cheap, poor people or those living in rural areas might not be able to buy enough of them due to lack of money or unavailability.

Owning to the above reasons, it is crucial to emphasize awareness among such people who are 'disadvantaged' in such ways. And so, the author has experimented incorporating features in the application which do not pose any barrier in terms of technology and language. The application is simply made using **Python3** with **GeoPy** and **Googletrans** libraries, and so involves a small memory usage.

To incorporate details about testing centres in India, the author has referred to this link (Cur, 2020). The author has created a database listing the name, address and contact-number of testing centres mentioned in the above link, at least one from each state. Finally, the author also provides details about the testing centre located in the state of the user running the application, by tracing his/her location, in order to facilitate diagnosis in the least amount of time.

5. Results

The following is the anonymized GitHub link for the source-code of this work: **https://anonymous.4open.science/r/6a1f04e7-8082-4894-9543-2810103db789/**

The code can be run in Google Colab or a local machine. However, if the user runs the code in Google Colab, the application will be run in English, which is its default language, because it will not be possible to track the user's location. For all the Indian languages that are supported by Googletrans package like – Hindi, Marathi, Gujrati, Punjabi, Bengali and others, the code will run in them in case the user happens to be in a location, primary language of which is one of these.

Figure 3 and 4 show snapshots of the application running in English and Hindi - the official languages of India. The default language of the application is English. For a user outside India, or in a region whose regional language is not supported by the Googletrans package, the application will run in its default language.

```
Hi there, I'm FauciBot!
Welcome to COVID-19 Checker.
If you are experiencing life-threatening symptoms, call 112 immediately!

== Disclaimer ==
This tool is not intended to be a substitute for professional medical advice,
diagnosis or treatment.
By using this tool, you attest that you are at least 18 years old and agree to
related Terms and Conditions of Use and Privacy Policy.
Next, you'll see a series of Yes/No questions designed to evaluate your condition
and provide guidance.
Let's get started.

FauciBot: Are you 18 or older?
1-Yes  2-No  3-Not sure   >>1
FauciBot: Got it.

FauciBot: Now for the next question, are you 60 or older?
1-Yes  2-No  3-Not sure   >>
```

Figure 3. COVID-19 Checker, English Language

For a user residing in a state where Hindi is the regional language, the application will automatically start in Hindi language as shown in Figure 4. Likewise, for a user residing in West Bengal or Maharashtra, the application will run in Bengali and Marathi respectively.

At the end of questionnaire, the application lists the details

```
नमस्कार, मैं FauciBot रहा हूँ!
COVID -19 परीक्षक में आपका स्वागत है।
आप जीवन के लिए खतरा लक्षणों का अनुभव कर रहे हैं, 112 तुरंत फोन!

== अस्वीकरण ==
यह उपकरण पेशेवर चिकित्सक की सलाह, निदान या उपचार के लिए एक विकल्प होने के लिए इ
रादा नहीं है।
इस उपकरण का उपयोग करके, आप प्रमाणित करते हैं कि आप कम से कम 18 वर्ष है और
संबंधित नियम और उपयोग की शर्तों और गोपनीयता नीति से सहमत हैं।
फिर, आपको अपने स्थिति का मूल्यांकन और मार्गदर्शन प्रदान करने के लिए डिज़ाइन हां / नहीं प्र
श्नों की एक श्रृंखला दिखाई देगी।
आएँ शुरू करें।

FauciBot: यदि आप 18 वर्ष या उससे हैं?
1-हाँ 2-नहीं 3-सुनिश्चित नहीं हैं कि >>1
FauciBot: समझ गया।

FauciBot: अब अगले प्रश्न के लिए, आप 60 या उससे अधिक है?

1-हाँ 2-नहीं 3-सुनिश्चित नहीं हैं कि >>
```

Figure 4. COVID-19 Checker, Hindi Language

(Name, Address and Contact Number) of a testing centre in the state of location of user as shown in Figure 5, in order to facilitate medical diagnosis.

```
Based on your responses, it seems like your situation is urgent.
You should go to the nearest Emergency Room. If you cannot safely get there on
your own, call 112.
IMPORTANT: You should call ahead to make sure the ER can prepare for your
arrival.
Be sure to tell them that you were potentially exposed to the coronavirus and
you also have severe difficulty breathing.

************************************************************

COVID-19 Testing Site nearest to you
```

	State	Name	Contact	Address
6	Delhi	All India Institute Medical Sciences, Delhi	011 2658 8500	Sri Aurobindo Marg, Ansari Nagar, Ansari Nagar...
7	Delhi	National Centre For Disease Control, Delhi	011 2391 3148	22, Sham Nath Marg, Civil Lines, New Delhi, De...

```
************************************************************
```

Figure 5. Details of Testing Centre nearby user's location

Finally, it lists the details of testing centres in each state of India as shown in Figure 6, in order to make the user aware of availability of different testing centres in India.

6. Conclusion

The author has tried experimenting in building a COVID-19 Symptom Checker application aimed at the rural population of India to make them aware of the COVID-19 symptoms and accordingly take precautionary measures. The author has experimented over the original implementation by making it available across multiple languages written and spoken in India and running the application in the user's regional language identified by tracking his/her location. Finally, the author details about COVID-19 testing centres in India.

COVID-19 Testing Sites in India

	State	Name	Contact	Address
0	Andhra Pradesh	Sri Venkateswara Institute Of Medical Sciences...	0877 228 7777	Alipiri Rd, Sri Padmavati Mahila Visvavidyalay...
1	Andaman & Nicobar Islands	Government Medical College, Anantapur	08554 249115	Rahamat Nagar, Anantapur, Andhra Pradesh 515001
2	Assam	Gauhati Medical College, Guwahati	0361 213 2751	Narakasur Hilltop, Bhangagarh, Guwahati, Assam...
3	Bihar	Rajendra Memorial Research Institute Of Medica...	0612 263 6651	Agam Kuan, Sadikpur, Patna, Bihar 800007
4	Chandigarh	Afc Urgent Care Arlington	0172 274 7585	Madhya Marg, Sector 12, Chandigarh, 160012
5	Chattisgarh	All India Institute Medical Sciences, Raipur	077125 72240	Great Eastern Rd, Aiims Campus, Tatibandh, Rai...
6	Delhi	All India Institute Medical Sciences, Delhi	011 2658 8500	Sri Aurobindo Marg, Ansari Nagar, Ansari Nagar...
7	Delhi	National Centre For Disease Control, Delhi	011 2391 3148	22, Sham Nath Marg, Civil Lines, New Delhi, De...
8	Gujrat	B.J. Medical College And Civil Hospital	079 2268 0074	Haripura, Asarwa, Ahmedabad, Gujarat 380016

Figure 6. Details of Testing Centres in each state of India

7. Future Scope

The author plans to convert this into a web-based application using Flask and subsequently to a smartphone-based application. Currently, the protocol is rule-based, but the functionality could be escalated to the usage of sophisticated tasks in NLP like building end-to-end dialogue systems.

References

Coronavirus Disease 2019 (COVID-19) - Symptoms and Causes. URL https://tinyurl.com/toucw96.

WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. URL https://tinyurl.com/vyvm6ob.

Arcgis dashboards. URL https://tinyurl.com/uwns6z5.

India Coronavirus: 265,928 Cases and 7,473 Deaths - Worldometer. URL https://tinyurl.com/tqy8knj.

Face masks during the COVID-19 pandemic, June 2020. URL https://tinyurl.com/y7782drx. Page Version ID: 961512419.

Covid-19: list of 52 testing centres in india & what you need to know before going for a test, March 2020. URL https://tinyurl.com/qo8ppxz.

Why does coronavirus spread so easily? Experts explain | news, March 2020. URL https://tinyurl.com/yddxadwf.

COVID-19 pandemic in India, June 2020. URL https://tinyurl.com/y7rsxeaa. Page Version ID: 961244579.

CDC. Coronavirus Disease 2019 (COVID-19), February 2020a. URL https://tinyurl.com/ybqh6cl3.

CDC. Coronavirus Disease 2019 (COVID-19), February 2020b. URL https://tinyurl.com/y7vbrpz9.

CDC. Coronavirus disease 2019 (COVID-19) – symptoms, May 2020c. URL https://tinyurl.com/sj3ssz2.

CDC. Coronavirus disease 2019 (COVID-19) – symptoms, May 2020d. URL https://tinyurl.com/sj3ssz2.

CDC. Coronavirus Disease 2019 (COVID-19), February 2020e. URL https://tinyurl.com/y73w6mga.

DelhiMarch 6, N. R. N., March 6, U., and Ist, . . Rural population in India defenceless against coronavirus threat. URL https://tinyurl.com/sgey59l.

Kuo, D. Dylan-kuo/covid19-checker, May 2020. URL https://github.com/dylan-kuo/covid19-checker. original-date: 2020-04-06T23:05:04Z.