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Data Visualization for Developing Effective Performance Dashboard with Power BI

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***Abstract*—Data visualization is a very important step in data analysis as it provides insight into the data in a more effective manner that is interesting, simple, and understandable to everyone without any language barrier. It can also represent a huge amount of data in a small space very easily. In the previous two years, the whole world has suffered from a very terrifying nightmare known as COVID-19. Known to be starting from the country of China, the pandemic affected not only the health and well-being of mankind, but also had serious impacts on the economies of various countries. Hence, a visualization of the data set of the pandemic might provide beneficial insights for finding a possible solution and can help in overcoming the impacts of the pandemic. Microsoft Power BI is a very famous tool for analyzing data. Power BI provides a different way to visualize the data. This paper has been analyzed the covid-19 data by using Power BI to understand the trends and patterns of the Pandemic. With the help of visualizing the data, it can be represented in stacked column charts, tables, and maps. These three ways are easy and simple to understand the patterns of the pandemic. It also helps to understand how covid impact the world. This research with power BI dashboard by using a dashboard feature that connects different pieces of visual graphs.**

***Index Terms*—Power BI, Covid-19, Data set, Stacked Column Chart, Map, Tooltip.**

I. Introduction

Power BI is a visualization tool. The first power BI project, called project Crescent, was initially accessible to the general public in July 2011. In September 2013 it was included in office 365 as Power BI and it was released to the general public in July 2015 [1]. With the assistance of Power BI, it can analyze the data easily it provides many features to analyze and visualize the data. It is not easy to understand the data in the form of numbers because our mind is more capable of understanding the data in the form of a picture rather than the number information. Data visualization gives us more ideas and more clarity about that data [2]. It has been analyzing data deeply through the visualization. After analyzing the data, it can easily understand the pattern and trends of data. Power BI provides the tools to convert our data into the format of graphs, maps, and charts. Power BI has visualization tools that provide many options to convert data in the format of stacked bar charts, stacked column charts, clustered column charts, scatter charts, pie charts, tables, matrix, and many more [3]. Microsoft Power BI supports many kinds of data as excel files, SQL server datasets, CSV files, and many more. In addition to this, also need to create a dataset directly. Power BI provides the transform data feature there can make changes in data in our preferable way. Power BI can work more than one sheet at the same time. Power BI has a filters feature; it makes visualization very interesting. Power BI provides a web feature with the help of this feature which can connect to the data directly from the on-line source.

II. Types of Visualization Charts

The main ways to analyze the covid-19 data in this paper are stacked column charts, tables, and maps. It can quickly analyze data using a stacked column graph with stacked columns diametrically opposed to a stacked bar chart. In a stacked bar chart, values are displayed on the x-axis and the axis is shown on the y-axis, whereas in a stacked column chart, The y-axis and the axis display values.is shown on the x-axis. It can include a legend in the stacked column chart. The legend divides the chart into various colors and categories. The tool-tip feature of the stacked column chart provides a very interesting way to represent data in a variety of ways.

The map facilitates data analysis by region. The map has a location feature where one can enter the country details, and the map has a legend option that displays the data in various colors and categories [4]. It includes additional features such as longitude, latitude, size, and tool-tips. All of these features add to the map's appeal. In addition, they can use a table to analyze data. If it has to read data in the form of numbers, a table can help. A table is made up of columns and rows. Essentially, a column is a field that represents a field in a table vertically, while a row represents a data entry in a table horizontally.

III. Bibliometric Study

A. Publication and Citation Country wise: Scopus database

Citation country-wise analyzed from the Scopus database as given in table 1 in which the USA has heights many documents 496, and also depicts in figure 1 during the covid 19 pandemic situation. The data visualization of the number of documents published and citations from Scopus the total of 1157, results obtained for possible publication as depicted in figure 2.

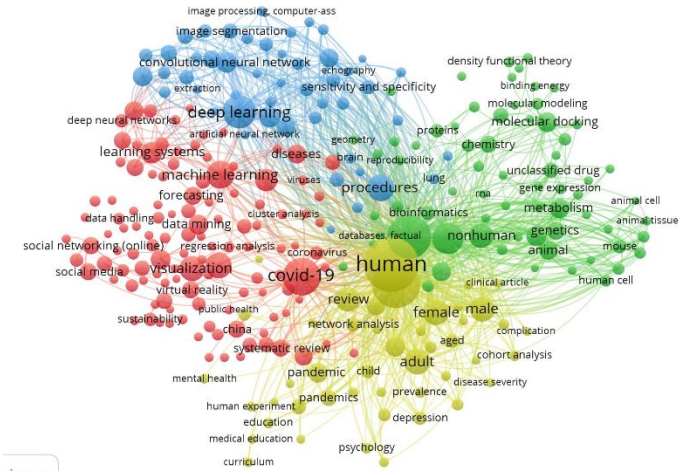


Fig. 1. Publication and Citation Country wise: Scopus Database

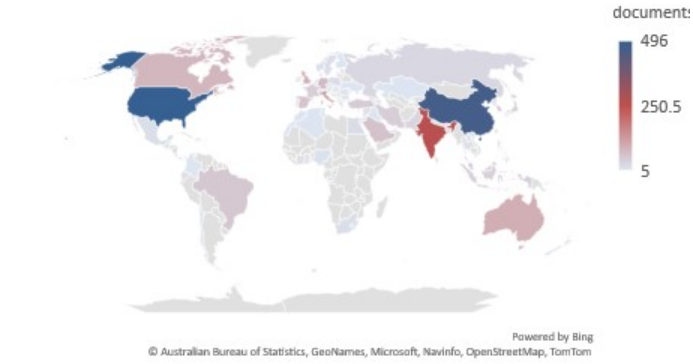


Fig. 2. Publication and Citation Country wise: Covid-19 Data

B. Publication and Citation: Web of Science

Data Visualization keywords with all fields and covid 19 the number of publications and citations have been analyzed as 998 results from Web of Science Core Collection given below in figure 3.

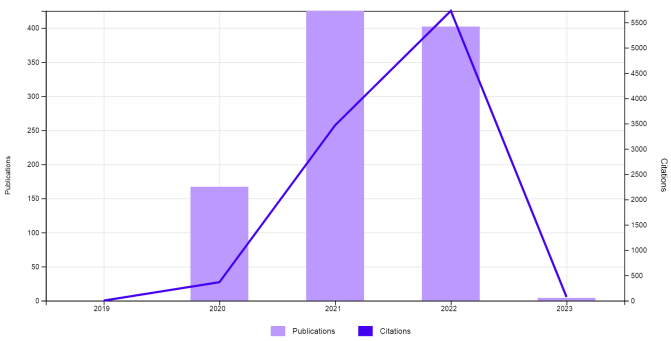


Fig. 3. Publication and Citation Country wise: Web of Science

The Given Figure 4 describes the report of documents published during covid-19 in a web of science database, a total total of 998 published during covid 19 pandemic situation.

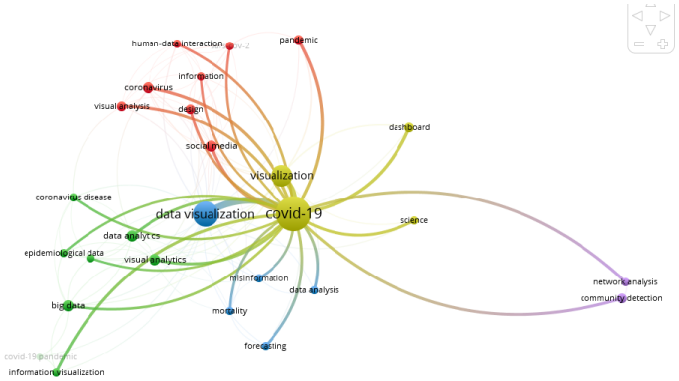


Fig. 4. Covid-19 Report: Web of Science Core Collection

IV. Case Study of Covid 19

The lethal COVID-19 virus also known as “Coronavirus” was found in Wuhan, China, and got burgeoned in more than 180 nations around the world. “The World Health Organization” declared COVID-19 as a pandemic on the “11th March 2020” deadline, as well as a rise in the number of case scenarios of virus infection. The first case of covid-19 was found in Thailand outside of China on January 13th, 2020 [5]. As a result of the virus, no country has been spared. continues to destroy and impair numerous others. The global economy is steadily deteriorating because of the virus’s impact. COVID-19 was a rapidly spreading pandemic with a virus that was still mutating [6].

TABLE I
CITATION REPORT COUNTRY WISE: SCOPUS DATABASE

Country	Documents	Citations
united states	496	610
china	469	857
india	264	459
italy	112	229
united kingdom	101	167
australia	96	204
canada	82	86
germany	75	119
saudi arabia	63	134
spain	59	91
brazil	54	74
south korea	54	79
turkey	49	81
hong kong	46	90
malaysia	46	139
iran	45	45
france	43	52
japan	41	24
taiwan	41	62
indonesia	40	52

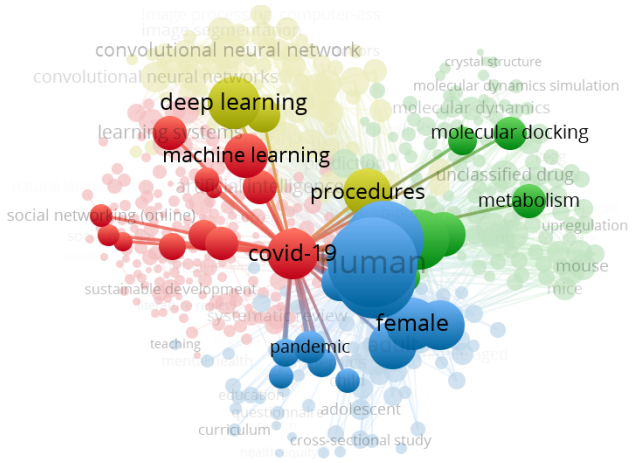
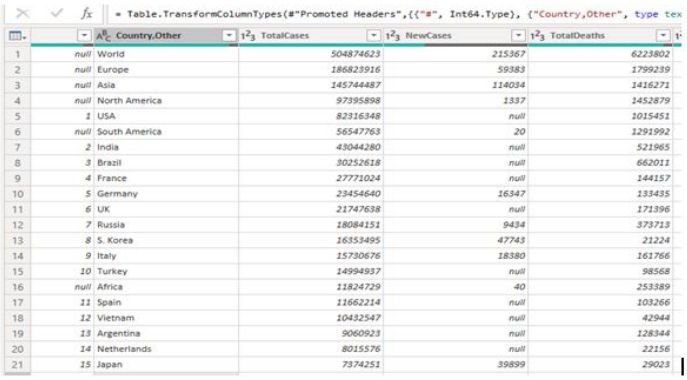


Fig. 5. Covid-19 Data Analysis: Scopus Database

The virus is spread from one person to another person mostly through touch with infected individual's droplets [7]. Various steps were listed to prevent the virus from spreading, however, the pathogen continues to spread. The documents published for covid 19 as depicts in figure 5. This paper describes the system for interactive visualization of COVID-19 data utilizing Power BI as an intelligence platform to obtain and process data from files, relational databases, and Big Data sources, which Power BI will link to [8]. The program allows for data merging and it is truly unique because of the real-time collaboration. Data analysis is the visualizations produced with Power BI are represented visually, thanks to worksheets and dashboards [9]. A Power BI report the dashboard allows for a large number of graphics to be presented in a single look. It's also utilized to show only the most important information that is frequently altered. As a result, integrating Power BI and demonstrating how to use it for the interactive process. Data visualization and analysis for COVID-19 [10], to encourage its widespread adoption. Power BI ushers in a new epoch. The pleasant experience of adaptability and ease of use is provided by this data analytics and visualization application.

A. Data Visualization with Power Bi

Power BI is capable of analyzing a wide range of data types and formats, and get information from the world-o-meter website. It has been obtained the table from this site, which includes all countries. Data from Covid 19 such as total number of cases, total number of fatalities, active cases, and recoveries, and so on. So that Power BI is used to analyze all of the data given in figure 6



	Country,Other	TotalCases	NewCases	TotalDeaths
1	null	World	504874623	215367	6223802
2	null	Europe	186823916	59383	1799239
3	null	Asia	145744487	114034	1416271
4	null	North America	97395898	1337	1452879
5	1	USA	82316348	null	1015451
6	null	South America	56547763	20	1291992
7	2	India	43044280	null	521965
8	3	Brazil	30252618	null	662011
9	4	France	27771024	null	144157
10	5	Germany	23454640	16347	133435
11	6	UK	21747638	null	171396
12	7	Russia	18084151	9434	373713
13	8	S. Korea	16353495	47743	21224
14	9	Italy	15730676	18380	161766
15	10	Turkey	14994937	null	98568
16	null	Africa	11824729	40	253389
17	11	Spain	11662214	null	103266
18	12	Vietnam	10432547	null	42944
19	13	Argentina	9060923	null	128344
20	14	Netherlands	8015576	null	22156
21	15	Japan	7374251	39899	29023

Fig. 6. Covid-19 World Data Analyze with Power BI [9]

To begin, we design the graphic levels that will be used to display the data directly shown in figure 7. Total cases, total tests, total deaths, serious cases, population, and new deaths are all included in these visual levels. to find covid data for any country by clicking on that country's data [10].

Fig. 7. Data Analyze with Power BI: Graphics Level [10]

B. Stacked Column Chart

To analyze Covid 19 data from all countries, it utilizes a stacked column chart. The names of the countries are on the stacked column chart's x-axis, while the rest of the data is in the values section, which can find all of the data in the column classified by country [11] [12]. A column with different colors represents the data of a specific country. Red denotes population statistics, dark black denotes a new death, sky blue denotes the total number of tests, yellow denotes the total number of cases, light black denotes the total number of deaths, and light sky denotes serious critical cases. With the use of a stacked column chart shown in figure 8, It may analyze Covid 19 data by country.

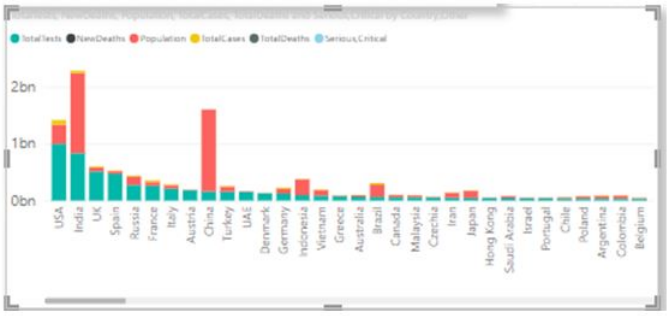


Fig. 8. Data Analyze with Power BI: Stacked Column Chart [12]

C. Table

To utilize a table to analyze Covid-19 data, and after selecting the table, to enter the data one by one into the values option. First, to put the nation name data, followed by global population data, and last, total cases, total fatalities, total tests, and critical data. Following the input of these data, one can locate a table containing all of the covid data records in a table format [13]. Click any country name to view individual data for that country. After clicking any country name, it can access all covid records at the visual level of that connected country shown in figure 9.

Country,Other	Population	Serious,Critical	NewDeaths	TotalDea
		0		
Afghanistan	40495803	1124	1	
Africa		963		25
Albania	2872176	2		
Algeria	45267027	6		
Andorra	77486	14		
Angola	34693502			
Anguilla	15243	4		
Antigua and Barbuda	99379	1		
Argentina	45937609	412		12
Armenia	2973150		1	
Aruba	107577	2		

Fig. 9. Data Analyze with Power BI: Table [14]

D. Map

Map is also used to analyze the data. To utilize this method, start by choosing a map from the build visual shown in figure 10, to put the covid data after selecting the map. That need to insert nation name data in the location area. it can put the total cases of covid-19 after, put the data in the location area. It can see the covid cases domain nation wise after putting both data in [14] [15]. It can easily analyze the data using the map approach to see which regions are more influenced by covid-19. for the observation the impacted region in this map graphic by the dark circle. These circles give us with information about the Covid-19 cases [16] [17]. And to understanding of the affected area of the globe, to look at data by region, it can be done this by clicking on that region, which would display data by region. To observe changes in visual levels, stacked column chart, and table after clicking on any region. As a result, to analyze data by region, chart, and table.

Fig. 10. Data Analyze with Power BI: Map [15]

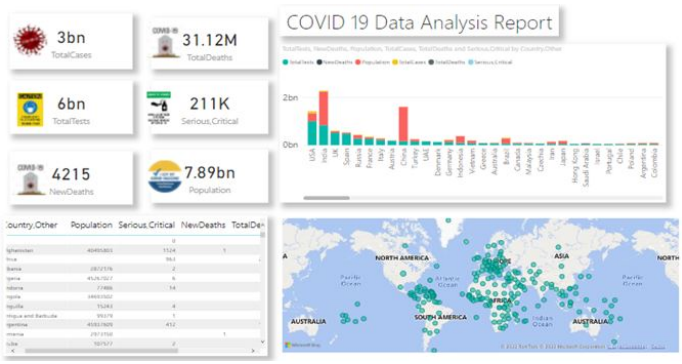


Fig. 12. Data Visualization report without Tooltip [25]

E. Tooltip

Tooltip can be used to better understand covid-19 data. To use a tooltip, first go to the second page. to utilise a clustered column chart in the tooltip, the data is placed in the clustered column chart [18] [19]. it can put country name data in the axis, and total cases, population, total death, total recovery, and critical cases in the values section. The data in the tooltip is displayed in a clustered column chart. To make Tooltip can be used to better understand covid-19 data this tooltip visualization tool is more appealing, it has more features [20] [21]. The depiction of covid-19 data is very simple to interpret. that need to add cards to add more features. As a result, drag three cards into the tooltip. that can drag the data on total cases into the first card, the data on total deaths into the second card, and the data on total tests into the third card [22] [23]. it can quickly analyze the covid data of the world after placing the cards in the tooltip shown in figure 11.

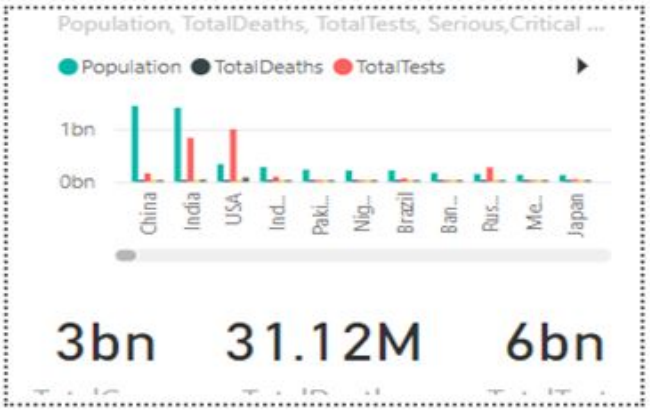


Fig. 11. Data Analyze with Power BI: Tooltip [22]

To see the tooltip on the first page, it must first activate the permission. Then it needs to hide the second page and show it in the tooltip [24] [25]. This tooltip is now shown in figure 12 on the first page, allowing us to choose any country. With the help of Power BI, that can now simply analyze covid-19 data given in figure 13.

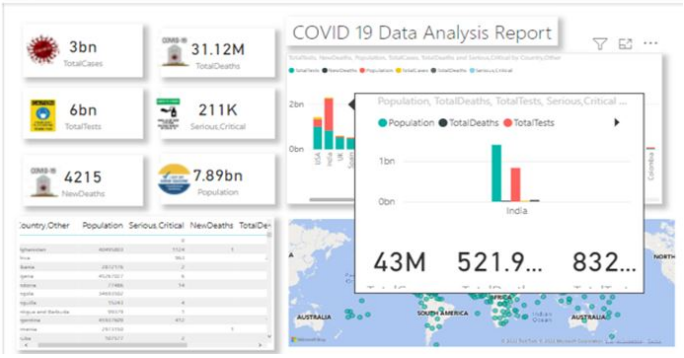


Fig. 13. Data Visualization Report with Tooltip [25]

V. Conclusion

The scenario studies show how well their method works for analyzing bi-directional movement characteristics through various angles and even at spatial levels. The study presented various plots to demonstrate comparisons between attributes and global cases. Several domain specialists recommended that an interesting route would be to expand their system to facilitate the study of authentic features extracted. Additionally, researchers intend to run experimental research as well as test our solution on datasets from different domains of applications. The Stacked Column Chart, table, and map were used to present the analysis results, and Power BI was used to visualize certain key points available. It is hoped that this analysis and visualization will assist governments around the world in determining what steps to take to stop the virus's spread.

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