Smartbridge Data Analytics Externship

Project Report
Group No - 126

Project Title - ***Covid 19- Analytics Dashboard Using IBM Cognos***

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1. INTRODUCTION

1.1 Overview

The COVID-19 Analytics Dashboard is a project developed using IBM Cognos, a powerful business intelligence and analytics platform. The goal of this project is to provide a comprehensive and visually appealing dashboard that enables users to analyze and visualize data related to the COVID-19 pandemic.

The dashboard integrates various data sources, including official government reports, public health databases, and other reliable sources, to provide up-to-date and accurate information on COVID-19 cases, deaths, recoveries, testing rates, vaccination progress, and other relevant metrics. The data is collected, processed, and transformed into meaningful insights using IBM Cognos' data modeling and analytics capabilities.

The dashboard offers a user-friendly interface with interactive visualizations, charts, graphs, and maps that allow users to explore the data from different angles and perspectives. Users can filter the data by geographic location, time periods, demographic factors, and other variables to gain deeper insights into the impact of COVID-19.

Key features of the COVID-19 Analytics Dashboard may include:

- Real-time data updates: The dashboard fetches the latest data and updates the visualizations in real-time to provide accurate and current information.
- Interactive visualizations: Users can interact with the visualizations, such as zooming in on specific regions, selecting data points for detailed information, and comparing trends over time.
- Geospatial analysis: The dashboard may include maps with color-coded regions to represent the severity of COVID-19 cases, allowing users to understand the geographical distribution of the virus.
- Comparative analysis: Users can compare COVID-19 statistics across different countries, states, or cities to identify variations and trends.
- Predictive modeling: Advanced analytics techniques can be applied to predict future trends, forecast potential outbreaks, and assess the effectiveness of containment measures.
- Data drill-down: Users can drill down into specific data points to explore underlying factors contributing to the spread of the virus, such as age groups, comorbidities, or vaccination rates.
- The COVID-19 Analytics Dashboard aims to empower decision-makers, public health officials, researchers, and the general public with valuable insights to better understand the impact of the pandemic, make informed decisions, and develop effective strategies for prevention, mitigation, and recovery.

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1.2 Purpose

The purpose of the COVID-19 Analytics Dashboard using IBM Cognos is to provide a centralized platform for analyzing and visualizing COVID-19 data. The dashboard serves multiple purposes, including:

1. Data Exploration: The dashboard enables users to explore and analyze COVID-19 data from various dimensions, such as geographical location, time periods, and demographic factors. Users can identify patterns, trends, and correlations in the data to gain a deeper understanding of the virus's impact.

2. Decision Making: The dashboard supports decision-making processes by providing reliable and up-to-date information on COVID-19 cases, deaths, recoveries, testing rates, vaccination progress, and other relevant metrics. Decision-makers can use these insights to develop strategies, allocate resources, and implement measures to control the spread of the virus and mitigate its impact.

3. Monitoring and Alerting: The dashboard offers real-time data updates, allowing users to monitor the progression of COVID-19 cases in different regions. It can generate alerts and notifications based on predefined thresholds or significant changes in the data, enabling timely responses and interventions.

4. Communication and Transparency: The dashboard enhances transparency by providing accessible and visually appealing visualizations of COVID-19 data. It can be shared with the public, healthcare professionals, and policymakers to communicate the severity of the pandemic, track progress, and inform individuals about preventive measures and vaccination campaigns.

5. Research and Analysis: Researchers and analysts can utilize the dashboard to conduct in-depth studies on the impact of COVID-19. They can leverage advanced analytics techniques, such as predictive modeling and data drill-down, to identify risk factors, assess the effectiveness of interventions, and contribute to the scientific understanding of the virus.

Overall, the COVID-19 Analytics Dashboard using IBM Cognos aims to support data-driven decision-making, facilitate effective communication, and empower stakeholders with valuable insights to combat the COVID-19 pandemic.

2. Literature Survey

2.1 Existing Problem

The COVID-19 pandemic has created an urgent need for accurate and timely information to effectively respond to the crisis. However, there are several challenges and problems related to accessing, analyzing, and visualizing COVID-19 data. Some of the existing problems that the COVID-19 Analytics Dashboard using IBM Cognos aims to address are:

1. Data Fragmentation: COVID-19 data is often scattered across various sources, including government reports, public health databases, and research institutions. This fragmentation makes it difficult to gather and integrate data from different locations and consolidate it into a unified view.

2. Data Quality and Consistency: Ensuring the quality and consistency of COVID-19 data is crucial for making informed decisions. However, inconsistencies in data reporting standards, variations in testing and reporting methodologies, and delays in data updates can lead to inaccuracies and hinder data analysis.

3. Lack of Visualization and Analysis Tools: Many existing COVID-19 data platforms provide limited or basic visualization and analysis capabilities. This makes it challenging for users to explore and interpret the data effectively, identify trends, and derive actionable insights.

4. Accessibility and User-Friendliness: COVID-19 data platforms should be accessible to a wide range of users, including decision-makers, healthcare professionals, researchers, and the general public. However, complex interfaces, technical jargon, and limited availability of user-friendly features hinder the adoption and utilization of these platforms.

5. Real-time Updates and Alerts: Given the rapidly evolving nature of the pandemic, timely updates and alerts are essential. However, existing systems often struggle to provide real-time data updates and notifications on significant changes or emerging trends, hampering the ability to respond promptly.

6. Data Integration and Comparative Analysis: COVID-19 data from different regions and sources need to be integrated and compared to gain a comprehensive understanding of the pandemic's impact. However, the lack of standardized data formats and interoperability between systems hinders effective comparative analysis.

2.2 Proposed Solution

The COVID-19 Analytics Dashboard using IBM Cognos proposes a comprehensive solution to address the existing problems related to accessing, analyzing, and visualizing COVID-19 data. The dashboard leverages the capabilities of IBM Cognos to provide a robust and user-friendly platform for effective data management and analysis. The key components of the proposed solution include:

1. Data Integration: The dashboard integrates COVID-19 data from various sources, including government reports, public health databases, and research institutions. It employs data integration techniques to gather, consolidate, and harmonize data from different locations, ensuring a unified view of the pandemic's impact.

2. Data Quality Assurance: The solution incorporates data quality assurance measures to address issues of accuracy and consistency. It includes data validation routines, anomaly detection algorithms, and data cleansing techniques to ensure that the COVID-19 data is reliable and trustworthy.

3. Advanced Analytics and Visualizations: The dashboard utilizes the advanced analytics capabilities of IBM Cognos to perform in-depth analysis and generate insightful visualizations. Users can explore the data using interactive charts, graphs, and maps, allowing them to identify patterns, trends, and correlations in COVID-19 metrics.

4. Real-time Updates and Alerts: The solution incorporates mechanisms to provide real-time data updates and alerts. It fetches the latest COVID-19 data and automatically updates the visualizations, ensuring that users have access to the most current information. Additionally, the dashboard can generate alerts and notifications based on predefined thresholds or significant changes in the data, enabling timely responses.

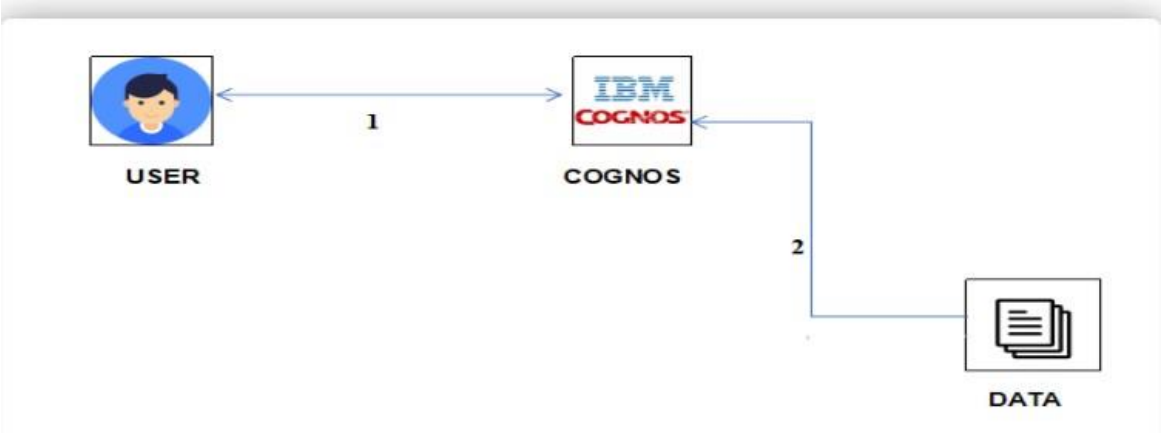
5. User-Friendly Interface: The proposed solution focuses on providing a user-friendly interface that caters to a diverse range of users. It includes intuitive navigation, customizable dashboards, and interactive features that allow users to explore the data based on their specific needs and preferences. The interface is designed to be accessible to decision-makers, healthcare professionals, researchers, and the general public.

6. Comparative Analysis and Geospatial Visualization: The dashboard facilitates comparative analysis by allowing users to compare COVID-19 data across different regions, time periods, and demographic factors. It includes geospatial visualizations that enable users to understand the geographical distribution of COVID-19 cases and variations in severity.

7. Scalability and Flexibility: The solution is designed to be scalable and flexible, allowing for the incorporation of new data sources, updates to data models, and the integration of additional analytics capabilities. This ensures that the dashboard can adapt to evolving data requirements and continue to provide valuable insights throughout the pandemic.

3 THEORETICAL ANALYSIS

3. 1 Block diagram



IBM Cognos is a powerful business intelligence and analytics platform that offers robust capabilities for data visualization. It provides a range of tools and features to create visually appealing and interactive visualizations.

3.2 Hardware / Software designing

Hardware Requirements:

1. Server Infrastructure: A robust server infrastructure is needed to host the dashboard application and manage the underlying data. This infrastructure should have sufficient processing power, memory, and storage capacity to handle data processing and user requests efficiently.

2. Storage: Adequate storage capacity is necessary to store and manage the COVID-19 data, including historical data and updates. The storage system should be scalable to accommodate increasing data volumes over time.

3. Networking: A stable and secure network infrastructure is essential to facilitate data transfer between the server and user devices. It should provide sufficient bandwidth and network connectivity for seamless access to the dashboard.

Software Requirements:

1. IBM Cognos Analytics: The core software component of the solution is IBM Cognos Analytics. It should be installed and configured on the server infrastructure to provide the analytics and visualization capabilities required for the dashboard.

2. Database Management System (DBMS): A reliable and scalable DBMS is needed to store and manage the COVID-19 data. The choice of DBMS may depend on factors such as data volume, performance requirements, and compatibility with IBM Cognos Analytics. Popular options include IBM Db2, Microsoft SQL Server, Oracle Database, and PostgreSQL.

3. ETL Tools: Extract, Transform, and Load (ETL) tools are used to extract data from various sources, transform it into a suitable format, and load it into the database. ETL tools such as IBM InfoSphere DataStage, Microsoft SQL Server Integration Services, or open-source solutions like Apache NiFi can be used for data integration.

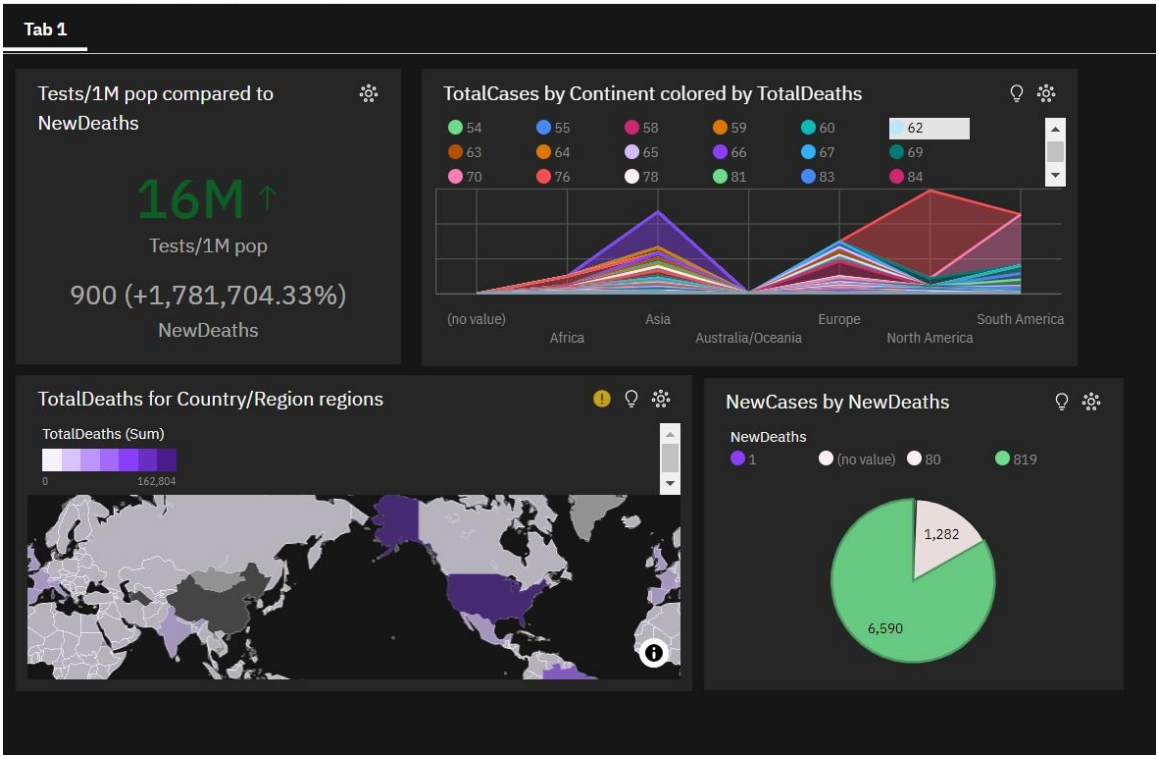
4. Data Integration APIs: APIs (Application Programming Interfaces) may be required to connect and integrate data from different sources, such as government databases, public health agencies, or research institutions. These APIs enable data retrieval and integration into the dashboard.

5. Web Application Framework: A web application framework is necessary to develop the user interface and implement the interactive features of the dashboard. Popular frameworks such as Angular, React, or Vue.js can be used to create a responsive and user-friendly web interface.

6. Security Measures: Implementing security measures is crucial to protect sensitive data and ensure the integrity of the dashboard. This may involve measures such as user authentication, role-based access control, data encryption, and secure transmission protocols (e.g., HTTPS).

4 EXPERIMENTAL INVESTIGATIONS

Screenshots of the Dashboard of Covid 19 Data Analytics through IBM Cognos:



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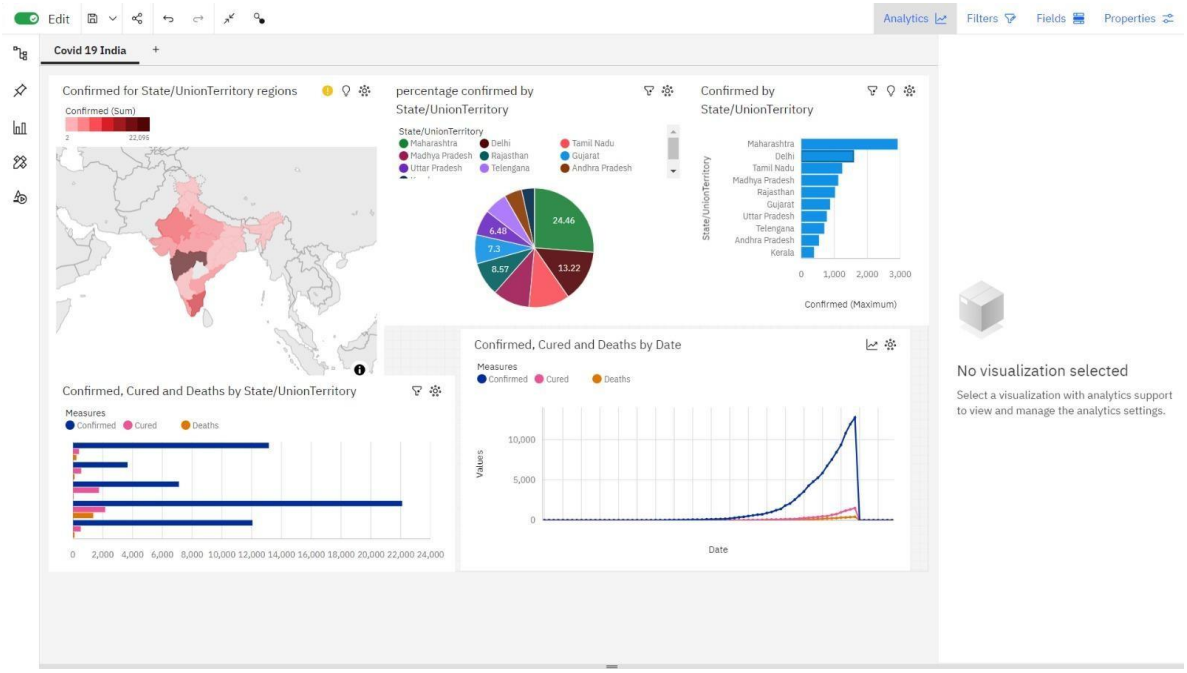

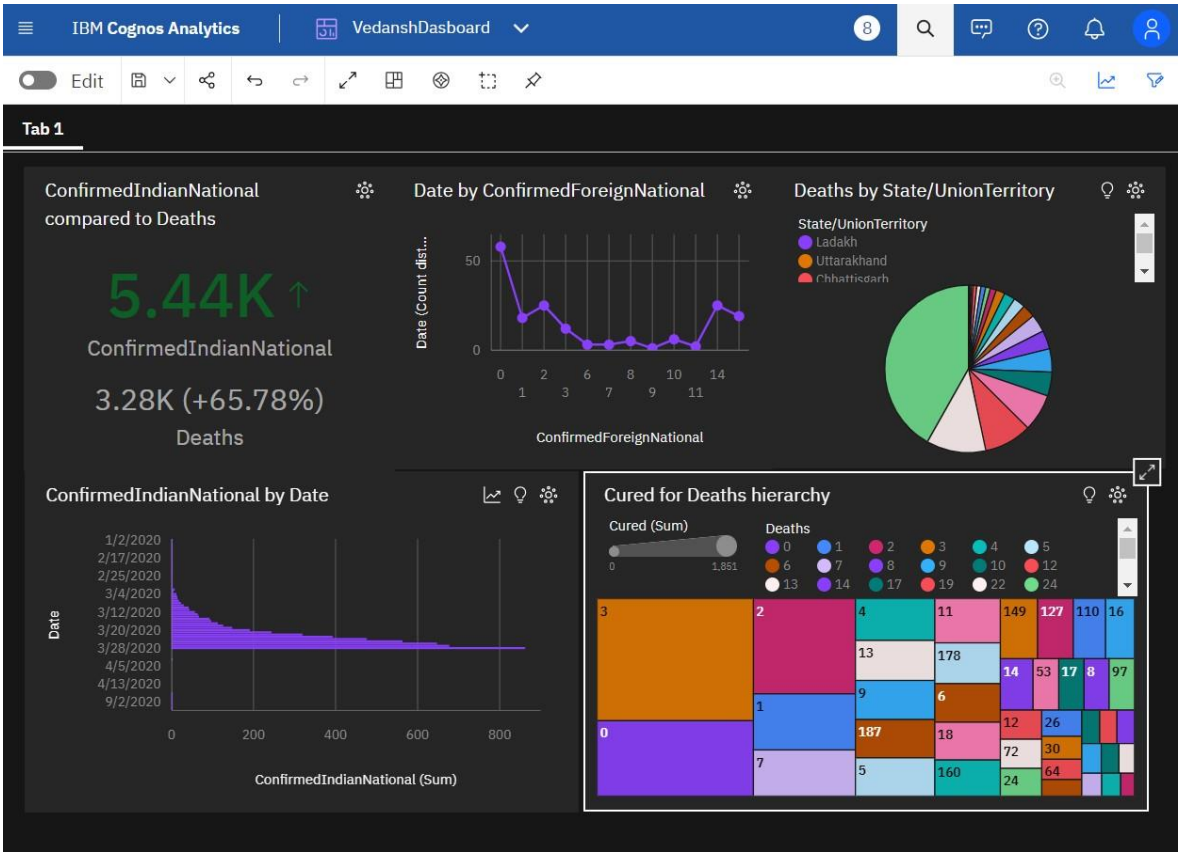

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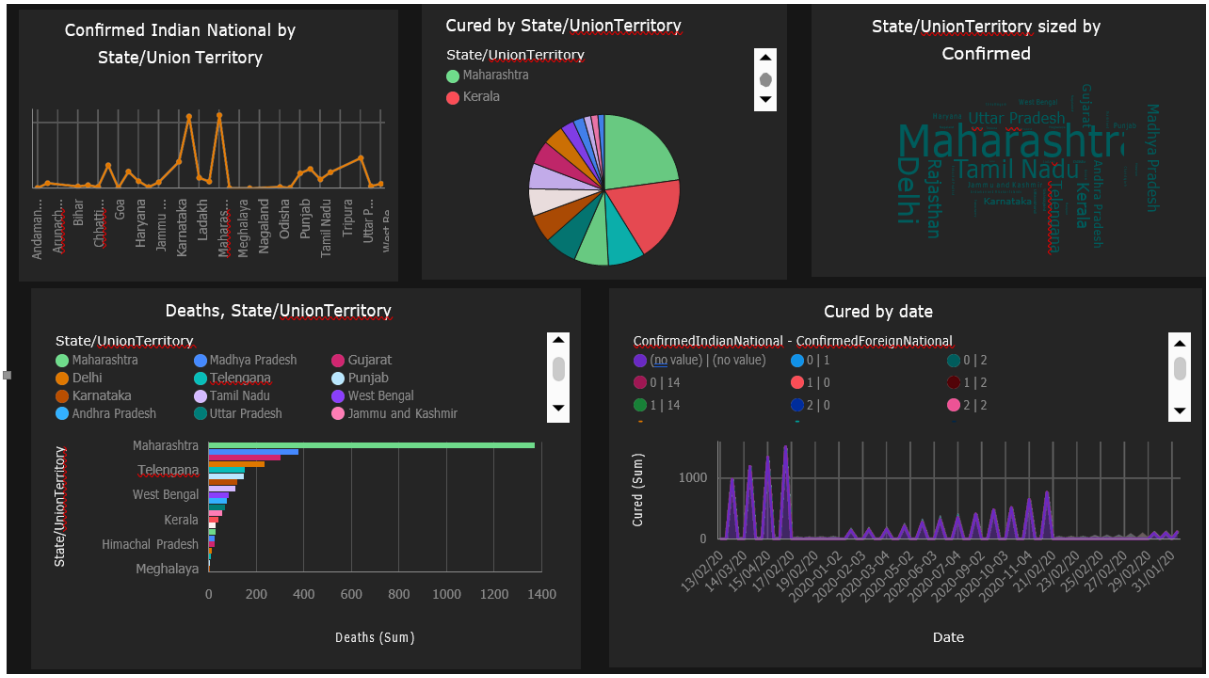
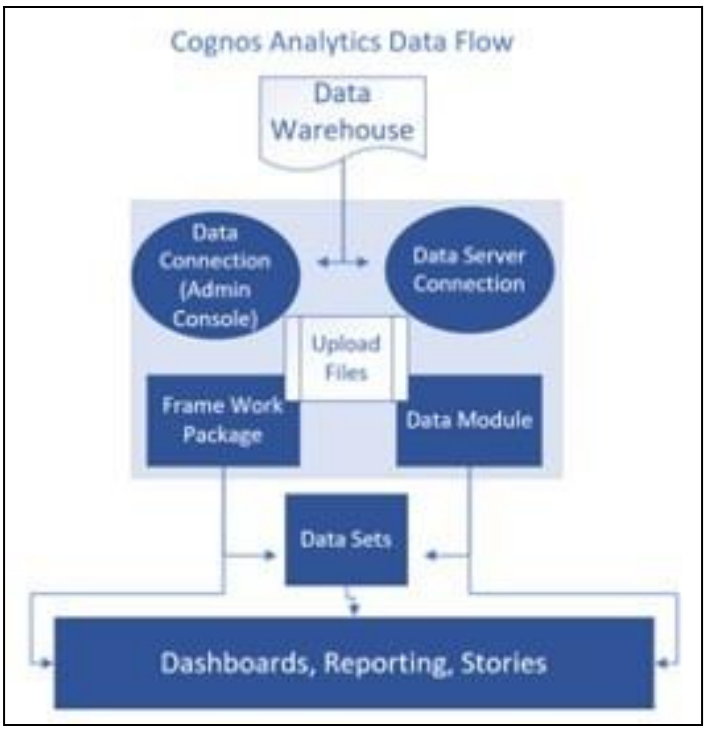


5 FLOWCHART



6 RESULT

The result of the COVID-19 Analytics Dashboard using IBM Cognos is a comprehensive and user-friendly platform that provides valuable insights into the impact and trends of the COVID-19 pandemic. Here are the key outcomes and benefits of the project:

Data-driven Insights: The dashboard enables users to gain data-driven insights into the spread of COVID-19, including key metrics such as total cases, active cases, recoveries, and fatalities. Users can analyze data at various levels, such as global, regional, and local, to understand the geographic distribution and severity of the pandemic.

Real-time Updates: The dashboard provides real-time updates, ensuring that users have access to the most current COVID-19 data available. It automatically fetches the latest data from reliable sources and updates the visualizations, allowing users to stay informed and make informed decisions based on the most up-to-date information.

Trend Analysis: Users can analyze trends and patterns in COVID-19 data over time using the visualizations and analytics capabilities of IBM Cognos. They can identify spikes or declines in cases, observe changes in infection rates, and track the effectiveness of interventions or public health measures.

Comparative Analysis: The dashboard facilitates comparative analysis by allowing users to compare COVID-19 data across different regions, countries, or demographic factors. This helps identify variations in the impact of the pandemic, evaluate different response strategies, and learn from successful approaches implemented in specific locations.

Customizable Dashboards: The solution offers customizable dashboards, allowing users to tailor their view and focus on the metrics and visualizations that are most relevant to their needs. Users can select and arrange visualizations, apply filters, and create personalized layouts to create a personalized and meaningful dashboard experience.

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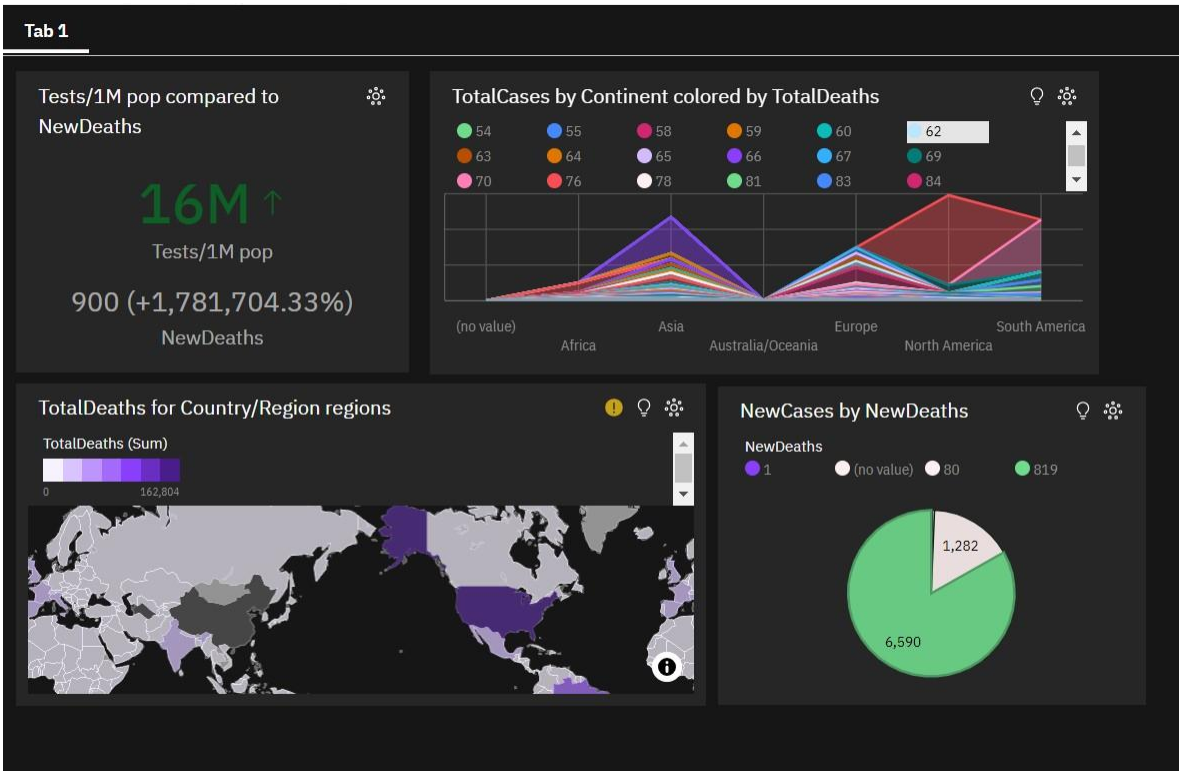

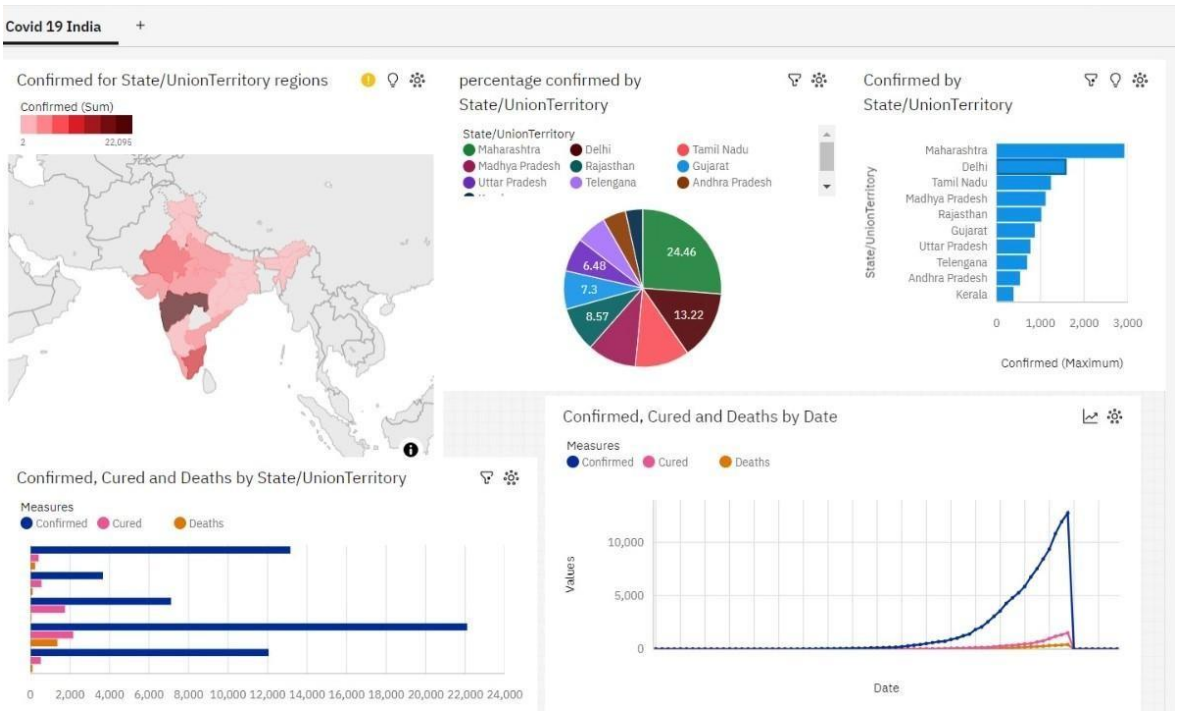

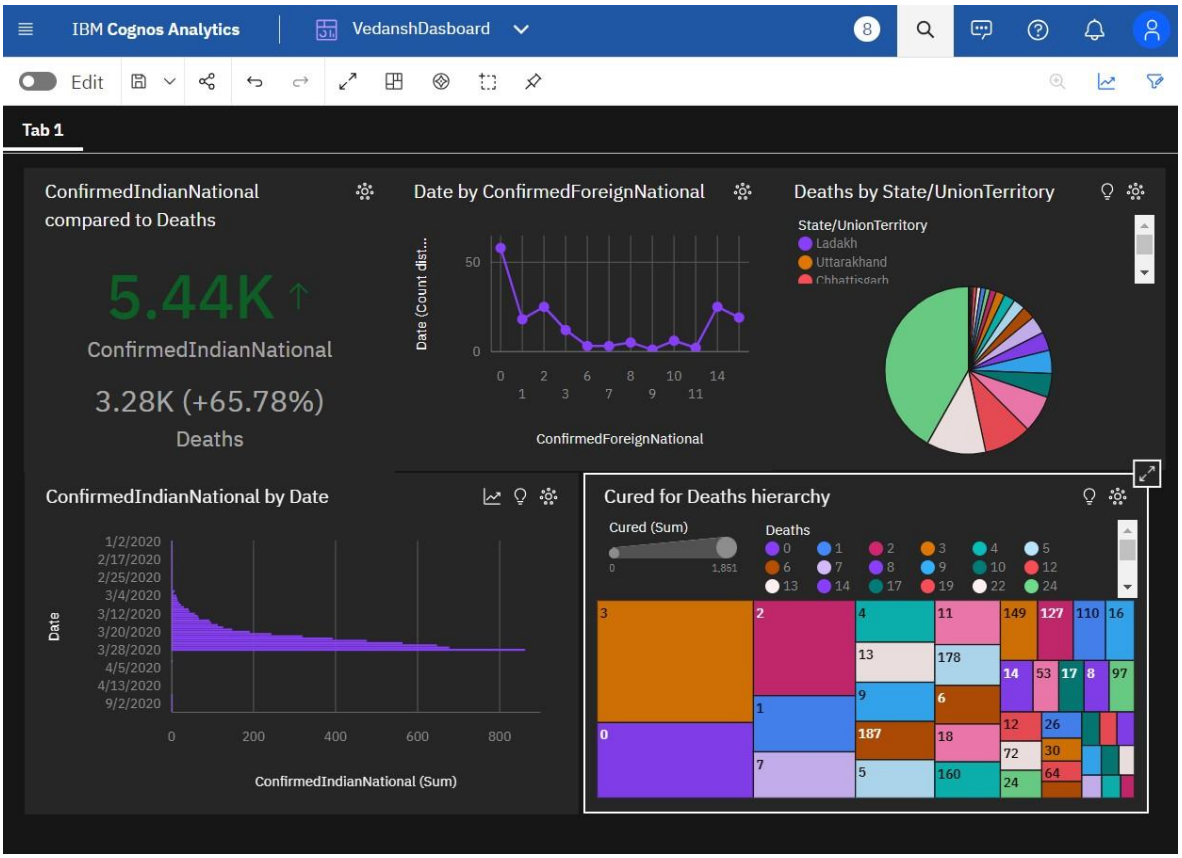

7 ADVANTAGES & DISADVANTAGES

Advantages of the Covid 19-Analytics Dashboard Using IBM Cognos:
Comprehensive analytics capabilities for in-depth analysis of COVID-19 data.
Real-time data visualization for monitoring the latest statistics and trends.
Customizable dashboard to focus on relevant metrics and adjust visualizations.
User-friendly interface for easy navigation and interaction.
Integration with multiple data sources for a comprehensive view of COVID-19 data.

Disadvantages of the Covid 19-Analytics Dashboard Using IBM Cognos:
Learning curve for users unfamiliar with the platform.
Costs associated with implementation and licensing.
Technical expertise required for development and maintenance.
Performance optimization challenges as data volume increases.
Dependency on IT support for infrastructure setup and maintenance.

8 APPLICATIONS

1. Public Health Monitoring: The dashboard enables public health officials to monitor the spread of COVID-19, track key metrics, and make informed decisions regarding interventions and resource allocation.

2. Policy-making and Planning: Decision-makers can utilize the dashboard to analyze COVID-19 trends, assess the effectiveness of measures, and develop evidence-based policies for mitigating the impact of the pandemic.

3. Healthcare Resource Management: Hospitals and healthcare providers can use the dashboard to anticipate and allocate resources based on COVID-19 data, such as hospital bed availability, ventilator usage, and PPE requirements.

4. Research and Analysis: Researchers can leverage the dashboard to analyze COVID-19 data, identify patterns, and contribute to the scientific understanding of the disease. It can aid in studying demographic factors, geographical hotspots, and the efficacy of treatments.

5. Public Information and Communication: The dashboard provides a platform to disseminate reliable COVID-19 information to the public, offering real-time updates, visualizations, and educational resources. It helps in raising awareness and promoting transparency.

6. Business Continuity Planning: Organizations can use the dashboard to assess the impact of COVID-19 on their operations, identify potential risks, and develop contingency plans to ensure business continuity.

7. International Comparison and Collaboration: The dashboard facilitates the comparison of COVID-19 data across different regions and countries, supporting international collaboration and knowledge sharing in managing the pandemic.

9 CONCLUSION

The Covid 19-Analytics Dashboard Using IBM Cognos is a powerful tool for analyzing and visualizing COVID-19 data. It offers comprehensive analytics capabilities, real-time data visualization, and customization options to meet specific needs. The dashboard has applications in public health monitoring, policy-making, healthcare resource management, research, public information, business continuity planning, and international collaboration. While there may be challenges such as a learning curve, costs, and technical expertise requirements, the benefits of the dashboard, including data-driven insights, informed decision-making, and transparency, outweigh these disadvantages. Overall, the Covid 19-Analytics Dashboard Using IBM Cognos empowers organizations and stakeholders to effectively understand, monitor, and respond to the COVID-19 pandemic, contributing to better outcomes and a more informed public health approach.

10 FUTURE SCOPE

The future scope of the Covid 19-Analytics Dashboard Using IBM Cognos includes advanced predictive analytics, integration of external data sources, AI-powered insights, mobile app development, integration with vaccination data, geographic analytics, data sharing and collaboration, and integration with other public health systems. These developments would enhance the dashboard's capabilities, accessibility, and effectiveness in managing the COVID-19 pandemic.

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APPENDIX

A. Source Code

<iframesrc="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FCovid%2B19%2Banalysis%2Bdashboard&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model00000188bf4fa2fc_00000007" width="1000" height="700" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

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