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COVID-19 track Application using Flutter

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Abstract: Every nation is now trying to deploy an interactive platform for creating public awareness and share the necessary information related to COVID-19. Keeping all of these in mind, authors have deployed an interactive cross-platform (web/mobile) application GO-COVID for the ease of the users, specifically in India. This dashboard is featured with all the real-time attributes regarding the novel coronavirus disease and its measures and controls. The system deliberately aims to maintain the digital well-being of the society, create public awareness, and not create any panic situation among the individuals of the society. The application uses modern AI-ML tools to analyze the disease among the individuals with the help of an informative test and has also deployed a chatbot for user ease of interaction. The application also collects the geo-location and other necessary historical data to ensure your safety and distancing from the affected personals. The same is also used to backtrack the ones affected and perform tests. All of these features enable the app to compete with the pandemic in this modern world

Index Terms **- COVID-19, mobile application, Artificial Intelligence-Machine Learning (AI-ML) tool, chat-bot, geo-location.**

I. INTRODUCTION

Nowadays, wireless communication in terms of mobile technology is an essential part of our life. This technology is now the guiding force for human life to perform any activities. Again, in this pandemic situation, fake news prevention and distribute genuine information, i.e., information regarding public awareness, test centers, geotracking, etc. to everyone in every time with minimum expense, it is perhaps the biggest challenge to any administration all over the world. Mobile technology is the only one stop solution for everything above mentioned problems. In response to this ongoing public health and economic emergency, we developed and deployed an interactive dashboard accessible online, to visualize and track reported cases of coronavirus disease 2019 (COVID-19) in real-time. The dashboard illustrates on the location and number of confirmed COVID-19 cases, deaths, and recoveries for all affected in a country, state as well in a district.

The dashboard is implemented for the common people, public health authorities and the researchers to provide a user-friendly tool to track the outbreak as it gets opened. The dashboard is entitled with many unique features such as geo-tracking to map the relationship diagram, catboat for test-oriented queries, graphical representation of the data for user ease, and the recent news & blog section are considered for future enhancements. Keeping all of these complex features in mind we have used all the promising technologies to build the mobile application as well as a web application. The speed and security are also enhanced by using decoupled cloud architecture for the entire system (i.e. separating the client-side cloud and the server-side cloud). The use of modern ML [XVII-XVIII] tools has also made this system advanced from the others. The dashboard is capable to report cases at the state level, city level and at the country level in INDIA. The COVID-19 related data published on the dashboard aligns with the WHO situation reports and the Ministry of Health and Family Welfare, Govt. of India for within and outside of INDIA, particularly.

Related Studies

In this research, authors have restricted themselves from studying the mobile applications used now in India as our implemented app is showing useful information related to India. A brief review is presented here. The Government of India took the initiative and developed a mobile application named Aarogya Setu [XIV] to connect essential health services with the people of INDIA. Basically, it is a mobile application; still, the use of web views was found in the statistics display dashboard. They have also come up with a geo-tracking facility that helps the system to track the coronavirus affected people and form a cluster. APOLLO, one of the biggest medical giants in India, developed a risk assessment scanner for COVID-19 outbreak in INDIA and named it “covid.apollo247” [XII].

This risk assessment scanner comes with a tag line ‘Stay calm amidst the current paranoia surrounding COVID-19’ and is successful in reaching a major part of the society during this outbreak. The solution could efficiently predict the chances of risk (Low, Mid, High) of having positive coronavirus tress depending on multiple users given parameters using their ML algorithms A team of twenty plus members (teachers and students) from Mahindra Ecole Centrale developed a dashboard for smooth user experience and quality visualization of real-time data [XIII]. The website shows the real-time data of the infected, cured, and deaths in INDIA, though some

inconsistency is also observed in their application. Several graphs and charts are used in the website to visualize the data also at the district level, but more accuracy is expected concerning their results.

METHODOLOGY

The system model of the developed system is shown in figure 1; authors have used a decoupled architecture for our designed interactive dashboard Go-COVID. The entire model has divided into two major components the frontend and the backend. In the frontend, the user is provided with a cross-platform application (mobile/web), i.e., some Use Interface/User Experience (UI/UX), which requests data from the clientside cloud and displays the data to the user. It also collects the geo-location of the user to keep track of the user's social behavior and is used to backtrack the infected ones. Next comes the backend, which has a database and server-side cloud as its major components.

The data from public API, web scraping, real-time datasets is fetched and stored in the database. The database and the server-side cloud also communicate in a similar response for request manner. In contrast, the data communication between the client-side cloud and the server-side cloud is maintained by our responsive REST API's. Thus, it makes the full system unique, helpful, secured, and user-friendly with all the features entitled to the users in an optimized way. The proposed system is built on a cross-platform mobile application developed as a step towards making the general awareness of the people regarding the global pandemic due to COVID-19 on a nationwide scale. The Entity-Relationship Diagram (ERD) of the developed system is shown in figure 2. The architecture of the proposed solution is a decentralized one where the frontend or the client-side logic is separated from the backend or the server-side logic.

This approach allows the system to be more fast, efficient, and scalable. To connect the frontend with the backend, both deployed on two separate cloud computing platforms. The use of Representational State Transfer (R.E.S.T.) APIs plays a significant role in communicating between the client-side server and the database. In our proposed solution, the total number of active cases, confirmed cases, active cases, and deaths in the home page using the data provided from the backend database. We are also displaying nation-wide, state-wise and district-wise data of the

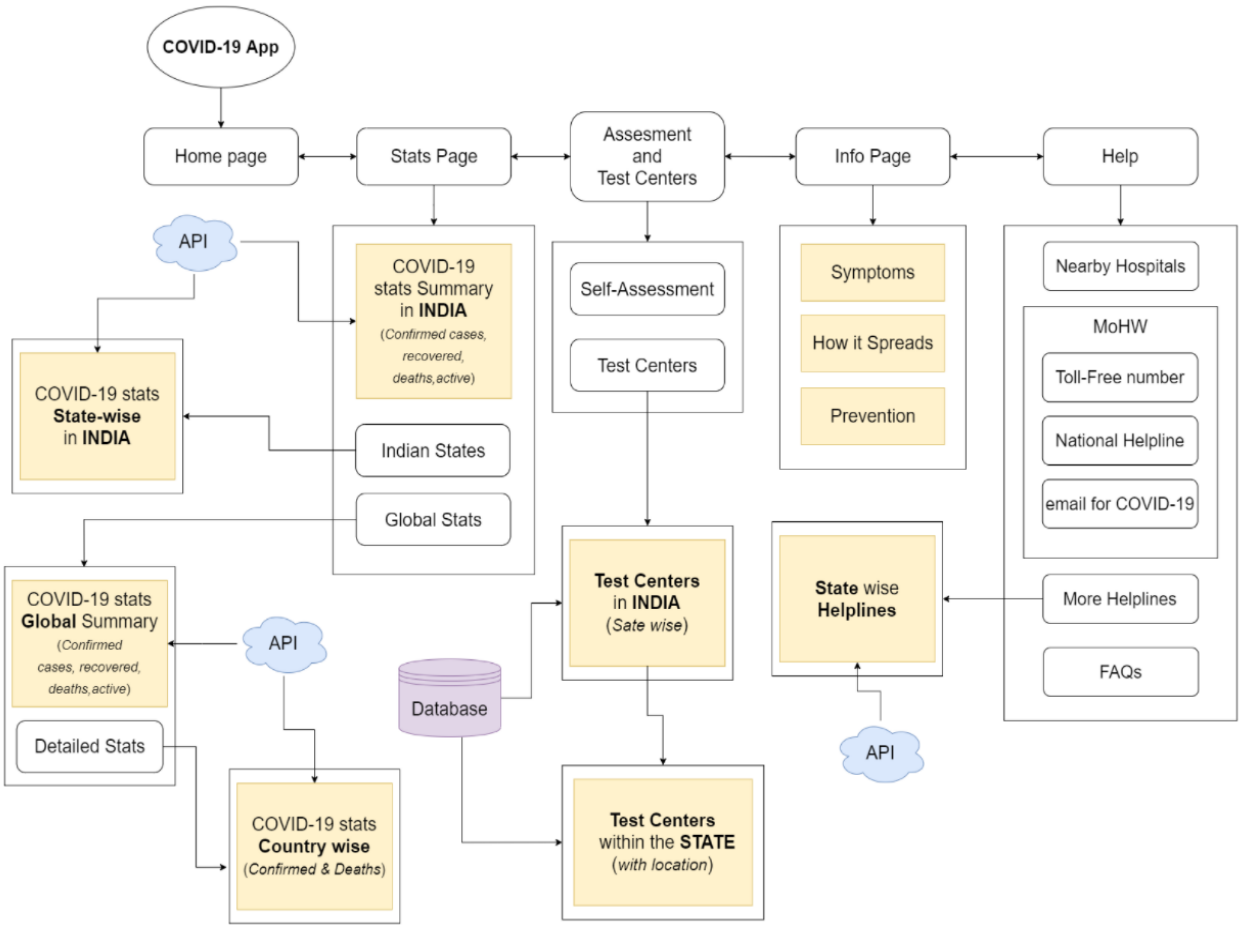


Figure. 1: Architecture of the developed cross-platform application (mobile/web)

number of confirmed cases with the use of geo graphs feature provided by Google Maps' API. With the use of chart.js, which is an open-source JavaScript charting library, we have created two other charts for better data representation. At first, we have created a pie chart that shows the total number of confirmed cases, active cases, and deaths. Another chart we have implemented is a line chart with multiple axes denoting the number of confirmed cases, recovered cases, and the number of deaths.

This approach allows the user, simple and easy access to the data in an understandable manner. All the necessary data is provided from the backend database. To make this proposed solution informative, we have also implemented all the government listed

COVID-19 test centres in a state-wise manner for the ease of the user. This feature is also implemented with the help of the geo-location feature provided by Google Maps' API.

MODELING AND ANALYSIS

Once a particular user selects its respective state and the test center nearest to him, from his current location, the shortest path will be displayed to him to the selected test center based on real-time traffic analysis. People can receive authentic news about COVID-19; the proposed solution also comes with a news section that displays news regarding COVID-19 only based on the user's current location. For quick and immediate suggestions on COVID-19 health-related issues, we have also implemented a chatbot, which allows the user to ask some basic questions, and the chatbot will provide an answer based on the most suitable feedback provided by our machine learning model.

After the conversation is over, our machine learning model generates the user's health condition as feedback to the user. As more and more time passes by, the machine learning model will be able to train itself on the cloud and provide more and more accurate results to the user. This approach provides a very interactive experience for the user, which is very easy to use also. Another key aspect of the proposed solution would be the use of geo-tracking. It allows the user to check all the people that they might have come in contact with if somehow the person is tested corona positive. All the people who have a chance to come in contact with that particular person can now have to be tested if they are corona positive or not, and if they are corona positive, they can be taken care of at the earliest.

Drawing from the two systems, the NHS and ACORN, the evident limitation of the C-19-C app that raises concern is the lack of proper identification mechanism. Both the NHS and ACORN carries extensive background checks during the registration process. This lowers the risk of exploitations of their systems by criminals to cause harm or loss to those who are in a vulnerable state. Though C-19-C is developed with other basic verification models such as a personal phone number and home address, there is a strong uncertainty in establishing that the user registered in the app are who they say they are. The system, therefore, can be exploited using fake ID which can lead to harm or loss of possessions to users. However, in collaboration with local authority or various organisations, identity verification can be integrated through APIs to carry out a background check against a trusted database to mitigate the risk of criminal exploitations.

FEATURES OF THE PROPOSED SOLUTION

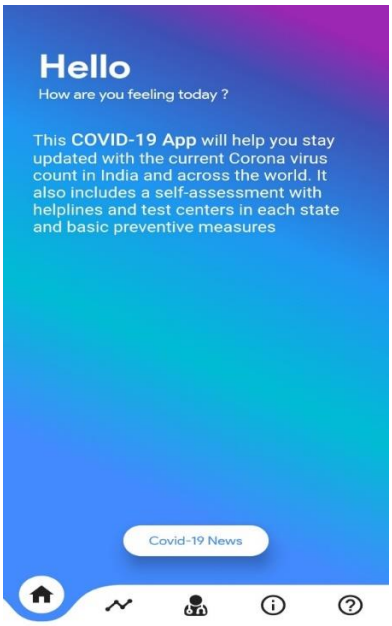
- Providing the total number of confirmed, active, recovered, and deaths on a national, state, and district level.
- A news segment to be able to read all the news related to COVID-19 in one place.
- The use of geo-graphs for the total number of confirmed cases in a user-friendly representation.
- Able to see all the test centers state wise.
- Use of Pie chart for better representation of confirmed, active, recovered, and death cases.
- Use of line graph for the day-wise representation of confirmed, active, recovered, and death cases.
- Use of chatbot for an interactive experience. • Able to predict health state based on the user’s condition.
- The use of geo-tracking to keep track of user’s health.
- To warn the user about the persons those with contacted the user, in case of any of they having corona positive

RESULTS AND DISCUSSION

We have implemented a mobile application that works for both Android as well as IOS for the ease of the user. The mobile application is based on the Flutter framework using Dart as the primary language. The fetching and updating of data are done using representational state transfer (Rest API), which is done using python on the Django framework. The application mainly consists of an array of graphs used to make the users aware of the current scenario of COVID-19’s impact.

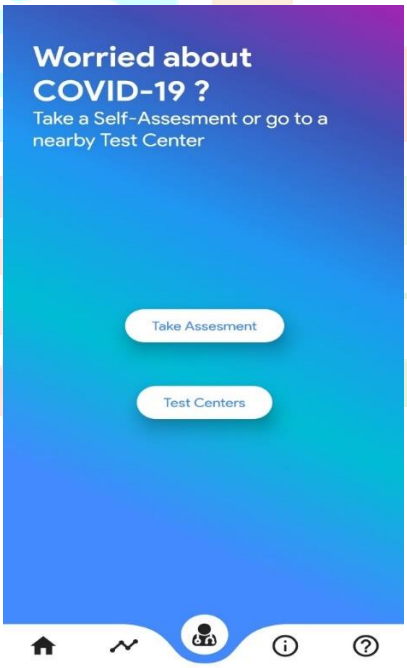
The graphs are listed below. The application is also integrated with a chatbot that uses modern machine learning and A.I. tools to predict the health condition of the user based on the input provided by the user. We are storing all the data gathered from their responses for training our machine learning model and providing the user with better results over time. Lastly, we have also provided a list of test centers for COVID-19 in a state-wise manner of India for the user to quickly locate the test centers in case of a medical emergency

SCREENSHOTS



(a)

(b)



(c)

(d)

1) The user can log in to the app using phone number. Each time the user logs in, a verification code is sent to their phone number via SMS, which they will need to use to put in the app to successfully log in. The verification screen is shown in Signup screen
3) An unregistered user can sign up to start using the application by filling the signup form which includes their first name, last name, and phone number. Also, they need to specify if they need help or they want to help. Finally, the user needs to confirm that they are at least 18 years old before they can start using the app.

Once the form is submitted, the user will be asked to verify their phone number to complete their registration process. The verification screen is shown in Fig. 4. 3) Phone verification screen (Fig. 4) This screen is shown when the user registers or every time the user logs in. This verification method will replace the password authentication so that the user does not need to remember their password as we believe that people need something that is as simple as possible to assist them during this uncertain and anxious time. 4) NH user main screen (Fig. 5) Basically, the app is designed in a way that both NH users and WH users share the same functionalities as we believe that even the people who want to help the community will probably need help in another time

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Therefore, a NH user can also help the others and a WH user can also ask for help. However, for the NH user, the Need help tab in the bottom navigation bar will appear first, while for the WH user, the Want to help tab will come first. 5) WH user main screen (Fig. 6) The users who preferred to help other people will see this screen first when the app starts up. 6) View help request details screen (Fig. 7 and Fig. 8) All users can see the details of a help request if it appears on their screen. However, only the help request owner can see the list of help offers made for their help request. The help request owner can also choose to accept one offer from all the offers they received. The other users who do not own the help request can see it details including what its owner needs help with. The address of the help request is not displayed publicly to anyone except the owner and the helper whose offer has been accepted by the owner of the help request.

CONCLUSION

The mobile application COVID-19 with the aim in mind to make the society aware in maximum capacity about the current pandemic situation of the nation due to the COVID-19. With the help of technological advancement, we can provide critical information to the people in their mobile phones with the ease of accessing it wherever they want it. Using the aid of modern Machine Learning algorithms and AI tools, we can predict the health condition of a particular user. In case of a medical emergency, our application helps a user to reach a test center using Google maps.

Considering the usefulness and impact of the dashboard, we are planning to extend this application further, i.e., the tool will provide similar information about the entire world regarding COVID-19. We strongly believe that in the early stage, this application plays a pivotal role in controlling the diseases. Thus, the advanced technology-based mobile application performs a significant role to combat against COVID-19.

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