COVID-19 VACCINES ANALYSIS

PROBLEM DEFINITION:

The problem is to conduct an in-depth analysis of covid-19 vaccine data,focusing on vaccine efficacy,distribution,and adverse effects.The goal is to provide insights that aid policymakers and health organization in optimizing vaccine deployment strategies.This project involves data collection,data processing,exploratory data analysis,statistical analysis,and visualization.

DESIGN THINKING:

1) Data collection
2) Data preprocessing
3) Exploratory data analysis
4) Statistical analysis
5) Visualization
6) Insights and recommendation

DATA COLLECTION:

Vaccine effectiveness is a measure of how well vaccination protects people against health outcomes such as infection, symptomatic illness, hospitalization, and death. Vaccine effectiveness is generally measured by comparing the frequency of health outcomes in vaccinated and unvaccinated people.
Vaccines reduce risks of getting a disease by working with your body's natural defences to build protection. When you get a vaccine, your immune system responds. We now have vaccines to prevent more than 20 life-threatening diseases, helping people of all ages live longer, healthier lives. Vaccine effectiveness against COVID-19 mortality was 58.7% for a first dose, 88.6% for a second dose and 93.2% for a third dose. Protection increases with the increase of doses and is high for the third dose or booster, as has been shown in previous research.

DATA PREPROCESSING:

Data from sources like twitter, organizations internal communications, Face book, blogs are keys in providing user the choice and scrutiny in organizational elevating. Text classification is used unrestricktedly to assign a fixed predefined grouping. This grouping is used for articles categorizing, chat organizing and brand mention on people opinion. There are number of method to classify, cluster or associate (Sentiment analysis activities) these data so as to obtain public opinion regarding particular topic. To perform sentiment analysis activities of the data collected from the source need to be processed. Garbage-in garbage-out is pertinent in relationships to data analysis. That is the output the analyzer gets from the analysis is completely depend on the input data provided. The inconsistent, jagged, inadequate, erroneous, data produce inaccurate results even though analyzer uses powerful algorithm. A preprocessing step is necessary to convert raw dirty data to trainable, understandable and analyzing data in the sentiment analysis algorithm. In

this research work, twitter COVID data set is classified using LIBLINEAR and Bayes Net classification techniques on both processed and unprocessed data. For processing, resample and Remove Useless filter is used and the results are compared. For the comparison purpose performance metrics like Fl-score and precision were also used to validate the used models with its results. Through this comparison analysis, the best performances of the classification algorithms are suggested for further process.

EXPLORATORY DATA ANALYSIS:

The COVID-19 epidemic has swept the world for more than a year. Besides the efforts of the medical staff to fight the outbreak, a number of researchers at home and abroad have conducted a visual analysis of the data of COVID-19 epidemic. They have made contributions to the fight against the epidemic mainly in two aspects: situation display and epidemic prediction. With the advance of research, more and more countries have developed effective vaccines. In this paper, we conducted exploratory data analysis on the existing data of COVID-19 vaccine. It reveals the types and quantities of vaccines currently in use, shows the comparison of vaccination data from different countries and global vaccination trends, made the comparison between China and India, and has a more in-depth and clear understanding of the world's fight against the epidemic situation.

The goal of this research is to analyze data on vaccinations, vaccination administration, and forecasting vaccination rates on a country-by-country basis for the general public, policymakers, vaccine manufacturers, national governments, and international governments to better understand the current state of COVID-19 vaccination. In this study, two public datasets were used: the Johns Hopkins University corona virus 2019 dataset and Our World in Data - Coron avirus Pandemic dataset. With datasets, two approaches have been used: visual data analysis for COVID-19 vaccine administration and the auto regressive integrated moving average (ARIMA) model for forecasting vaccination rates. The findings confirm that Oxford/Astra Zeneca is the top vaccine used across the globe with 26.54%, the United States is the top in vaccination, with 277,290,173, India is the top in number of daily vaccinations with 3.659357M, and in total vaccinations per hundred people, the United States has the highest count with 82.91, among the top five countries. It is also estimated that the vaccination rate in the United States will reach almost 60%, while India, Brazil, France, and Turkey will reach about 15%, 28%, 60%, and 23%, respectively, in the following 50 days beginning 20 May 2021. This exploratory study of COVID-19 vaccination data was carried out to effectively show the current state of COVID-19 vaccine administration and to anticipate vaccination rates in the United States, India, Brazil, France, and Turkey.

STATISTICAL ANALYSIS:

The global outbreak of COVID-19 caused by the SARS-CoV-2 virus elicited immense global interest in the development and distribution of safe COVID-19 vaccines by various governments and researchers, capable of stopping the spread of COVID-19 disease. After COVID-19 was declared a global pandemic, several vaccines have been developed for emergency use authorization. The accelerated development of the vaccines was attributed to many factors but mainly by capitalizing on years of research and technology development. Although several countries tried to develop COVID-19 vaccines only a few countries succeeded. Therefore, we applied statistical methods to find factors that have contributed to the fast development of COVID-19 vaccines. All 11 countries that developed vaccines were considered and chose other 24 countries for comparison purposes according to different criteria of their R&D. Fourteen R&D indicator variables that are a measure of the R&D for all countries [World Development Indicators (WDI)] were obtained from the World Bank Data Bank and data on the COVID-19 vaccine R&D were obtained from The Knowledge Portal of the Graduate Institute Geneva and Global Health Center. The World Bank records WDI yearly, and 2019 was chosen because of a few missing values. Also, different vaccine policies were adopted by different countries during the COVID-19 vaccination

period, producing different impacts of vaccinations on the population. So, we applied the generalized estimating equations (GEE) approach to find policies that contributed greatly to decreasing the spread of COVID-19 using data from the Oxford COVID-19 Government Response Tracker (OxCGRT) and age-specific vaccination data from the European Center for Disease and Prevention and Control. Logistic regression, two-sample t-test, and Wilcoxon rank-sum test found scientific and technical journals, liability, and COVID-19 Vaccine R&D Funding (investment in pharmaceutical industry US$) are significantly associated with fast COVID-19 vaccine development. Vaccine prioritization and government vaccine financial support were significantly associated with COVID-19 daily cases. The impact of vaccination on lowering the rate of new cases is greatly observed among the mid-aged populations (25–64 years) and lower or non-significant among the younger (<25 years) and (>65 years) older populations. Therefore, these age-groups especially > 79 can be prioritized during vaccine roll-out.

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VISUALIZATION:

In this section, we will look at a quick and easy way to compare people who have been fully vaccinated against COVID-19 in two different parts of the world: North America and the Arabian Peninsula. The comparison is made by considering the percentage of people fully vaccinated against COVID-19. The comparison of the percentage of people fully vaccinated against COVID-19 in North American countries and Arabian Peninsula countries is presented in Tables 1 and 2, as well as in Figures 1 and 2.

Table 1

In North American countries, the percentage of people who have been fully immunized against COVID-19.

Table 2

Percentage of person completely vaccinated against COVID-19 in the Arabian Peninsula countries.

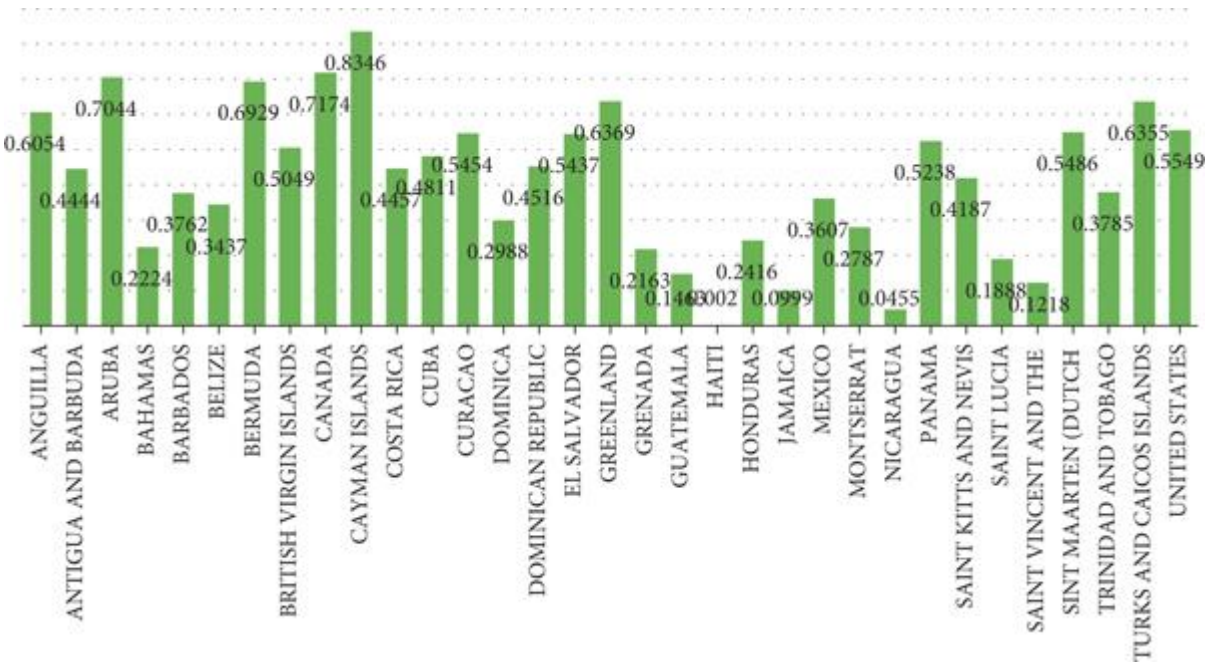

Figure 1

Bar chart of percentage of person completely vaccinated against COVID-19 in North American countries.

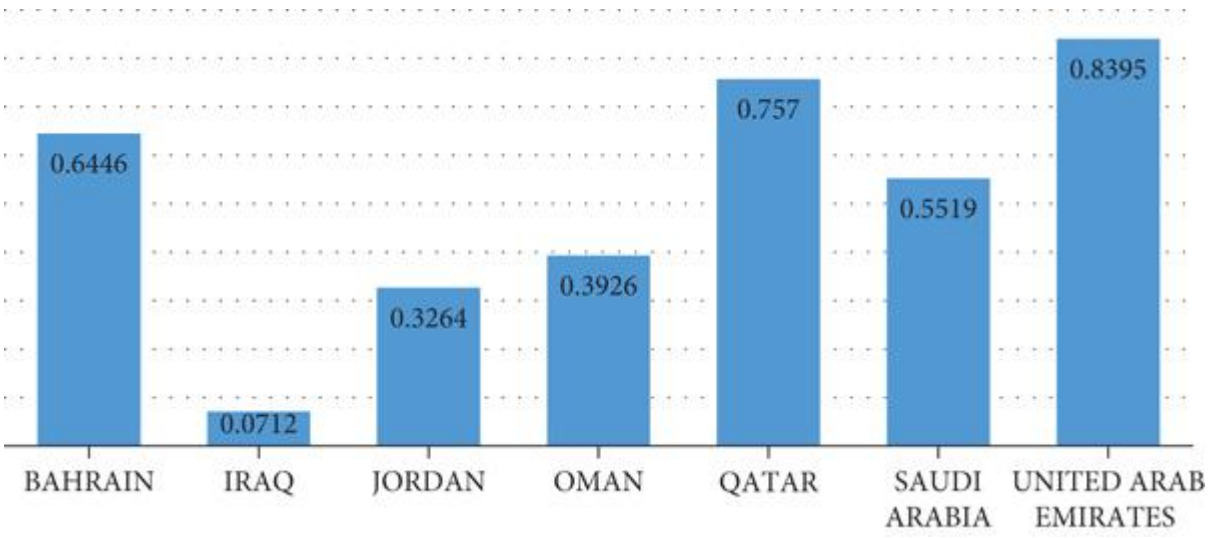

Figure 2
Bar chart of percentage of person completely vaccinated against COVID-19 in the Arabian Peninsula countries.

INSIGHTS AND RECOMMENDATION:

The spread of COVID-19 has sent shock waves across the globe. The public health crisis, unprecedented in our lifetimes, has caused severe human suffering and loss of life. The exponential rise in infected patients and the dramatic consequences of serious cases of the disease have overwhelmed hospitals and health professionals and put significant strain on the health sector. As governments grappled with the spread of the disease by closing down entire economic sectors and imposing widespread restrictions on mobility, the sanitary crisis evolved into a major economic crisis which is expected to burden societies for years to come. According to the OECD's latest Economic Outlook, even the most optimistic scenarios predict a brutal recession. Even if a second wave of infections is avoided, global economic activity is expected to fall by 6% in 2020, with average unemployment in OECD countries climbing to 9.2%, from 5.4% in 2019. In the event of a second large-scale outbreak triggering a return to lockdown, the situation would be worse (OECD, 2020[2]). All this has implications for education, which depends on tax money but which is also the key to tomorrow's tax income. Decisions concerning budget allocations to various sectors (including education, healthcare, social security and defence) depend on countries' priorities and the prevalence of private provision of these services. Education is an area in which all governments intervene to fund, direct or regulate the provision of services. As there is no guarantee that markets will provide equitable access to educational opportunities, government funding of educational services is needed to ensure that education is not beyond the reach of some members of society.