College code:4212

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COVID VACCINES ANALYSIS PHASE 4-DATA ANALYTICS WITH COGNOS GROUP 2 DEVELOPMENT PART 2

In the previous phases we have discussed the step-by-step process, Design thinking and at the phase3 we have discussed the data preprocessing techniques and many more in the last steps and in this step, we have given some problem statements to solve.

In this part we will continue building your project. Continue conducting the Covid-19 vaccines analysis by performing:

- Exploratory data analysis
- Statistical analysis
- Visualization

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Development Part 2 - COVID VACCINES ANALYSIS

Exploratory data analysis

```
In [1]: import pandas as pd
        import matplotlib.pyplot as plt
        import seaborn as sns
        from scipy import stats
In [2]: # Load your Covid-19 vaccine data into a DataFrame
        data = pd.read_csv("D:/ibm naan mudhalvan/country_vaccinations.csv") # Replace with your dataset's filename
In [3]: # Display basic information about the dataset
        print(data.info())
        <class 'pandas.core.frame.DataFrame'>
        RangeIndex: 86512 entries, 0 to 86511
        Data columns (total 15 columns):
                                                 Non-Null Count Dtype
        # Column
         0
             country
                                                 86512 non-null object
                                                 86512 non-null object
            iso_code
                                                 86512 non-null object
            date
            total_vaccinations
                                                 43607 non-null float64
            people_vaccinated
                                                 41294 non-null float64
            people_fully_vaccinated
                                                 38802 non-null float64
            daily_vaccinations_raw
                                                 35362 non-null float64
            daily_vaccinations
                                                 86213 non-null float64
         8
            total_vaccinations_per_hundred
                                                 43607 non-null float64
            people_vaccinated_per_hundred
                                                 41294 non-null float64
         10 people_fully_vaccinated_per_hundred 38802 non-null float64
         11 daily_vaccinations_per_million
                                                 86213 non-null float64
         12 vaccines
                                                 86512 non-null object
         13 source_name
                                                 86512 non-null object
         14 source_website
                                                 86512 non-null object
        dtypes: float64(9), object(6)
        memory usage: 9.9+ MB
        None
```

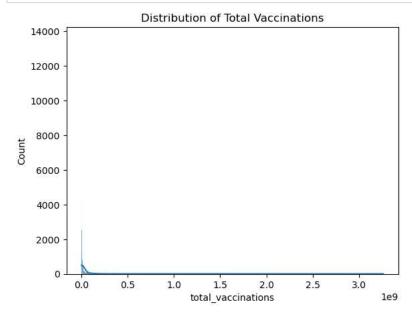
In [4]: # Display summary statistics print(data.describe())

```
people fully vaccinated
       total vaccinations
                            people vaccinated
             4.360700e+04
                                  4.129400e+04
                                                            3.880200e+04
count
             4.592964e+07
                                  1.770508e+07
                                                            1.413830e+07
mean
std
             2.246004e+08
                                  7.078731e+07
                                                            5.713920e+07
             0.000000e+00
                                  0.000000e+00
                                                            1.000000e+00
min
25%
             5.264100e+05
                                  3.494642e+05
                                                            2.439622e+05
             3.590096e+06
50%
                                  2.187310e+06
                                                            1.722140e+06
75%
             1.701230e+07
                                  9.152520e+06
                                                            7.559870e+06
             3.263129e+09
                                  1.275541e+09
                                                            1.240777e+09
max
       daily_vaccinations_raw
                                {\tt daily\_vaccinations} \ \ \backslash
count
                 3.536200e+04
                                       8.621300e+04
mean
                 2.705996e+05
                                       1.313055e+05
std
                  1.212427e+06
                                       7.682388e+05
                  0.000000e+00
                                       0.000000e+00
min
                  4.668000e+03
                                       9.000000e+02
25%
50%
                 2.530900e+04
                                       7.343000e+03
75%
                  1.234925e+05
                                       4.409800e+04
max
                  2.474100e+07
                                       2.242429e+07
       total_vaccinations_per_hundred people_vaccinated_per_hundred \
count
                          43607.000000
                                                           41294.000000
                             80.188543
                                                              40.927317
mean
                             67.913577
                                                              29.290759
std
                              0.000000
                                                               0.000000
min
25%
                             16.050000
                                                              11.370000
50%
                             67.520000
                                                              41.435000
75%
                            132.735000
                                                              67.910000
                            345.370000
                                                             124,760000
max
       people\_fully\_vaccinated\_per\_hundred \quad daily\_vaccinations\_per\_million
                               38802.000000
                                                                 86213.000000
count
                                  35.523243
                                                                  3257.049157
mean
std
                                   28.376252
                                                                  3934.312440
min
                                   0.000000
                                                                      0.000000
25%
                                   7.020000
                                                                   636.000000
                                   31.750000
50%
                                                                  2050.000000
75%
                                  62.080000
                                                                  4682,000000
                                  122.370000
                                                                117497.000000
max
```

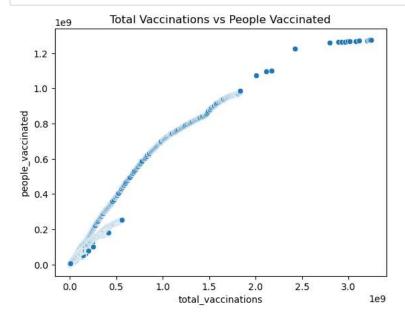
In [5]: # Check for missing values print(data.isnull().sum())

country 0 iso_code 0 a date total_vaccinations 42905 people_vaccinated 45218 people fully vaccinated 47710 daily_vaccinations_raw 51150 daily_vaccinations 299 ${\tt total_vaccinations_per_hundred}$ 42905 people_vaccinated_per_hundred 45218 people_fully_vaccinated_per_hundred 47710 ${\tt daily_vaccinations_per_million}$ 299 vaccines 0 source_name 0 source website 0 dtype: int64

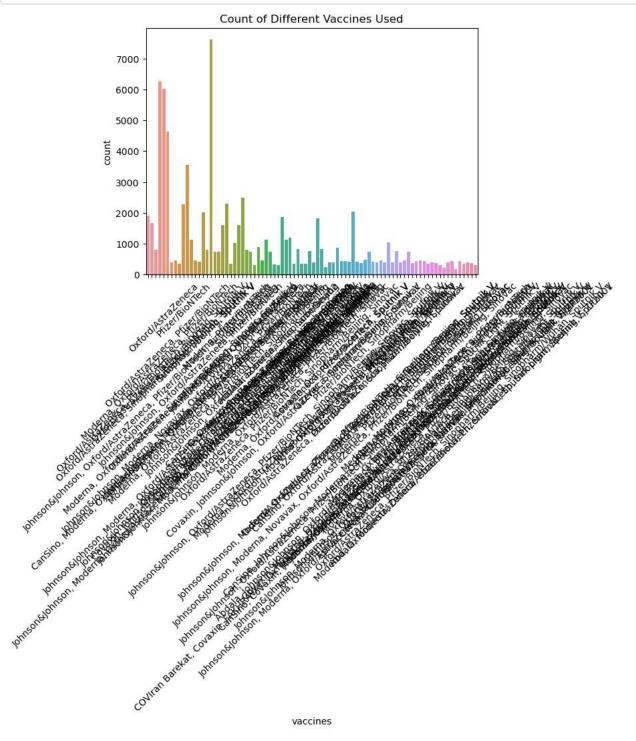
```
In [6]: # Visualize the distribution of total_vaccinations
sns.histplot(data['total_vaccinations'].dropna(), kde=True)
plt.title('Distribution of Total Vaccinations')
plt.show()
```



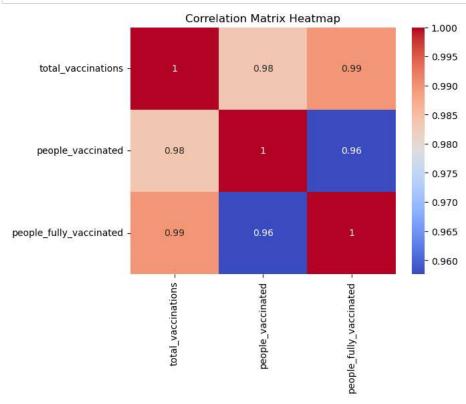
In [7]: # Visualize the relationship between total_vaccinations and people_vaccinated
 sns.scatterplot(x='total_vaccinations', y='people_vaccinated', data=data)
 plt.title('Total Vaccinations vs People Vaccinated')
 plt.show()



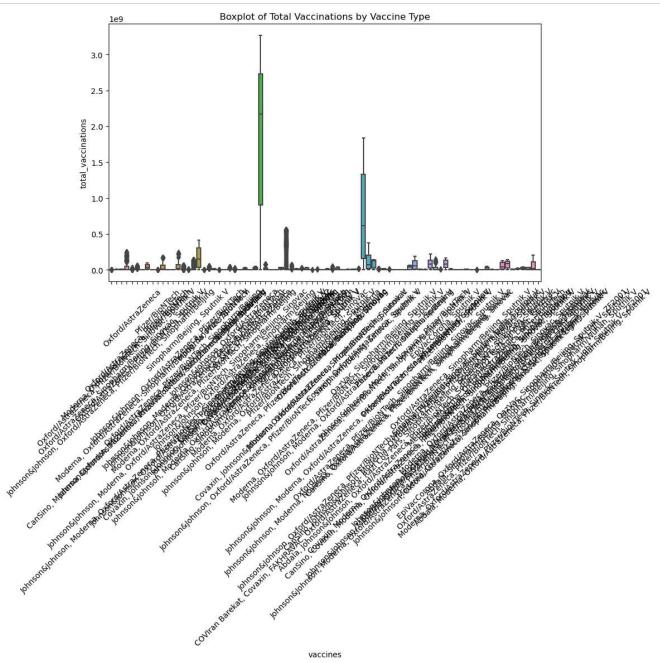
```
In [8]: # Visualize the distribution of vaccines used
sns.countplot(x='vaccines', data=data)
plt.title('Count of Different Vaccines Used')
plt.xticks(rotation=45)
plt.show()
```



```
In [9]: # Correlation matrix heatmap for relevant numerical variables
    numerical_columns = ['total_vaccinations', 'people_vaccinated', 'people_fully_vaccinated']
    correlation_matrix = data[numerical_columns].corr()
    sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm')
    plt.title('Correlation Matrix Heatmap')
    plt.show()
```



```
In [10]: # Boxplot to identify outliers in 'total_vaccinations' for each 'vaccines' category
    plt.figure(figsize=(10, 6)) # Adjust the figure size if needed
    sns.boxplot(x='vaccines', y='total_vaccinations', data=data)
    plt.title('Boxplot of Total Vaccinations by Vaccine Type')
    plt.xticks(rotation=45)
    plt.show()
```



Statistical Analysis

Visualization

```
In [12]: #Visualization

#Bar chart

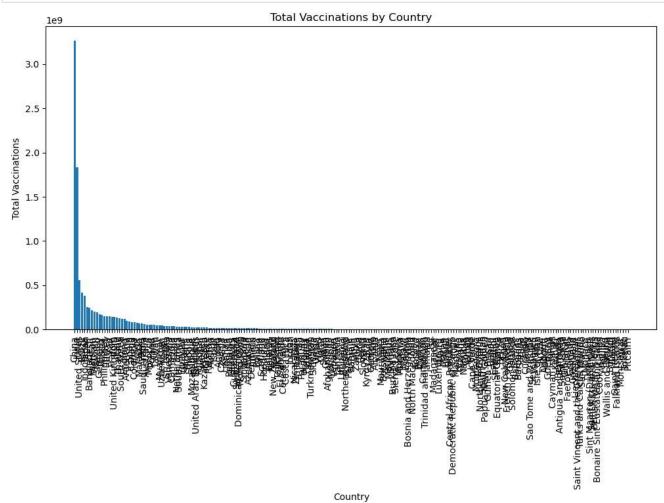
# Group the data by 'country' and calculate the total vaccinations for each country
country_totals = data.groupby('country')['total_vaccinations'].max().reset_index()

# Sort the data by total vaccinations in descending order
country_totals = country_totals.sort_values(by='total_vaccinations', ascending=False)

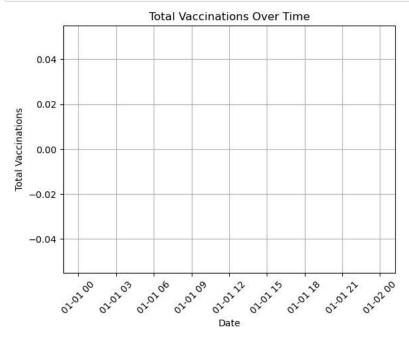
# Create a bar chart
plt.figure(figsize=(12, 6)) # Adjust the figure size if needed
plt.bar(country_totals['country'], country_totals['total_vaccinations'])

# Add labels and a title
plt.xlabel('Country')
plt.ylabel('Total Vaccinations')
plt.title('Total Vaccinations by Country')

# Show the chart
plt.xticks(rotation=90)
plt.show()
```



```
In [13]: #line chart
         # Assuming 'date' is in datetime format, if not, convert it to datetime
         data['date'] = pd.to_datetime(data['date'])
         # Sort the data by date
         data.sort_values(by='date', inplace=True)
         # Extract data for a specific country (you can change the country)
         country_data = data[data['country'] == 'Your_Country_Name']
         # Create a line chart
         plt.plot(country_data['date'], country_data['total_vaccinations'], marker='o', linestyle='-')
         # Add labels and a title
         plt.xlabel('Date')
         plt.ylabel('Total Vaccinations')
         plt.title('Total Vaccinations Over Time')
         # Show the chart
         plt.grid(True) # Add grid lines
         plt.xticks(rotation=45)
         plt.show()
```



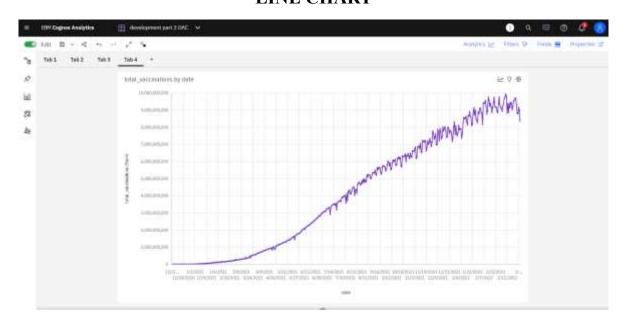
In []:

VISUALIZATION USING IBM COGNOS SCATTER PLOT

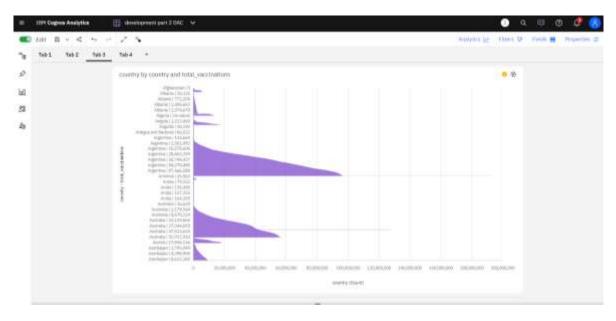


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LINE CHART



BAR CHART



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BOX PLOT

