Data Visualization to solve COVID-19

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Abstract. This electronic document describes how data visualization can be used to solve problems related to Coronavirus using graphical representation of information and data. This article mentions several well-known methods to contain the coronavirus pandemic and discusses how these methods can be effectively implemented across the country. The focus has been given more to the implementation in local level than a country wide implementation. The article describes a comprehensive way to predict the next hotspot in a district wise level using projection graphs. The article also describes The Delhi model using data projection and analysis. The conclusions derived from these analyses can be implemented effectively in district wise level to flatten the Coronavirus curve and develop herd immunity in category wise zones.

Keywords— coronavirus, community spread, data visualization, flattening the curve, herd immunity.

1. Introduction

This electronic document is created in Microsoft Word Online for online view, it explains how data visualization can help us minimize the damage caused by covid-19. Data Visualization is the way of representing data using different types of graphs, charts, and various other methods. It helps us recognize any underlying pattern in a given set of data and help us predict results using the set of data. Data Visualization helps us to understand the behavior of a particular data set using visual representation which enables us to understand the subject (which is represented by the dataset) in a much proper and engaging way.

The districts lying in Category 1 should be the top priority of the Government, a complete lockdown for infinite number of days has to be implemented, only the sale of essential commodities should be permitted that too for a limited number of hours in a day (8 AM to 5 PM). The districts lying in Category 2 should be of moderate priority, a complete lockdown should be implemented on alternate days and partial lockdown from 9 A.M to 6 P.M in the consecutive days after a complete lockdown, there should not be any restrictions in the sale of essential commodities. The districts lying in category 3 should be of least concern, social distancing should be the remedy for coronavirus in these areas. By this way the resources could be properly focused on the areas which needs them the most and thereby achieving the objective of developing herd immunity and thus, flattening the curve.

Figure 1 is a wagon wheel, which is a country wise representation of the total number confirmed cases around the world. The continents Africa, Asia, Europe and America are represented by Red, Blue, Green and Orange respectively. Under different continents different countries are represented. This type of Data Visualization gives us an overall summary of the spread of the virus without going much into the
details. This type of Visualizations also gives us an insight about the economic opportunities and the health care facilities present in different countries.

Figure 1 A wagon wheel, which is a country wise representation of the total number confirmed cases around the world.

2. Use of data visualization to solve Covid crisis

2.1 Local lockdowns

The Coronavirus outbreak has shaken the World economy. Indian economy too is struggling. In this situation a Nationwise lockdown is not the answer. Instead focus should be given on local lockdowns, where the focus should be on those districts where there are maximum number of cases, the districts with moderate number of cases should be the second priority of the Government and the districts with least number of cases should be given the least priority. For example, consider the map above, we can categorize the districts according to the number of cases Category 1- The districts having above 5000 cases, Category 2- The districts having above 1000 cases, Category 3- The districts having below 1000 case. Based on the category of a district or a zone different types of lockdowns each with different level of restrictions can be implemented. This in return will contain the virus only to the most affected areas and will also ensure the circulation of money in least affected areas thereby reducing the damage on the economy.

Figure 2 is the map of West Bengal which shows the areas with most affected people and also the areas which are relatively less affected. This type of Visualizations can help us to easily categorize the affected areas. This Visualization uses different shades of the same colour to differentiate the affected areas for e.g. 1-99 is represented by whitish red, 1000-4999 is represented by primary red and >= 10000 is represented by dark red.
2.2 Prediction of next hotspot

Data Visualization can be used to predict ‘the next’ hotspot. The curve of a potential hotspot can be flattened before reaching its full potential by predicting the number of cases and recovery rates of a particular area and comparing them with other areas. In this way the government can focus their attention and resources in the most affected areas. Updating projections daily along the daily data will enable us to see the big picture and will help us buying time. Projection of recovery rates and daily deaths along with daily cases will help us check whether the safety precautions taken by the government is working effectively or not. Local lockdown as already mentioned in this article will also be very effective in containing the coronavirus in the ‘next’ hotspot.

Figure 3 represents daily Covid cases in the district of Paschim Medinipur in a bar graph format, the rise and fall of the daily cases can be easily seen. The districts with the most number of cases can also be seen in the figure. The figure also does a percentage comparison of rise and fall of daily cases. For e.g. there was a 78.3% drop in the number of daily cases on 16th August in comparison to 15th August.
2.3 The Delhi model

As Corona positive cases keeps on increasing in India, Delhi is seeing a fall in the number of active cases. From being one of the worst Covid hit state in India to becoming one of most recovering state in the country, The Delhi model is based on the principal of three T's, Testing, Tracing and Treatment. These measured can be implemented in local level across various states of India. The increase in testing number is the key factor responsible for higher recovery rate. The same should be done in local levels, if enough testing kit is not present then only patients with mild to adequate symptoms should be tested. Home isolation for mild symptoms is another key factor behind Delhi’s success. As there are limited number of hospital beds in rural areas, the patients with mild symptoms should be home isolated and only people with severe need should be hospitalized. Sero-surveys in local level can decrease the rate of infection. The detection of herd immunities in local levels will be easier with Sero-surveys.

Figure 4 indicates daily confirmed cases within a period of time, 4235 indicates total number of confirmed cases on 13th September, -86 indicates that there has been 86 less cases on 13th September as compared to 12th September. The dates are represented on x-axis and the number of confirmed cases is represented on y-axis. this can be used to understand whether the measures taken by authorities to control the spread of the virus are working properly or not. If the graph increases then that would indicate the authorities need to change the methods of containing the virus and similarly if the graph decreases then that would mean that there is successful implementation of proper methods to contain the virus and these methods can be applied in other areas to control the curve in the same way.
Figure 5 indicates the daily increase or decrease in total number active cases within a period of time. The dates are represented on the x-axis and the number of cases is represented on the y-axis. The number 69 on the top left corner indicates the number of active cases on 19th August which is 147 less than 18th August. Increase in number of active cases would mean low recovery rate of the affected patients. Increase in daily active cases will cause shortage of beds and increase in work hours of doctors and nurses.

Figure 6 indicates the recovery rates of the patients. The dates are represented on the x-axis and the number of recovered patients is represented on the y-axis. The number 1320 in the top left corner indicates the total number of recovered patients on 19th August, the number +174 indicates that the recovered cases on 19th August is 174 more than on 18th August. Higher recovery rates indicates proper measures been taken and implemented by the authorities and it also ensures the proper functioning of the healthcare machinery.

Figure 7 indicates the daily number of deaths. The x-axis represents the dates and the number of daily deaths is represented by y-axis. The number of deaths on 19th August is 9 which is 3 less than 18th August. As we can see there was a sudden rise in number of deaths somewhere in between 1st June and 1st July. Data Visualization can help us tremendously to keep these numbers in check.
Figure 8 indicates the number of testing in a daily basis. The numbers in the top left corner indicates that 20815 people were tested on 19th August which is 549 more than the people tested on 18th August. The dates are represented on the x-axis and the number of tested people is represented on the y-axis.

2.4 Conclusion

Data Visualization is an amazing tool to study a specific dataset. If the knowledge gathered from Data Visualization is properly utilized and various methods mentioned in this article is properly implemented then we can definitely recover from Coronavirus at a faster rate.

2.5 Acknowledgment

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