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Tracking and Visualization of COVID-19 data using Cellular Application

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Abstract:

Coronavirus disease 2019 (COVID-19) is because of a brand-new coronavirus first identified in Wuhan, China, in December 2019. Because it is a brand-new virus, scientists are getting to know more every day. Although the majority who've COVID-19 have slight symptoms, COVID-19 can also cause intense infection or even demise. A few corporations, together with older adults and those who've certain underlying scientific conditions, are at accelerated risk of extreme contamination So monitoring and Visualization of COVID-19 cases and simply representing the information for a higher understanding of the COVID-19 instances around the world helps humans recognize the present-day state of affairs and to try this a cellular application is a fine way. In this article, we summarize and illustrate with examples the way to amass and visualize the statistics of the COVID-19 cases in a cellular application using Flutter. Our way of visualization will assist the healthcare and public works department to make appropriate decision.

Keywords: COVID-19, Flutter, Tracking, Visualization, Data gathering, Data Manipulation, Data Visualization, etc.

1.0 Introduction

The COVID-19 outbreak has put everyone in an unprecedented difficult situation that has made life around the world stop and claims thousands of lives. Due to the COVID-19 spread in 212 countries and territories and the increase in the number of infected cases and the death toll in 11,07,49,023 and 24,55,131 (as of 22 February 2021), it remains a real threat to the public health system [12] . On 11 February 2020, the World Health Organization announced an official name for the disease that is causing the coronavirus outbreak of the 2019 novel [6]. The new name of this disease is coronavirus disease 2019, abbreviated In COVID-19. In COVID-19, 'CO' means 'crowns', 'VI' for 'Viruses', and 'D' for the disease. Previously, this disease was defined as "New Coronavirus 2019" or "2019-NCOV". Coronavirus, named after the indigenous councils on its surfaces, is a large family of common viruses in people and many types of animals, including camels, cattle, cats, and bats. There are many types of human coronaviruses, some of which often communicate with light respiratory diseases. Caliber 19 is a new disease caused by a novel (or new) coronavirus, which is not yet visible in humans [9]. Infected Coronavirus rarely infected people and distributed among people. All three viruses have their origin in fleeting mice. W. Patal sequences are similar to the fact that China has initially published and offers a unique and recent unique emergency in this virus.

2.0 Related Work

Hellewell, J et al (2020) has proposed a stochastic transmission model caused by COVID-19 outbreak with Ro (basic reproduction number). Ro of 1.5 have shown that 50% of contacts could be traced successfully, Ro of 2.5 could traced 70% of contacts where as 3.5 could trace 90% contacts [10].

C. K. Leung et aal (2020) has presented big data visualization and visual analytics tool, a choropleth map for representing COVID data. A choropleth map uses different shading, colors or placing of symbols in order to represent the value of a property in those areas [7]. Data has been represented with frequent patterns of higher cardinality. Mai M et al (2019) has represented the analytics for extracting interesting information from data collected from social media [13].

Y. Zhou *et al* (2020) has proposed a two-level interactive visualization system using feedback which collects epidemic data from multiple sources and provide an interactive mode of multi-graph linkage [18]. Afzal, S. Ghani et al has supplied country-wide details such as population, demographics and hospital beds and demonstrated visual manner. This type of representation will be helpful for environment and public health department to take necessary steps in the avoidance of spread of the disease [3] [4] [8] [11] [14] [15][16][17].

Covid19india.org It's a non-official internet site for tracking the COVID-19 instances in India, it is being maintained through a collection of dedicated volunteers who curate and verify the information coming from numerous assets. They extract the information like an affected person's courting with other sufferers to perceive local and network transmissions, travel records, and status. They're the use of nation announcements and authentic handles to update our numbers. The statistics are validated with the aid of a group of volunteers and posted into a Google sheet and an API. API is to be had for all at api.covid19india.org. They may be putting their time and assets without thinking of earning a single penny from us and the purpose for that is to think that it affects every person. Nowadays, it is a person else who is getting infected; tomorrow it could be us. We want to save you the spread of this virus. We want to file the records so that people with understanding can use these records to make informed choices that make this website even extra incredible[19,20,21,22].

Covid-19 Dashboard of Johns Hopkins University It's additionally a non-legitimate website which was developed to respond to this ongoing public health emergency, they developed an interactive internet-primarily based dashboard hosted by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins college, to visualize and track stated cases in real-time. The dashboard first shared publicly on January 22, illustrates the location and quantity of confirmed COVID-19 cases, deaths, and recoveries for all affected international locations. It was developed to offer researchers, the public health government, and most people a person-friendly device to track the outbreak because it unfolds. Besides, all the facts accrued and displayed are made free to be had, initially as google sheets, now in a GitHub repository, together with the feature layers of the dashboard, which can be now blanketed in the ESRI dwelling Atlas. This is the list of the companies supporting their center's COVID-19 mapping and modeling efforts. They may be grateful for monetary help from JHU, NSF, NIAID, and NASA, Bloomberg Philanthropies, Stavros Niarchos Foundation, aid from AWS, Slack, and GitHub, and technical aid from Esri Living Atlas team and JHU APL

Aarogya Setu It's a legit Android and IOS application advanced and maintained by Indian authorities. The app makes use of mobile Bluetooth, GPS location, and contacts so that it can gather the data of affected people near the user. The App also uses the user contacts for verifying if there are any people affected by the virus of the user contacts. This app helps the user and also the government at the same time by showing coronavirus cases to the user and to protecting the user and his/her family from the virus and also displaying total affected cases of the Virus to the

Government so that the government takes measures from spreading the virus. This app functionality increases by the increase in its users.

Coronotracker.in This website was developed by some Students in Goa. They designed the website in a simple manner such that it's easy to understand the cases. This website currently supports to display of all coronavirus case details of every state and district. This website includes a map overview for better understanding and also displays the recovered and deaths of every state and district. For more details of the state, the user can click on the map for a better understanding of the situation of that state. The supply in their information is from the Johns Hopkins University dataset and additionally some other assets.

Mygov.in/covid-19 Indian government has developed the Aarogya setu app for the latest COVID-19 updates and tracking the cases and also developed a website for real-time updates on the COVID-19 cases for each state case like confirmed, recovered, active, and deaths cases. It also

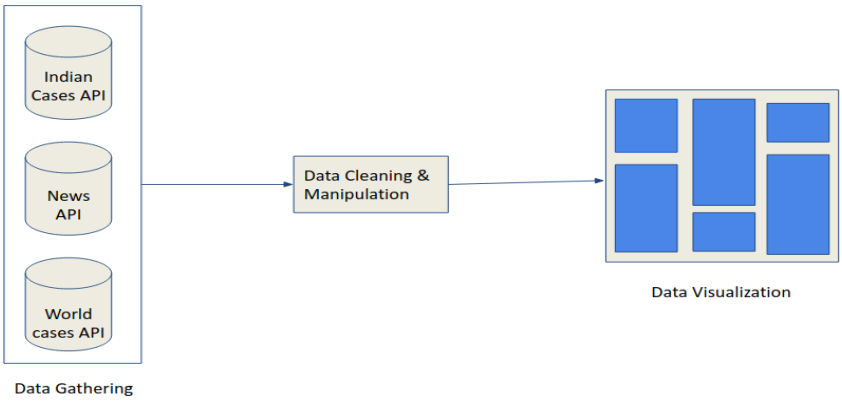

Fig. 1 Architecture adopted

displays the latest news on pan-India lockdowns for preventing the spread of the virus across the country.

3.0 Proposed Methodology

While developing a mobile application a procedure should be followed for a better understanding of the code was written and also the quality of the code for the future reuse of the code. Fig. 1 depicts the adopted architecture.

COVID-19 cases all over India along with the states and district cases. For collecting world cases, it's better to either use disease. sh or any RapidAPI APIs are of free of cost but it currently supports the CSV download file and doesn't support API service, so it's best to go with the above API services. For Collecting news on the COVID-19, an API from RapidAPI is used so that latest news can be retrieved whenever the user desires. As the app is collecting a lot of data from different APIs at the same it might not collect all the data and after the splash screen. The data can't be collected in the background so for that reason collecting only the necessary data helps. So, in the main activity which is while displaying the splash screen, the app is going to collect all the data

from the APIs and store them in local variables. In the main activity, the app is going to collect data like state codes, state names, state cases, news data store them locally, and share them between different pages using class arguments which is one of the easiest ways and for the world and district cases it's better to directly retrieve the data when the page is opened, as the world page has more data and if the data is retrieved in the main activity it might slow down the opening of the app, so it's better to retrieve the world case's data when the user opens it and same goes to district cases as has fewer data it requires less time for retrieving the data, so data will be collected when the user opens its.

3.1 Data Cleaning and Manipulation

Data cleaning is a process of removing unnecessary data or removing null data from the data retrieved and the manipulation part is to change the data such that it favors the user for easier understanding of the target. As mentioned above after data gathering categorizing the data is the best option for the future use of the data. So, data from the collection of states can be categorized into four ways.

1. Confirmed - Total Patients affected by the Virus
2. Recovered - Total Patients recovered from the Virus
3. Active - Total Patients remaining after removing the recovered and dead patients from the infected patients
4. Deaths - Total patients dead by the virus

After categorizing data will be stored in different Lists for future usability and management of data. The way of storing the data is also crucial so that it can be easily accessible so that it's better to use dictionaries as the data in it can be accessed easily.

4.0 RESULTS AND DISCUSSION

Data visualization is a process of converting the data into graphs or charts or any other types of visualization forms for better understanding the data. When designing a UI for the mobile application limitation of flutter should be kept in mind as it is a new technology to the world, and it doesn't have a large packages platform like JavaScript. So, UI should be developed in a minimalist way and also should show all the data the user requires for that better to use some Bar graphs which are easy to understand for even a child so using the bar graph can convey information fast, and also they are best showing values which are independent to each other as states. Fig 2 shows the confirmed cases of every state in India till yesterday in ascending order.

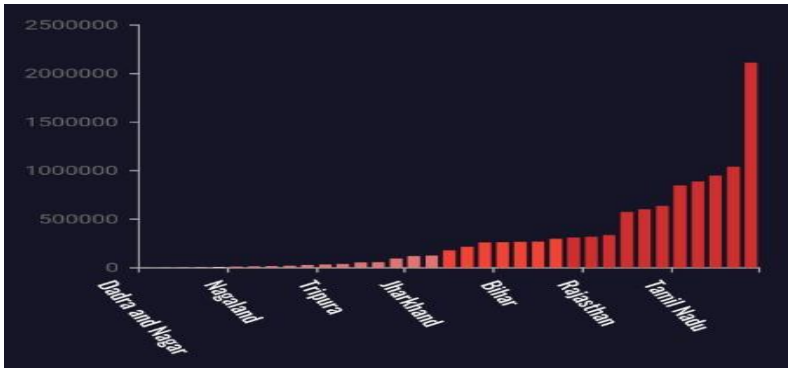

Fig 2: Bar Graph

Line graphs can also be used as date-time series is needed for showing the history of the past 7

or 30 days as the consumer wishes. It's higher to use a line graph than a bar graph as values are dependent on the day past's values. Fig. 3 shows the beyond 30 days' document of shown instances in India.

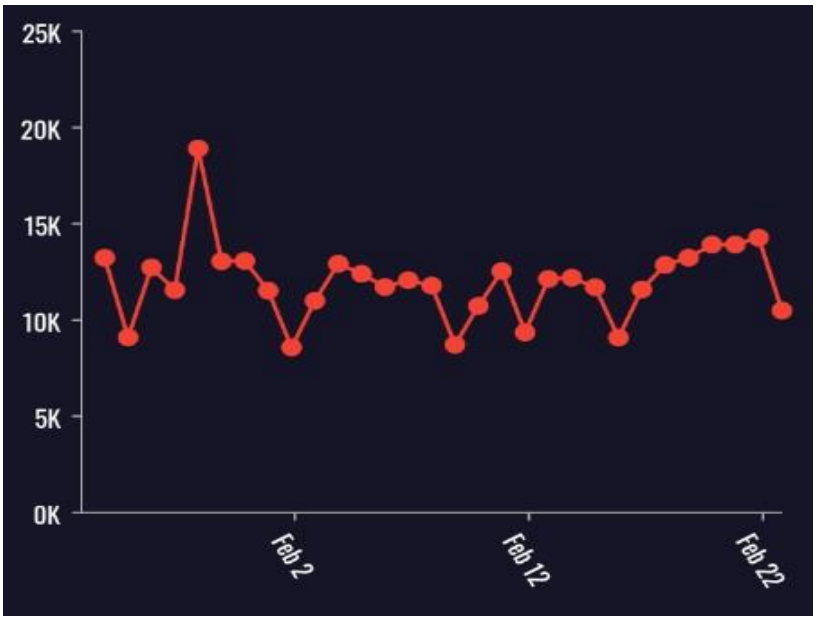

Fig 3:Line Graph

A pie graph can also be used to expose the percentage of recovered, active, and loss of life instances inside the general confirmed instances throughout India which makes the consumer recognize the values more without problems. It's better to use a pie graph as values recovered, active, and death depends upon the confirmed cases as they are a part of it. Fig. 4 indicates the proportion of recovered, lively, and demise within the shown cases in India.

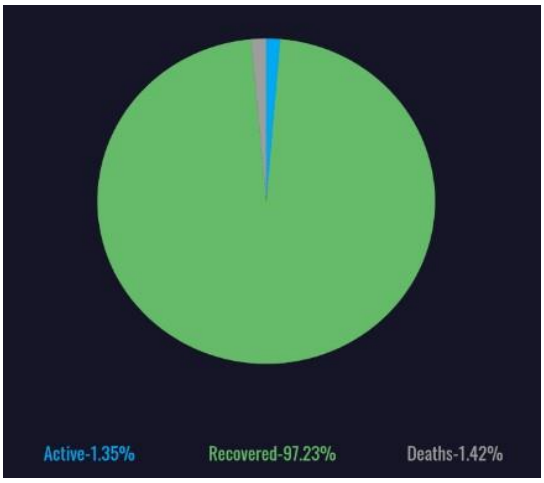

Fig 4: Pie Graph

The above graphs may not be sufficient to make the consumer recognize the data that become gathered so for that first-rate to apply shape files that may be effortlessly found around the internet and the usage of the one's shape files statistics can display within the form coloring like from light red to the darkest crimson which symbolizes the matter of the cases from low to

excessive. Fig. 5 is an India shape file showing confirmed instances depend on the shape of colors.

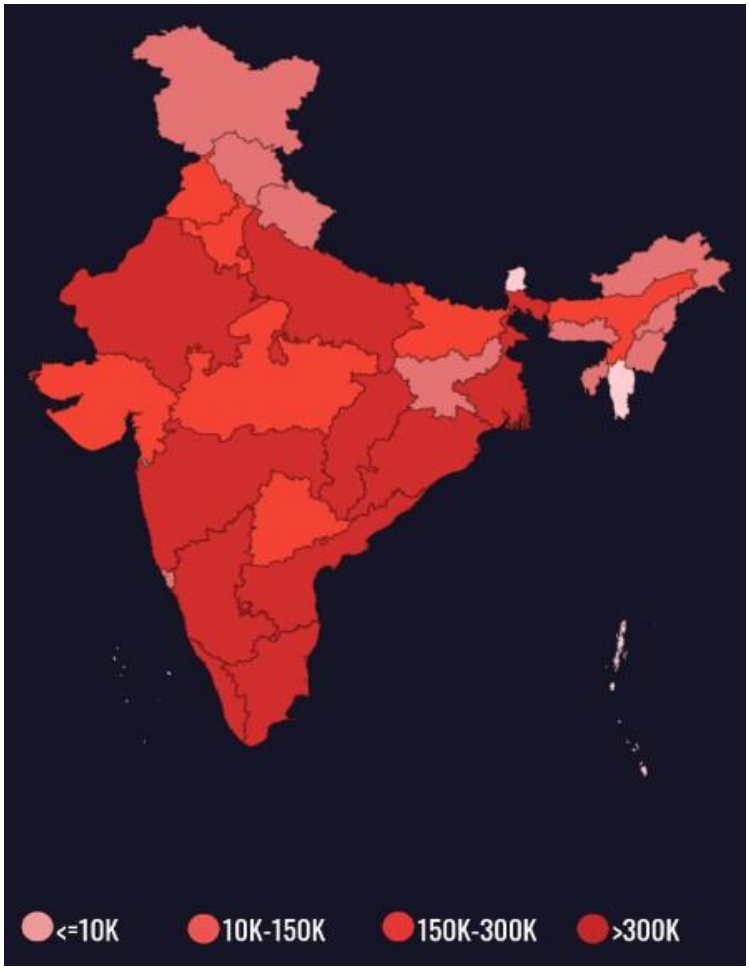

Fig 5:India Map

For the world cases, a world shape file can be used for representing the count values. Fig.6 shows the confirmed cases count in the form of colors

Fig 6: World Map

The news is a small component to which consumers may not give plenty of choices, so the news page may be designed in a simple manner for that displaying the media photograph and title of

the information may be sufficient for greater details the user can see the respectable information web page of the news he/she clicked. The underneath picture indicates the layout of the news web page.

5.0 CONCLUSION

COVID-19 is spreading faster and more deadly than ever before which makes the world a more dangerous place to live as there are no proper vaccines available, it's not recommended using them, and also following rules like maintaining distance, wearing a mask, sanitizing the hands time to time, etc can prevent the people from being infected by the deadly disease. One of the ways to control people from breaking the rules and doing whatever they want is by showing them the current situation of the deadly disease around the world which might help the people understand the situation and follow the rules for them and also other people.

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