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Covid-19 Spread Analysis

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Abstract: Covid-19 Spread Analysis is a stand-alone application developed in python which will help us to analyse the covid-19 cases all over the world.
In this python project, we will implement a live dashboard for COVID 19 spread analysis. This dashboard will provide much insightful visualization for the study of corona virus spread. It will consist of a world map on which circles of the top 15 regions having the largest corona cases of will be displayed. There will be a table in the left panel showing the total active cases till date in the respective region. In the right panel, there will be a world map which will represent the impact of the virus using a red circle. More the number of cases in the region on the map, the bigger are the red circle in that region.
Also, the user can see a detailed graph of state wise covid-19 cases of our country. This graph will show the active, confirmed, recovered and death cases. User can see all this information date wise as well as month wise. The graph will be updated every day so that user can clearly analyse the covid-19 spread. The project aims to understand various useful features of this tool and to present different concepts of data science applied within the application along with its importance in managing the ongoing pandemic. . It gives the readers an insight in to covid-19 spread is happening with the help of the entire data.
Keywords: Covid-19 Spread Analysis, live dashboard, world map, state wise detailed graph

I. INTRODUCTION

Various types of analysis have been made on COVID-19 data. Hamzah, et al. has considered Worldwide COVID-19 Outbreak data analysis and prediction using SEIR models with nonlinear ordinary differential equations. Rodriguez-Morales have performed systematic review including mete analysis. The data consist daily total cases, daily new cases, daily recovered cases and daily deaths. The attack rate for day t is calculated from the ratio of DNC of day t to DTC of day t-1. This work was aimed to develop a model to predict attack rate and total finished cases for future and to find out the breakeven point for total cases and total finished cases. That means a time point after which there will not be any new active cases of corona virus in India under the assumption that the current environmental situations remains same.

Aarogya Setu, developed by the Government of India is a mobile application developed under the Health Ministry, as a part of the E-Governance initiative, to track and sensitize the citizens of India in a joint battle against COVID-19 spread. The application uses various Data Science concepts such as Classification, Association Rule Mining, and Clustering to analyse COVID-19 spread in India. The study also shows potential up gradations in the application, which includes usage of Artificial Intelligence and Computer Vision to detect COVID-19 patients. The study would be useful for mobile technology professionals, data science professionals, medical practitioners, health-related frontline workers, public administrators, and government officials.

Comparing some other apps developed by different nations for COVID tracing on various parameters is as follows.

1) *Data Destruction:* The data that the App collects should be automatically deleted in a reasonable amount of time (maximum 30 days), or the App allows users to delete their own data manually. Some countries that automatically destroy the data are Australia, Canada, India, Israel, Italy, and Japan. Countries that do not destroy the data are Belgium, China, France, Germany, and UK.
2) *Transparency:* It can take the form of clear, publicly available policies and design, an open-source code base. Countries whose apps are transparent are Austria, Canada, India, Israel, Poland, and Singapore. Apps that are not transparent belong to Australia, China, France, Malaysia, and Norway.
3) *Limitations on Data Collection:* Data may sometimes be used for purposes other than public health such as law enforcement—and that may last longer than COVID-19. Countries that are limited in Data Collection: Australia, Bulgaria, Denmark, Israel, and Switzerland. Countries that have not limited Data Usage: Algeria, Belgium, China, Finland, and Hungary. For India, it is not clear.
4) *Underlying Technology:* Some apps identify a person's contacts by tracking the phone's movements like GPS. Some systems use “proximity tracking,” in which phones swap encrypted tokens with any other nearby phones over Bluetooth. Many apps rely on the standard API that Apple and Google are developing. Some use DP-3T, which is a decentralized privacy-preserving proximity tracing. Countries that are using only Bluetooth technology for locations include Australia, Czechia, and France. Austria and Belgium uses Bluetooth along with the common API from Google or Apple. India used both Bluetooth and GPS.

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II. LITERATURE REVIEW

COVID-19 outbreak was first reported in Wuhan, China and has spread most of the countries of the world. The outbreak spreads are largely influenced by each country's policy and social responsibility. According to WHO, the estimate of attack the rate on 23, June, 2020 to be between 1.4 to 2.5. In India the situation is somehow controllable compared to the situations of developed countries. It will be worth interesting to know about the fact and figures of corona cases in India. The different types of data are available on world meters. We have tried to analyze such data for India and made different kinds of prediction regarding affected rate, daily new cases, daily total finished cases etc. From our study we observed that the affected rate may decrease after 31-03-2020. Daily new cases will be under control and decreases from the end of April, 2020. After 23-06-2020 there may not be any pending effective cases. On January 30, 2020 the World Health Organization declared the outbreak as a Public Health Emergency of International Concern. As of February 14, 2020, 49,053 laboratory-confirmed and 1,381 deaths have been reported globally. Perceived risk of acquiring disease has led many governments to institute a variety of control measures. We conducted a literature review of publicly available information to summarize knowledge about the pathogen and the current epidemic.

In this literature review, the causative agent, pathogenesis and immune responses, epidemiology, diagnosis, treatment and management of the disease, control and preventions strategies are all reviewed. In India first case reported on 30, January 2020 from Kerala. The number of corona virus infected in India crossed the 200 number after a spike in cases over the past six days. The challenge for India versus its peers is starker if infections spread rapidly considering the higher density of population per capita and weaker health infrastructure. Day by day total number of corona virus cases have been increasing in folded. India is at second rank as per the area and the population density. Compared to other developing countries of the world, India possesses a good control on the spread of corona virus. It will be worth interesting to know the attack rate, and rate of finished cases (recovered and death).Many countries have developed contact-tracing techniques through which they can trace the person suspected of the infection.

III. SYSTEM ARCHITECTURE

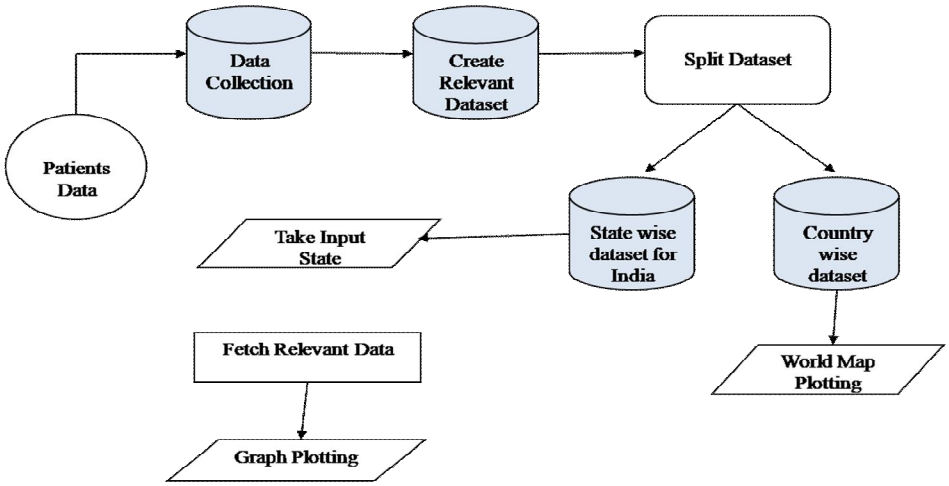

Fig.1 System Architecture

A. *Front End*

Python provides various options for developing GUIs, web applications, games, software etc . And most important it has abundant libraries that used for various reasons. Some of them are:-

1) *Flask:* Flask is an API of Python that allows us to build up web-applications.
2) *Folium:* Folium is a powerful data visualization library in Python that was built primarily to help people visualize geospatial data.
3) *Panda:* Pandas is mainly used for data analysis. It allows importing data from various file formats.
4) *Matplotlib:* Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy.
5) *Pyplot:* pyplot is a plotting library used for 2D graphics in python programming language.

There are many other libraries available, which are used for different purposes.

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B. Back End

Python supports various databases like MySQL, Oracle, Sybase, PostgreSQL, MS-Excel, etc. But we used Microsoft Excel for storing our covid cases data; as excel is the best and the most accessible tool when it comes to working with structured data. It organizes, analyzes, and stores your data in tabular row-column fashion.

We can perform calculations and create pivot tables, graphs, and a lot more! The growth in data has pushed the need for people to understand how to analyze it.

Corporations and governments were collecting big data. Hence, the term data science was coined. Python developers came up with ways of reading, writing, analyzing all kinds of file formats, including spreadsheets.

There are few packages like *pandas, openpyxl, xlrd, xlutils,* and *pyexcel* that we can use to load, read, write, and analyze these spreadsheets with the help of Python.

As we know Python is a suitable language for script writers and developers and that's why the whole system is developed using the Python programming language. Python provides a ton of libraries that can be used to make programming more simple and efficient.

IV. PROPOSED METHODOLOGY

We have created a simple Live Dashboard for Covid-19 Cases for Windows OS Users. Anyone using Windows 7 or above can use this dashboard to give insight into covid-19 spread.

So the System Components & its Uses and Info are as follows:

A. Data Capture

Data capture is the process of extracting information from a document and converting it into data readable by a computer. More generally, data capturing can also refer to collecting relevant information whether sourced from paper or electronic documents. In our project we collected the country wise data for map plotting and India's state wise data for graph plotting where captured data was active, recovered, confirmed and death cases of people.

B. Data Processing

Data processing is manipulation of data by a computer. It includes the conversion of raw data to machine-readable form, flow of data through the CPU and memory to output devices, and formatting or transformation of output. Any use of computers to perform defined operations on data can be included under data processing. In our project we processed data like active, recovered, confirmed and death cases of people worldwide and these data was processed in Ms-Excel.

C. Data Visualization

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data. In our dashboard, we have visualized the region-wise effect of corona virus.

More the number of cases in the region on the map, the bigger are the red circle in that region. Also we have plotted graphs to visualise the growth of total number of cases in states of India.

V. CONCLUSION

This python project, implements a live dashboard for COVID 19 spread analysis. This dashboard provides consists of a world map on which circles of the top 15 regions having the largest corona cases of will be displayed. The table in the left panel shows the total active cases till date in the respective region.

The right panel shows a world map which represents the impact of the virus using a red circle. More the number of cases in the region on the map, the bigger are the red circle in that region. User can also see a detailed graph of state wise covid-19 cases of our country. This graph shows the active, confirmed, recovered and death cases. All this information is date wise as well as month wise. The graph being updated every day gives user a clear analysis of the covid-19 spread in India. The different types of data are available on world meters.

We have tried to analyze such data for India and made different kinds of prediction regarding affected rate, daily new cases, daily total finished cases etc. This project aims to understand various useful features of this tool and to present different concepts of data science applied within the application along with its importance in managing the ongoing pandemic. It gives the readers an insight in to covid-19 spread is happening with the help of the entire data.

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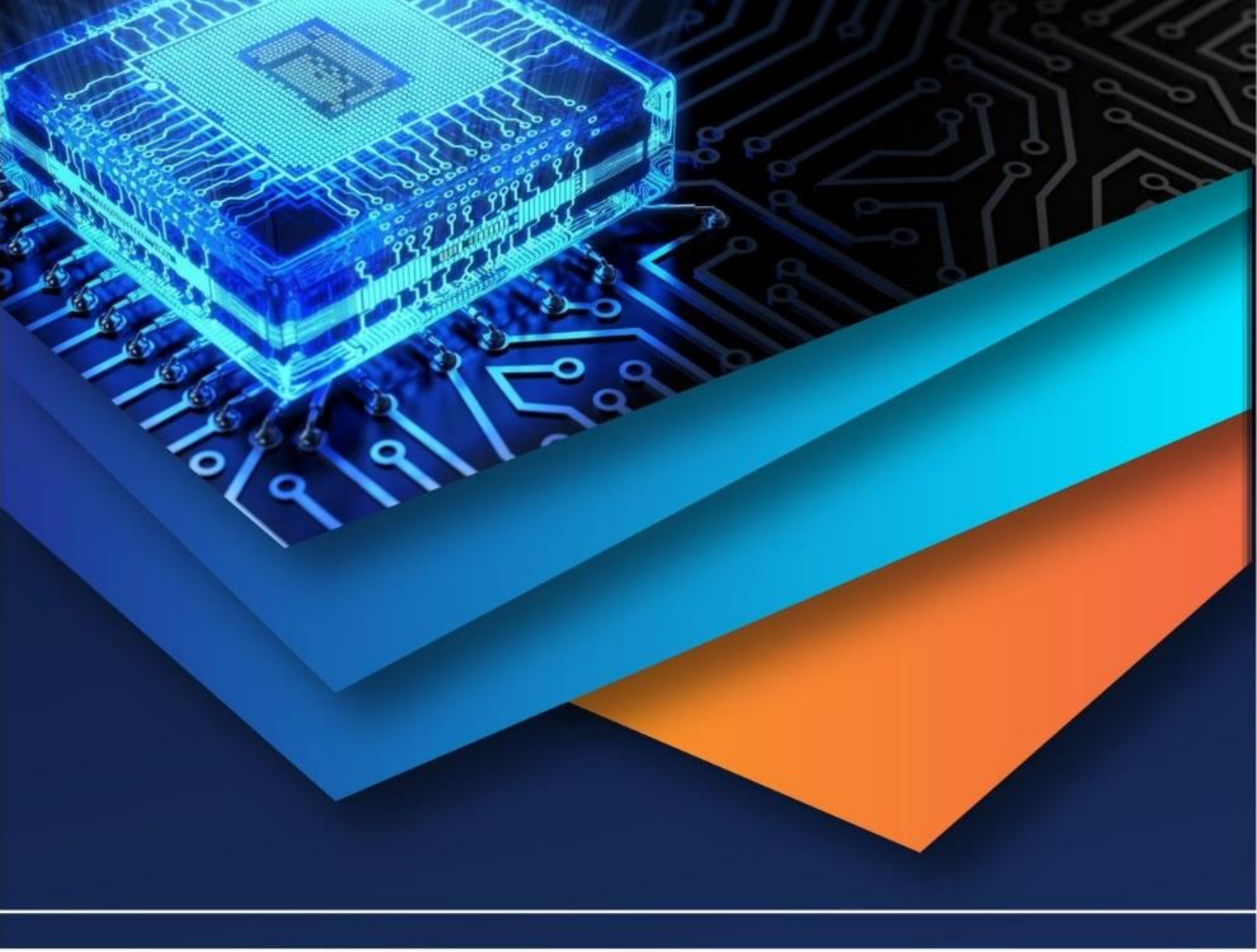

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