**COVID-19 2021 Data Analysis – Documentation**

**1. Abstract**

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has affected millions of lives worldwide. Understanding the trends in confirmed cases, recoveries, and deaths is crucial for health organizations and policymakers. This project analyzes COVID-19 data for the year 2021, visualizing it through interactive charts using HTML, CSS, and JavaScript. The system allows users to upload CSV files containing COVID-19 statistics and automatically generates multiple types of graphs, enabling better insights into the pandemic trends.

**2. Introduction**

COVID-19 continues to challenge global health systems and economies. Accurate analysis of the available data can help in understanding the spread, peak infection periods, and recovery patterns. This project focuses on developing a web-based application that can process and visualize COVID-19 data interactively. By using modern web technologies, the project ensures accessibility, responsiveness, and easy usability for researchers, students, and health organizations.

**3. Existing System**

Existing COVID-19 data analysis platforms, such as WHO dashboards and other statistical websites, provide static data visualization that is often difficult to customize. These systems:

* Do not always allow users to upload their own datasets.
* Lack flexibility in choosing chart types.
* Often require specialized software or programming knowledge.

**4. Proposed System**

The proposed system is a **fully web-based, interactive COVID-19 data analysis tool** that:

* Accepts user-uploaded CSV files containing COVID-19 data for 2021.
* Automatically generates a minimum of five different types of graphs:
  1. Line Chart – Trend over time
  2. Bar Chart – Daily confirmed cases
  3. Pie Chart – Proportion of cases, recoveries, and deaths
  4. Area Chart – Cumulative growth
  5. Scatter Plot – Case comparison
* Provides dynamic and responsive design for mobile and desktop use.
* Ensures clear visualization with color coding for better understanding.

**5. Technology Used**

* **Frontend:**
  + **HTML5** – Structuring the web application.
  + **CSS3** – Styling and creating a responsive user interface.
  + **JavaScript (Vanilla + Chart.js)** – Data processing and visualization.
* **Data Format:** CSV (Comma-Separated Values)
* **Library Used:** Chart.js (for graphs)
* **Browser Compatibility:** Chrome, Firefox, Edge, Safari

**6. System Architecture**

1. **User Upload Module:** Accepts CSV files.
2. **Data Parser Module:** Reads and processes CSV data in JavaScript.
3. **Chart Generation Module:** Uses Chart.js to generate five graphs.
4. **UI Layer:** Displays the graphs in a responsive layout.

**7. Analysis of COVID-19 2021 Data**

For the sample dataset:

* **Peak months:** April and May showed maximum confirmed cases.
* **Recovery trends:** Gradual increase in recovered cases from June onwards.
* **Mortality rate:** Less than 5% of total confirmed cases.
* **Geographical spread:** Major impact observed in urban regions.
* **Observation:** Vaccination rollout reduced infection rate in the later months.

**8. Advantages**

* User-friendly interface with no need for technical knowledge.
* Multiple graph formats for better insights.
* Upload any COVID-19 CSV dataset.
* Runs directly in any modern browser without installation.
* Fully responsive for mobile and desktop.

**9. Future Scope**

* Integration with live COVID-19 APIs for real-time data visualization.
* Adding advanced filtering options for region and date range.
* Implementing predictive analytics using AI/ML for forecasting.
* Allowing export of generated graphs in PNG/PDF formats.
* Multi-language support for global users.

**10. Bibliography**

* World Health Organization (WHO) – <https://www.who.int>
* Ministry of Health and Family Welfare, India – https://www.mohfw.gov.in
* Chart.js Documentation – https://www.chartjs.org

**11. References**

* Dong, E., Du, H., & Gardner, L. (2020). *An interactive web-based dashboard to track COVID-19 in real time.*
* Our World in Data COVID-19 Dataset – https://ourworldindata.org