Covid-19 Analysis and Visualization

March 19, 2025

##Covid-19 Analysis and Visualization This analysis summarizes the modeling, simulation, and analytics work around the COVID-19 outbreak around the world from the perspective of data science and visual analytics. It examines the impact of best practices and preventive measures in various sectors and enables outbreaks to be managed with available health resources.

Step 1: Importing Necessary Libraries

[ ]:
```
# Data analysis and Manipulation
import plotly.graph_objs as go
import plotly.io as pio
import plotly.express as px
import pandas as pd

# Data Visualization
import matplotlib.pyplot as plt

# Importing Plotly
import plotly.offline as py
py.init_notebook_mode(connected=True)

# Initializing Plotly
pio.renderers.default = 'colab'
```

Step 2: Importing the Datasets

Importing three datasets into this project

covid– This dataset contains Country/Region, Continent, Population, TotalCases, NewCases, TotalDeaths, NewDeaths, TotalRecovered, NewRecovered, ActiveCases, Serious, Critical, Tot Cases/1M pop, Deaths/1M pop, TotalTests, Tests/1M pop, WHO Region, iso_alpha.

covid_grouped– This dataset contains Date(from 20-01-22 to 20-07-27), Country/Region, Confirmed, Deaths, Recovered, Active, New cases, New deaths, New recovered, WHO Region, iso_alpha.

coviddeath– This dataset contains real-world examples of a number of Covid-19 deaths and the reasons behind the deaths.

[ ]:
```
# Importing Dataset1
dataset1 = pd.read_csv("covid.csv")
dataset1.head()  # returns first 5 rows
```

[ ]:

	Country/Region	Continent	Population	TotalCases	NewCases	TotalDeaths	NewDeaths	TotalRecovered	NewRecovered	ActiveCases	Serious,Critical	Tot Cases/1M pop	Deaths/1M pop	TotalTests	Tests/1M pop	WHO Region	iso_alpha
0	USA	North America	3.311981e+08	5032179	NaN	162804.0	NaN	2576668.0	NaN	2292707.0	18296.0	15194.0	492.0	63139605.0	190640.0	Americas	USA
1	Brazil	South America	2.127107e+08	2917562	NaN	98644.0	NaN	2047660.0	NaN	771258.0	8318.0	13716.0	464.0	13206188.0	62085.0	Americas	BRA
2	India	Asia	1.381345e+09	2025409	NaN	41638.0	NaN	1377384.0	NaN	606387.0	8944.0	1466.0	30.0	22149351.0	16035.0	South-EastAsia	IND
3	Russia	Europe	1.459409e+08	871894	NaN	14606.0	NaN	676357.0	NaN	180931.0	2300.0	5974.0	100.0	29716907.0	203623.0	Europe	RUS
4	South Africa	Africa	5.938157e+07	538184	NaN	9604.0	NaN	387316.0	NaN	141264.0	539.0	9063.0	162.0	3149807.0	53044.0	Africa	ZAF

Getting dataset information

[ ]:
```
# Returns tuple of shape (Rows, columns)
print(dataset1.shape)

# Returns size of dataframe
print(dataset1.size)

# Information about Dataset1
# return concise summary of dataframe
dataset1.info()
```

```
(209, 17)
3553
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 209 entries, 0 to 208
Data columns (total 17 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   Country/Region    209 non-null    object
```

```
 1   Continent          208 non-null    object
 2   Population         208 non-null    float64
 3   TotalCases         209 non-null    int64
 4   NewCases           4 non-null      float64
 5   TotalDeaths        188 non-null    float64
 6   NewDeaths          3 non-null      float64
 7   TotalRecovered     205 non-null    float64
 8   NewRecovered       3 non-null      float64
 9   ActiveCases        205 non-null    float64
 10  Serious,Critical   122 non-null    float64
 11  Tot Cases/1M pop   208 non-null    float64
 12  Deaths/1M pop      187 non-null    float64
 13  TotalTests         191 non-null    float64
 14  Tests/1M pop       191 non-null    float64
 15  WHO Region         184 non-null    object
 16  iso_alpha          209 non-null    object
dtypes: float64(12), int64(1), object(4)
memory usage: 27.9+ KB
```

Importing dataset number 2

[ ]:
```
# Importing Dataset2
dataset2 = pd.read_csv("covid_grouped.csv")
dataset2.head()  # return first 5 rows of dataset2
```

[ ]:

	Date	Country/Region	Confirmed	Deaths	Recovered	Active	New cases	\
0	2020-01-22	Afghanistan	0	0	0	0	0	
1	2020-01-22	Albania	0	0	0	0	0	
2	2020-01-22	Algeria	0	0	0	0	0	
3	2020-01-22	Andorra	0	0	0	0	0	
4	2020-01-22	Angola	0	0	0	0	0	

	New deaths	New recovered	WHO Region	iso_alpha
0	0	0	Eastern Mediterranean	AFG
1	0	0	Europe	ALB
2	0	0	Africa	DZA
3	0	0	Europe	AND
4	0	0	Africa	AGO

Getting dataset information

[ ]:
```
# Returns tuple of shape (Rows, columns)
print(dataset2.shape)

# Returns size of dataframe
print(dataset2.size)

# Information about Dataset2
```

```
dataset2.info()  # return concise summary of dataframe
```

```
(35156, 11)
386716
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 35156 entries, 0 to 35155
Data columns (total 11 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Date            35156 non-null  object
 1   Country/Region  35156 non-null  object
 2   Confirmed       35156 non-null  int64
 3   Deaths          35156 non-null  int64
 4   Recovered       35156 non-null  int64
 5   Active          35156 non-null  int64
 6   New cases       35156 non-null  int64
 7   New deaths      35156 non-null  int64
 8   New recovered   35156 non-null  int64
 9   WHO Region      35156 non-null  object
 10  iso_alpha       35156 non-null  object
dtypes: int64(7), object(4)
memory usage: 3.0+ MB
```

Step 3: Dataset cleaning

[ ]:
```
# Columns labels of a Dataset1
dataset1.columns
```

[ ]:
```
Index(['Country/Region', 'Continent', 'Population', 'TotalCases', 'NewCases',
       'TotalDeaths', 'NewDeaths', 'TotalRecovered', 'NewRecovered',
       'ActiveCases', 'Serious,Critical', 'Tot Cases/1M pop', 'Deaths/1M pop',
       'TotalTests', 'Tests/1M pop', 'WHO Region', 'iso_alpha'],
      dtype='object')
```

We don't need 'NewCases', 'NewDeaths', 'NewRecovered' columns as they contains NaN values. So drop these columns by drop() function of pandas.

[ ]:
```
# Drop NewCases, NewDeaths, NewRecovered rows from dataset1

dataset1.drop(['NewCases', 'NewDeaths', 'NewRecovered'],
              axis=1, inplace=True)

# Select random set of values from dataset1
dataset1.sample(5)
```

[ ]:

	Country/Region	Continent	Population	TotalCases	TotalDeaths	\
68	El Salvador	North America	6489514.0	19126	513.0	
90	Zambia	Africa	18430129.0	7164	199.0	

```
196       Saint Lucia  North America    183712.0          25           NaN
156  Diamond Princess            NaN         NaN         712          13.0
10               Iran           Asia  84097623.0      320117       17976.0

     TotalRecovered  ActiveCases  Serious,Critical  Tot Cases/1M pop  \
68           9236.0       9377.0             509.0            2947.0
90           5786.0       1179.0               NaN             389.0
196            24.0          1.0               NaN             136.0
156           651.0         48.0               4.0               NaN
10         277463.0      24678.0            4156.0            3806.0

     Deaths/1M pop  TotalTests  Tests/1M pop            WHO Region iso_alpha
68            79.0    251271.0       38720.0              Americas       SLV
90            11.0     90307.0        4900.0                Africa       ZMB
196            NaN      3895.0       21202.0              Americas       LCA
156            NaN         NaN           NaN                   NaN
10           214.0   2612763.0       31068.0  EasternMediterranean       IRN
```

Creating table using plotly express

[ ]:
```
# Import create_table Figure Factory

from plotly.figure_factory import create_table

colorscale = [[0, '#4d004c'], [.5, '#f2e5ff'], [1, '#ffffff']]
table = create_table(dataset1.head(15), colorscale=colorscale)
py.iplot(table)
```

Step 4: Bar graphs- Comparisons between COVID infected countries in terms of total cases, total deaths, total recovered & total tests

[ ]:
```
px.bar(dataset1.head(15), x = 'Country/Region',
       y = 'TotalCases',color = 'TotalCases',
       height = 500,hover_data = ['Country/Region', 'Continent'])
```

As the plot clearly shows the data for the top 15 countries, now again take the country with respect to the total number of cases from the top 15 countries, color the total deaths hover data as 'Country/Region', 'Continent' and analyze the visualization.

[ ]:
```
px.bar(dataset1.head(15), x = 'Country/Region', y = 'TotalCases',
       color = 'TotalDeaths', height = 500,
       hover_data = ['Country/Region', 'Continent'])
```

Let's analyze by coloring the total number of recovered cases

[ ]:
```
px.bar(dataset1.head(15), x = 'Country/Region', y = 'TotalCases',
       color = 'TotalDeaths', height = 500,
       hover_data = ['Country/Region', 'Continent'])
```

Visualize the same again by coloring the total number of tests.

```
[ ]: px.bar(dataset1.head(15), x = 'Country/Region', y = 'TotalCases',
       color = 'TotalTests', height = 500, hover_data = ['Country/Region',␣
     ↪'Continent'])
```

The visualization could be as we have done with the top 15 countries with total cases, deaths, recoveries, and tests. We can analyze the plot by looking at them.

Let's create a horizontal orientation plot with X-axis as 'TotalTests' and Y-axis as 'Country/Region' with passing parameter orientation="h" and color the plot by 'TotalTests'.

```
[ ]: px.bar(dataset1.head(15), x = 'TotalTests', y = 'Country/Region',
       color = 'TotalTests',orientation ='h',  height = 500,
       hover_data = ['Country/Region', 'Continent'])
```

Let's look at 'TotalTests' followed by 'Continent' and color the plot with 'Continent'.

```
[ ]: px.bar(dataset1.head(15), x = 'TotalTests', y = 'Continent',
       color = 'TotalTests',orientation ='h',  height = 500,
       hover_data = ['Country/Region', 'Continent'])
```

Step 5: Data Visualization through Bubble Charts-Continent Wise

Let's create a scatter plot and take a look at the continent's statistics, firstly look at the total number of cases by continent and take hover data as 'Country/Region', 'Continent'.

```
[ ]: px.scatter(dataset1, x='Continent',y='TotalCases',
           hover_data=['Country/Region', 'Continent'],
           color='TotalCases', size='TotalCases', size_max=80)
```

log_y= True, the histogram axis (not the returned parameter) is in log scale. The return parameter (n, bins), i.e. the values of bins and sides of bins are the same for log=True and log=False. This means both n==n2 and bins==bins2 are true

```
[ ]: px.scatter(dataset1.head(57), x='Continent',y='TotalCases',
           hover_data=['Country/Region', 'Continent'],
           color='TotalCases', size='TotalCases', size_max=80, log_y=True)
```

```
[ ]: px.scatter(dataset1.head(54), x='Continent',y='TotalTests',
           hover_data=['Country/Region', 'Continent'],
           color='TotalTests', size='TotalTests', size_max=80)
```

```
[ ]: px.scatter(dataset1.head(50), x='Continent',y='TotalTests',
           hover_data=['Country/Region', 'Continent'],
           color='TotalTests', size='TotalTests', size_max=80, log_y=True)
```

Step 6: Data Visualization through Bubble Charts-Country Wise Let's take a look at the country-wise data visualization, first look at the continent with respect to the total number of

deaths by the top 50 countries only and color the total number of deaths and take the hover data as 'Country/Region', 'Continent'.

Example: Bubble chart

```
[ ]: px.scatter(dataset1.head(100), x='Country/Region', y='TotalCases',
                hover_data=['Country/Region', 'Continent'],
                color='TotalCases', size='TotalCases', size_max=80)
```

Now format the image of the country/region in relation to the total number of deaths. And do the same for the other aspects of COVID-19 from dataset1.

Example: Bubble chart

```
[ ]: px.scatter(dataset1.head(10), x='Country/Region', y= 'TotalDeaths',
                hover_data=['Country/Region', 'Continent'],
                color='Country/Region', size= 'TotalDeaths', size_max=80)
```

Example: Country/Region VS Tests/1M pop (color-scale of Tests/1M pop)

```
[ ]: px.scatter(dataset1.head(30), x='Country/Region', y= 'Tests/1M pop',
                hover_data=['Country/Region', 'Continent'],
                color='Tests/1M pop', size= 'Tests/1M pop', size_max=80)
```

```
[ ]: px.scatter(dataset1.head(30), x='TotalCases', y= 'TotalDeaths',
                hover_data=['Country/Region', 'Continent'],
                color='TotalDeaths', size= 'TotalDeaths', size_max=80)
```

It is clear from the result that they have a linear relationship between the total number of cases and the total number of deaths. That means more cases, more deaths.

```
[ ]: px.scatter(dataset1.head(30), x='TotalCases', y= 'TotalDeaths',
                hover_data=['Country/Region', 'Continent'],
                color='TotalDeaths', size= 'TotalDeaths', size_max=80,
                log_x=True, log_y=True)
```

```
[ ]: px.scatter(dataset1.head(30), x='TotalTests', y= 'TotalCases',
                hover_data=['Country/Region', 'Continent'],
                color='TotalTests', size= 'TotalTests', size_max=80,
                log_x=True, log_y=True)
```

Step 7: Advanced Data Visualization-Bar graphs for All top infected Countries

In this task, we will explore covid-19 data using bar graphs and charts and use dataset2 as it has date column.

Example: Bar chart

```
[ ]: px.bar(dataset2, x="Date", y="Confirmed", color="Confirmed",
           hover_data=["Confirmed", "Date", "Country/Region"], height=400)
```

The above graph we get as output which includes all countries with respect to recovered cases. we can imagine the exponential growth of corona cases by date. We can use log function for this to be more clear.

Example: Bar chart

```
[ ]: px.bar(dataset2, x="Date", y="Confirmed", color="Confirmed",
       hover_data=["Confirmed", "Date", "Country/Region"],log_y=True,␣
     ↪height=400)
```

Let's imagine death instead of confirmation with the same and color it by date.

Example: Bar chart

```
[ ]: px.bar(dataset2, x="Date", y="Deaths", color="Deaths",
       hover_data=["Confirmed", "Date", "Country/Region"],
       log_y=False, height=400)
```

Step 8: Countries Specific COVID Data Visualization: (United States)

In this specific task, we will analyze data of the USA country.

Example: Refining dataset to get only USA data

```
[ ]: df_US= dataset2.loc[dataset2["Country/Region"]=="US"]
```

Now let us plot and study the covid situation in the USA.

Example: Bar chart

```
[ ]: px.bar(df_US, x="Date", y="Confirmed", color="Confirmed", height=400)
```

Here we can clearly see how the confirmed cases increased in the United States with respect to time (January 2020 to July 2020). Similarly, we can check the same for recovered cases, tests and deaths.

Example: Bar chart

```
[ ]: px.bar(df_US,x="Date", y="Recovered", color="Recovered", height=400)
```

Similarly, we can analyze the data in all the ways to generate the line graph for the same.

Example: Line plot

```
[ ]: px.line(df_US,x="Date", y="Recovered", height=400)
```

Example: Line plot

```
[ ]: px.line(df_US,x="Date", y="Deaths", height=400)
```

```
[ ]: px.line(df_US,x="Date", y="Confirmed", height=400)
```

```
[ ]: px.line(df_US,x="Date", y="New cases", height=400)
```

Similarly, let us also plot a line plot.

Example: Scatter plot

```
[ ]: px.scatter(df_US, x="Confirmed", y="Deaths", height=400)
```

Step 9: Visualization of Data in terms of Maps We can use choropleth to visualize the data in terms of maps, with maps usually being the predominant way of visualizing the data. Since COVID-19 is a global phenomenon and so we look through and fix them in terms of wall maps. Ortho-graphics, rectangular and natural earth projection to visualize the data With dataset2 for the purpose as it has Dates column. It will look at the growth of Covid-19 (from Jan to July 2020) as in how the virus reached across the world.

Choropleth is an amazing representation of data on a map. Choropleth maps provide an easy way to visualize how a measurement varies across a geographic areal-Life

Project Application in Real choropleth map displays divided geographical areas or regions that are colored, shaded or patterned in relation to a data variable.

Equi-rectangular Projection:

```
[ ]: px.choropleth(dataset2,
                   locations="iso_alpha",
                   color="Confirmed",
                   hover_name="Country/Region",
                   color_continuous_scale="Blues",
                   animation_frame="Date")
```

This creates an animation containing visualizations from January to July 2020. Playing this animation will make it more clear how the virus spread around the world. The darker the color, the higher the confirmed cases are.

Creating map

```
[ ]: px.choropleth(dataset2,
                   locations='iso_alpha',
                   color="Deaths",
                   hover_name="Country/Region",
                   color_continuous_scale="Viridis",
                   animation_frame="Date" )
```

This code creates an animation of death cases by date. By playing this animation it will be shown how deaths increase around the world.

Natural Earth projection is a compromise pseudo-cylindrical map projection for world maps.

Example: Natural earth projection

```
[ ]: px.choropleth(dataset2,
                   locations='iso_alpha',
                   color="Recovered",
                   hover_name="Country/Region",
```

```
                color_continuous_scale="RdYlGn",
                projection="natural earth",
                animation_frame="Date" )
```

By running the output, things start to become more clear about how the recovery rate changes with respect to the date. Lets also look at how an animation can be added to a bar graph. We can convert the bar graph into animation using Dates column that is in dataset2.

Example: Bar graph animation

[ ]:
```
px.bar(dataset2, x="WHO Region", y="Confirmed", color="WHO Region",
       animation_frame="Date", hover_name="Country/Region")
```

When running the output, the animation will run from January to July 2020. It will show 6 different bar graphs, each continent has its own color representing the confirmed cases.

Step 10: Visualize text using Word Cloud Visualize the causes of death due to covid-19, as covid-19 affects people in different ways, hence creating a word cloud to visualize the leading cause of covid-19 deaths. To visualize the text the steps need to be followed are-

Used to convert data elements of an array into list. Convert the string to one single string. Convert the string into word cloud Dataset3: This dataset contains real world examples of number of Covid-19 deaths and the reasons behind the deaths.

Example: Importing dataset

[ ]:
```
dataset3= pd.read_csv("coviddeath.csv")
dataset3.head()
```

[ ]:

	Data as of	Start Week	End Week	State	Condition Group	Condition	ICD10_codes	Age Group	Number of COVID-19 Deaths	Flag
0	08/30/2020	02/01/2020	08/29/2020	US	Respiratory diseases	Influenza and pneumonia	J09-J18	0-24	122.0	NaN
1	08/30/2020	02/01/2020	08/29/2020	US	Respiratory diseases	Influenza and pneumonia	J09-J18	25-34	596.0	NaN
2	08/30/2020	02/01/2020	08/29/2020	US	Respiratory diseases	Influenza and pneumonia	J09-J18	35-44	1521.0	NaN
3	08/30/2020	02/01/2020	08/29/2020	US	Respiratory diseases	Influenza and pneumonia	J09-J18	45-54	4186.0	NaN
4	08/30/2020	02/01/2020	08/29/2020	US	Respiratory diseases	Influenza and pneumonia	J09-J18	55-64	10014.0	NaN

Getting dataset information

[ ]:
```
dataset3.groupby(["Condition"]).count()
```

[ ]:

Condition	Data as of	Start Week	End Week	State
Adult respiratory distress syndrome	540	540	540	540
All other conditions and causes (residual)	540	540	540	540
Alzheimer disease	530	530	530	530
COVID-19	540	540	540	540
Cardiac arrest	520	520	520	520
Cardiac arrhythmia	540	540	540	540
Cerebrovascular diseases	530	530	530	530
Chronic lower respiratory diseases	540	540	540	540
Diabetes	540	540	540	540
Heart failure	540	540	540	540
Hypertensive diseases	540	540	540	540
Influenza and pneumonia	540	540	540	540
Intentional and unintentional injury, poisoning…	520	520	520	520
Ischemic heart disease	540	540	540	540
Malignant neoplasms	540	540	540	540
Obesity	530	530	530	530
Other diseases of the circulatory system	530	530	530	530
Other diseases of the respiratory system	540	540	540	540
Renal failure	540	540	540	540
Respiratory arrest	480	480	480	480
Respiratory failure	540	540	540	540
Sepsis	530	530	530	530
Vascular and unspecified dementia	530	530	530	530

Obesity	530	530
Other diseases of the circulatory system	530	530
Other diseases of the respiratory system	540	540
Renal failure	540	540
Respiratory arrest	480	480
Respiratory failure	540	540
Sepsis	530	530
Vascular and unspecified dementia	530	530

	Condition Group	\
Condition		
Adult respiratory distress syndrome	540	
All other conditions and causes (residual)	540	
Alzheimer disease	530	
COVID-19	540	
Cardiac arrest	520	
Cardiac arrhythmia	540	
Cerebrovascular diseases	530	
Chronic lower respiratory diseases	540	
Diabetes	540	
Heart failure	540	
Hypertensive diseases	540	
Influenza and pneumonia	540	
Intentional and unintentional injury, poisoning…	520	
Ischemic heart disease	540	
Malignant neoplasms	540	
Obesity	530	
Other diseases of the circulatory system	530	
Other diseases of the respiratory system	540	
Renal failure	540	
Respiratory arrest	480	
Respiratory failure	540	
Sepsis	530	
Vascular and unspecified dementia	530	

	ICD10_codes	Age Group	\
Condition			
Adult respiratory distress syndrome	540	540	
All other conditions and causes (residual)	540	540	
Alzheimer disease	530	530	
COVID-19	540	540	
Cardiac arrest	520	520	
Cardiac arrhythmia	540	540	
Cerebrovascular diseases	530	530	
Chronic lower respiratory diseases	540	540	
Diabetes	540	540	
Heart failure	540	540	

Hypertensive diseases	540	540
Influenza and pneumonia	540	540
Intentional and unintentional injury, poisoning…	520	520
Ischemic heart disease	540	540
Malignant neoplasms	540	540
Obesity	530	530
Other diseases of the circulatory system	530	530
Other diseases of the respiratory system	540	540
Renal failure	540	540
Respiratory arrest	480	480
Respiratory failure	540	540
Sepsis	530	530
Vascular and unspecified dementia	530	530

Condition	Number of COVID-19 Deaths	\
Adult respiratory distress syndrome	272	
All other conditions and causes (residual)	363	
Alzheimer disease	144	
COVID-19	377	
Cardiac arrest	219	
Cardiac arrhythmia	192	
Cerebrovascular diseases	187	
Chronic lower respiratory diseases	229	
Diabetes	276	
Heart failure	204	
Hypertensive diseases	264	
Influenza and pneumonia	331	
Intentional and unintentional injury, poisoning…	188	
Ischemic heart disease	224	
Malignant neoplasms	198	
Obesity	182	
Other diseases of the circulatory system	213	
Other diseases of the respiratory system	188	
Renal failure	238	
Respiratory arrest	111	
Respiratory failure	320	
Sepsis	243	
Vascular and unspecified dementia	191	

Condition	Flag
Adult respiratory distress syndrome	268
All other conditions and causes (residual)	177
Alzheimer disease	386
COVID-19	163
Cardiac arrest	301

```
Cardiac arrhythmia                                    348
Cerebrovascular diseases                              343
Chronic lower respiratory diseases                    311
Diabetes                                              264
Heart failure                                         336
Hypertensive diseases                                 276
Influenza and pneumonia                               209
Intentional and unintentional injury, poisoning…      332
Ischemic heart disease                                316
Malignant neoplasms                                   342
Obesity                                               348
Other diseases of the circulatory system              317
Other diseases of the respiratory system              352
Renal failure                                         302
Respiratory arrest                                    369
Respiratory failure                                   220
Sepsis                                                287
Vascular and unspecified dementia                     339
```

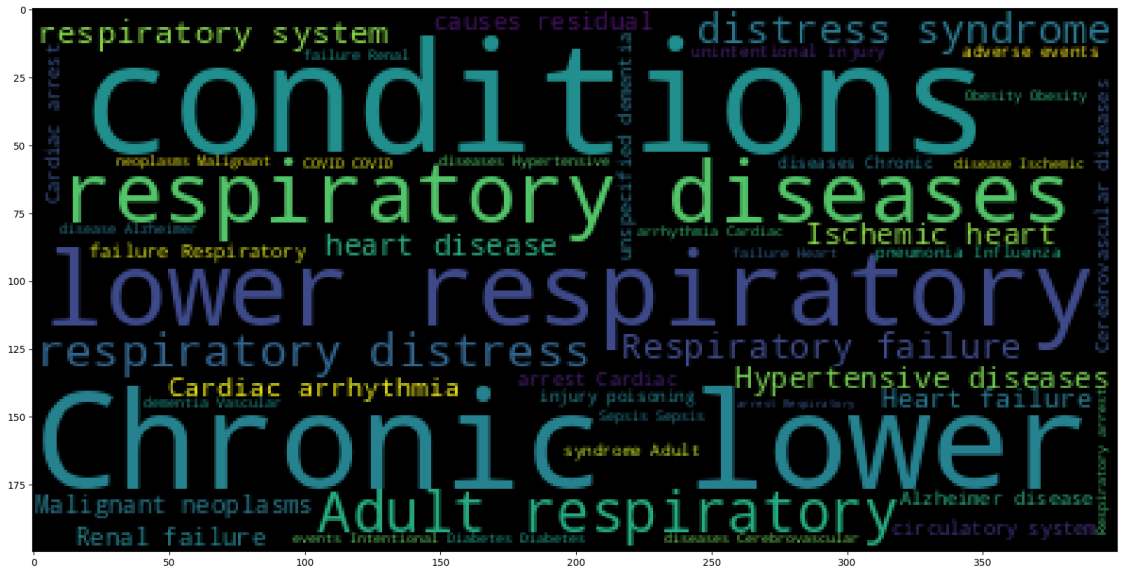
Creating wordcloud

[ ]:
```
# import word cloud
from wordcloud import WordCloud

sentences = dataset3["Condition"].tolist()
sentences_as_a_string = ' '.join(sentences)


# Convert the string into WordCloud
plt.figure(figsize=(20, 20))
plt.imshow(WordCloud().generate(sentences_as_a_string))
```

[ ]:
```
<matplotlib.image.AxesImage at 0x7f44b34c1f00>
```



From the output, it can be clearly seen that the leading cause of death is Influenza Pneumonia. We have converted the condition group to the list and stored the list in the variable "column_to_list". Here we have converted the list into a single string and stored in a variable named "column2_to_string" by using .join().

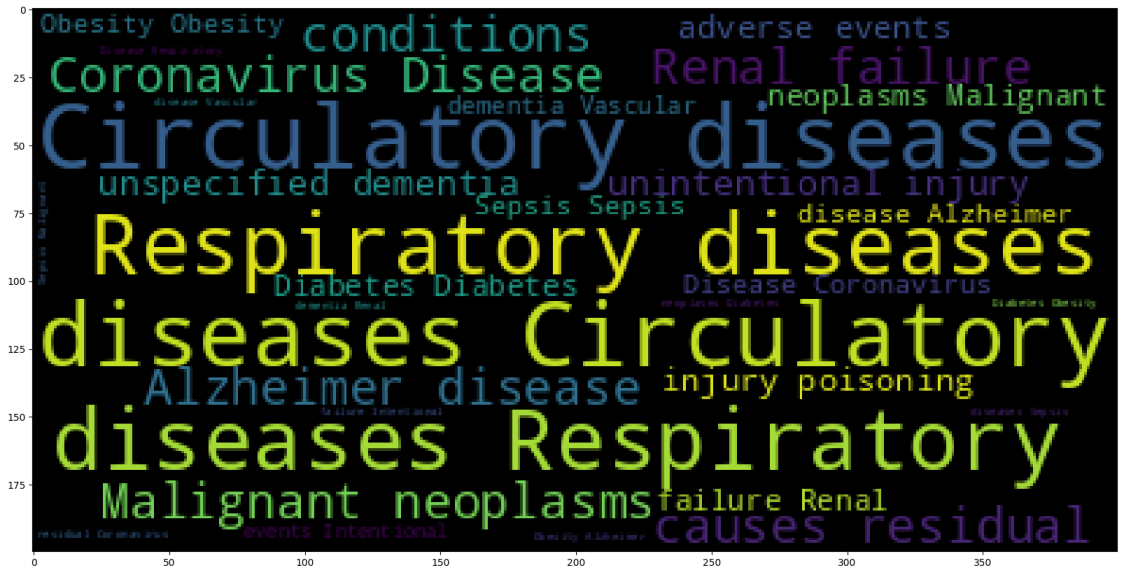
Creating wordcloud

[ ]:
```
column2_tolist= dataset3["Condition Group"].tolist()

# Convert the list to one single string
column_to_string= " ".join(column2_tolist)

# Convert the string into WordCloud
plt.figure(figsize=(20,20))
plt.imshow(WordCloud().generate(column_to_string))
```

[ ]:
```
<matplotlib.image.AxesImage at 0x7f44b34c25f0>
```



Here, respiratory diseases are the major cause of death followed by circulatory diseases which are cardiovascular diseases.

[1]:
```
!sudo apt-get update
!sudo apt-get install texlive-xetex pandoc
```

```
Get:1 http://security.ubuntu.com/ubuntu jammy-security InRelease [129 kB]
Hit:2 http://archive.ubuntu.com/ubuntu jammy InRelease
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [128 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [127 kB]
Get:5 https://cloud.r-project.org/bin/linux/ubuntu jammy-cran40/ InRelease
[3,632 B]
Get:6 https://r2u.stat.illinois.edu/ubuntu jammy InRelease [6,555 B]
Get:7 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu2204/x86_64
InRelease [1,581 B]
Hit:8 https://ppa.launchpadcontent.net/deadsnakes/ppa/ubuntu jammy InRelease
Hit:9 https://ppa.launchpadcontent.net/graphics-drivers/ppa/ubuntu jammy
InRelease
Hit:10 https://ppa.launchpadcontent.net/ubuntugis/ppa/ubuntu jammy InRelease
Get:11 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages
[1,535 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [3,000
kB]
Get:13 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages
[1,236 kB]
Get:14 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages
[2,692 kB]
Get:15 https://cloud.r-project.org/bin/linux/ubuntu jammy-cran40/ Packages [69.9
kB]
```

```
Get:16 https://r2u.stat.illinois.edu/ubuntu jammy/main all Packages [8,754 kB]
Get:17
https://developer.download.nvidia.com/compute/cuda/repos/ubuntu2204/x86_64
Packages [1,378 kB]
Get:18 https://r2u.stat.illinois.edu/ubuntu jammy/main amd64 Packages [2,675 kB]
Fetched 21.7 MB in 8s (2,574 kB/s)
Reading package lists… Done
W: Skipping acquire of configured file 'main/source/Sources' as repository
'https://r2u.stat.illinois.edu/ubuntu jammy InRelease' does not seem to provide
it (sources.list entry misspelt?)
Reading package lists… Done
Building dependency tree… Done
Reading state information… Done
The following additional packages will be installed:
  dvisvgm fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono
  fonts-texgyre fonts-urw-base35 libapache-pom-java
  libcmark-gfm-extensions0.29.0.gfm.3 libcmark-gfm0.29.0.gfm.3
  libcommons-logging-java libcommons-parent-java libfontbox-java libfontenc1
  libgs9 libgs9-common libidn12 libijs-0.35 libjbig2dec0 libkpathsea6
  libpdfbox-java libptexenc1 libruby3.0 libsynctex2 libteckit0 libtexlua53
  libtexluajit2 libwoff1 libzzip-0-13 lmodern pandoc-data poppler-data
  preview-latex-style rake ruby ruby-net-telnet ruby-rubygems ruby-webrick
  ruby-xmlrpc ruby3.0 rubygems-integration t1utils teckit tex-common tex-gyre
  texlive-base texlive-binaries texlive-fonts-recommended texlive-latex-base
  texlive-latex-extra texlive-latex-recommended texlive-pictures
  texlive-plain-generic tipa xfonts-encodings xfonts-utils
Suggested packages:
  fonts-noto fonts-freefont-otf | fonts-freefont-ttf libavalon-framework-java
  libcommons-logging-java-doc libexcalibur-logkit-java liblog4j1.2-java
  texlive-luatex pandoc-citeproc context wkhtmltopdf librsvg2-bin groff ghc
  nodejs php python libjs-mathjax libjs-katex citation-style-language-styles
  poppler-utils ghostscript fonts-japanese-mincho | fonts-ipafont-mincho
  fonts-japanese-gothic | fonts-ipafont-gothic fonts-arphic-ukai
  fonts-arphic-uming fonts-nanum ri ruby-dev bundler debhelper gv
  | postscript-viewer perl-tk xpdf | pdf-viewer xzdec
  texlive-fonts-recommended-doc texlive-latex-base-doc python3-pygments
  icc-profiles libfile-which-perl libspreadsheet-parseexcel-perl
  texlive-latex-extra-doc texlive-latex-recommended-doc texlive-pstricks
  dot2tex prerex texlive-pictures-doc vprerex default-jre-headless tipa-doc
The following NEW packages will be installed:
  dvisvgm fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono
  fonts-texgyre fonts-urw-base35 libapache-pom-java
  libcmark-gfm-extensions0.29.0.gfm.3 libcmark-gfm0.29.0.gfm.3
  libcommons-logging-java libcommons-parent-java libfontbox-java libfontenc1
  libgs9 libgs9-common libidn12 libijs-0.35 libjbig2dec0 libkpathsea6
  libpdfbox-java libptexenc1 libruby3.0 libsynctex2 libteckit0 libtexlua53
  libtexluajit2 libwoff1 libzzip-0-13 lmodern pandoc pandoc-data poppler-data
  preview-latex-style rake ruby ruby-net-telnet ruby-rubygems ruby-webrick
```

```
  ruby-xmlrpc ruby3.0 rubygems-integration t1utils teckit tex-common tex-gyre
  texlive-base texlive-binaries texlive-fonts-recommended texlive-latex-base
  texlive-latex-extra texlive-latex-recommended texlive-pictures
  texlive-plain-generic texlive-xetex tipa xfonts-encodings xfonts-utils
0 upgraded, 58 newly installed, 0 to remove and 35 not upgraded.
Need to get 202 MB of archives.
After this operation, 728 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-droid-fallback all
1:6.0.1r16-1.1build1 [1,805 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-lato all 2.0-2.1
[2,696 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy/main amd64 poppler-data all
0.4.11-1 [2,171 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy/universe amd64 tex-common all 6.17
[33.7 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-urw-base35 all
20200910-1 [6,367 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libgs9-common
all 9.55.0~dfsg1-0ubuntu5.10 [752 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libidn12 amd64
1.38-4ubuntu1 [60.0 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy/main amd64 libijs-0.35 amd64
0.35-15build2 [16.5 kB]
Get:9 http://archive.ubuntu.com/ubuntu jammy/main amd64 libjbig2dec0 amd64
0.19-3build2 [64.7 kB]
Get:10 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libgs9 amd64
9.55.0~dfsg1-0ubuntu5.10 [5,031 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libkpathsea6
amd64 2021.20210626.59705-1ubuntu0.2 [60.4 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy/main amd64 libwoff1 amd64
1.0.2-1build4 [45.2 kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy/universe amd64 dvisvgm amd64
2.13.1-1 [1,221 kB]
Get:14 http://archive.ubuntu.com/ubuntu jammy/universe amd64 fonts-lmodern all
2.004.5-6.1 [4,532 kB]
Get:15 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-noto-mono all
20201225-1build1 [397 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy/universe amd64 fonts-texgyre all
20180621-3.1 [10.2 MB]
Get:17 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libapache-pom-java
all 18-1 [4,720 B]
Get:18 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libcmark-
gfm0.29.0.gfm.3 amd64 0.29.0.gfm.3-3 [115 kB]
Get:19 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libcmark-gfm-
extensions0.29.0.gfm.3 amd64 0.29.0.gfm.3-3 [25.1 kB]
Get:20 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libcommons-parent-
java all 43-1 [10.8 kB]
Get:21 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libcommons-logging-
```

```
java all 1.2-2 [60.3 kB]
Get:22 http://archive.ubuntu.com/ubuntu jammy/main amd64 libfontenc1 amd64
1:1.1.4-1build3 [14.7 kB]
Get:23 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libptexenc1
amd64 2021.20210626.59705-1ubuntu0.2 [39.1 kB]
Get:24 http://archive.ubuntu.com/ubuntu jammy/main amd64 rubygems-integration
all 1.18 [5,336 B]
Get:25 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ruby3.0 amd64
3.0.2-7ubuntu2.8 [50.1 kB]
Get:26 http://archive.ubuntu.com/ubuntu jammy/main amd64 ruby-rubygems all
3.3.5-2 [228 kB]
Get:27 http://archive.ubuntu.com/ubuntu jammy/main amd64 ruby amd64 1:3.0~exp1
[5,100 B]
Get:28 http://archive.ubuntu.com/ubuntu jammy/main amd64 rake all 13.0.6-2 [61.7
kB]
Get:29 http://archive.ubuntu.com/ubuntu jammy/main amd64 ruby-net-telnet all
0.1.1-2 [12.6 kB]
Get:30 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ruby-webrick
all 1.7.0-3ubuntu0.1 [52.1 kB]
Get:31 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ruby-xmlrpc all
0.3.2-1ubuntu0.1 [24.9 kB]
Get:32 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libruby3.0
amd64 3.0.2-7ubuntu2.8 [5,113 kB]
Get:33 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libsynctex2
amd64 2021.20210626.59705-1ubuntu0.2 [55.6 kB]
Get:34 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libteckit0 amd64
2.5.11+ds1-1 [421 kB]
Get:35 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libtexlua53
amd64 2021.20210626.59705-1ubuntu0.2 [120 kB]
Get:36 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libtexluajit2
amd64 2021.20210626.59705-1ubuntu0.2 [267 kB]
Get:37 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libzzip-0-13 amd64
0.13.72+dfsg.1-1.1 [27.0 kB]
Get:38 http://archive.ubuntu.com/ubuntu jammy/main amd64 xfonts-encodings all
1:1.0.5-0ubuntu2 [578 kB]
Get:39 http://archive.ubuntu.com/ubuntu jammy/main amd64 xfonts-utils amd64
1:7.7+6build2 [94.6 kB]
Get:40 http://archive.ubuntu.com/ubuntu jammy/universe amd64 lmodern all
2.004.5-6.1 [9,471 kB]
Get:41 http://archive.ubuntu.com/ubuntu jammy/universe amd64 pandoc-data all
2.9.2.1-3ubuntu2 [81.8 kB]
Get:42 http://archive.ubuntu.com/ubuntu jammy/universe amd64 pandoc amd64
2.9.2.1-3ubuntu2 [20.3 MB]
Get:43 http://archive.ubuntu.com/ubuntu jammy/universe amd64 preview-latex-style
all 12.2-1ubuntu1 [185 kB]
Get:44 http://archive.ubuntu.com/ubuntu jammy/main amd64 t1utils amd64
1.41-4build2 [61.3 kB]
Get:45 http://archive.ubuntu.com/ubuntu jammy/universe amd64 teckit amd64
```

```
2.5.11+ds1-1 [699 kB]
Get:46 http://archive.ubuntu.com/ubuntu jammy/universe amd64 tex-gyre all
20180621-3.1 [6,209 kB]
Get:47 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 texlive-
binaries amd64 2021.20210626.59705-1ubuntu0.2 [9,860 kB]
Get:48 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-base all
2021.20220204-1 [21.0 MB]
Get:49 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-fonts-
recommended all 2021.20220204-1 [4,972 kB]
Get:50 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-base
all 2021.20220204-1 [1,128 kB]
Get:51 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libfontbox-java all
1:1.8.16-2 [207 kB]
Get:52 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libpdfbox-java all
1:1.8.16-2 [5,199 kB]
Get:53 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-
recommended all 2021.20220204-1 [14.4 MB]
Get:54 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-pictures
all 2021.20220204-1 [8,720 kB]
Get:55 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-extra
all 2021.20220204-1 [13.9 MB]
Get:56 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-plain-
generic all 2021.20220204-1 [27.5 MB]
Get:57 http://archive.ubuntu.com/ubuntu jammy/universe amd64 tipa all 2:1.3-21
[2,967 kB]
Get:58 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-xetex all
2021.20220204-1 [12.4 MB]
Fetched 202 MB in 3s (59.1 MB/s)
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line 78,
<> line 58.)
debconf: falling back to frontend: Readline
debconf: unable to initialize frontend: Readline
debconf: (This frontend requires a controlling tty.)
debconf: falling back to frontend: Teletype
dpkg-preconfigure: unable to re-open stdin:
Selecting previously unselected package fonts-droid-fallback.
(Reading database … 125044 files and directories currently installed.)
Preparing to unpack …/00-fonts-droid-fallback_1%3a6.0.1r16-1.1build1_all.deb
…
Unpacking fonts-droid-fallback (1:6.0.1r16-1.1build1) …
Selecting previously unselected package fonts-lato.
Preparing to unpack …/01-fonts-lato_2.0-2.1_all.deb …
Unpacking fonts-lato (2.0-2.1) …
Selecting previously unselected package poppler-data.
Preparing to unpack …/02-poppler-data_0.4.11-1_all.deb …
Unpacking poppler-data (0.4.11-1) …
```

```
Selecting previously unselected package tex-common.
Preparing to unpack …/03-tex-common_6.17_all.deb …
Unpacking tex-common (6.17) …
Selecting previously unselected package fonts-urw-base35.
Preparing to unpack …/04-fonts-urw-base35_20200910-1_all.deb …
Unpacking fonts-urw-base35 (20200910-1) …
Selecting previously unselected package libgs9-common.
Preparing to unpack …/05-libgs9-common_9.55.0~dfsg1-0ubuntu5.10_all.deb …
Unpacking libgs9-common (9.55.0~dfsg1-0ubuntu5.10) …
Selecting previously unselected package libidn12:amd64.
Preparing to unpack …/06-libidn12_1.38-4ubuntu1_amd64.deb …
Unpacking libidn12:amd64 (1.38-4ubuntu1) …
Selecting previously unselected package libijs-0.35:amd64.
Preparing to unpack …/07-libijs-0.35_0.35-15build2_amd64.deb …
Unpacking libijs-0.35:amd64 (0.35-15build2) …
Selecting previously unselected package libjbig2dec0:amd64.
Preparing to unpack …/08-libjbig2dec0_0.19-3build2_amd64.deb …
Unpacking libjbig2dec0:amd64 (0.19-3build2) …
Selecting previously unselected package libgs9:amd64.
Preparing to unpack …/09-libgs9_9.55.0~dfsg1-0ubuntu5.10_amd64.deb …
Unpacking libgs9:amd64 (9.55.0~dfsg1-0ubuntu5.10) …
Selecting previously unselected package libkpathsea6:amd64.
Preparing to unpack …/10-libkpathsea6_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
Unpacking libkpathsea6:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libwoff1:amd64.
Preparing to unpack …/11-libwoff1_1.0.2-1build4_amd64.deb …
Unpacking libwoff1:amd64 (1.0.2-1build4) …
Selecting previously unselected package dvisvgm.
Preparing to unpack …/12-dvisvgm_2.13.1-1_amd64.deb …
Unpacking dvisvgm (2.13.1-1) …
Selecting previously unselected package fonts-lmodern.
Preparing to unpack …/13-fonts-lmodern_2.004.5-6.1_all.deb …
Unpacking fonts-lmodern (2.004.5-6.1) …
Selecting previously unselected package fonts-noto-mono.
Preparing to unpack …/14-fonts-noto-mono_20201225-1build1_all.deb …
Unpacking fonts-noto-mono (20201225-1build1) …
Selecting previously unselected package fonts-texgyre.
Preparing to unpack …/15-fonts-texgyre_20180621-3.1_all.deb …
Unpacking fonts-texgyre (20180621-3.1) …
Selecting previously unselected package libapache-pom-java.
Preparing to unpack …/16-libapache-pom-java_18-1_all.deb …
Unpacking libapache-pom-java (18-1) …
Selecting previously unselected package libcmark-gfm0.29.0.gfm.3:amd64.
Preparing to unpack …/17-libcmark-gfm0.29.0.gfm.3_0.29.0.gfm.3-3_amd64.deb …
Unpacking libcmark-gfm0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) …
Selecting previously unselected package libcmark-gfm-
extensions0.29.0.gfm.3:amd64.
```

```
Preparing to unpack …/18-libcmark-gfm-
extensions0.29.0.gfm.3_0.29.0.gfm.3-3_amd64.deb …
Unpacking libcmark-gfm-extensions0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) …
Selecting previously unselected package libcommons-parent-java.
Preparing to unpack …/19-libcommons-parent-java_43-1_all.deb …
Unpacking libcommons-parent-java (43-1) …
Selecting previously unselected package libcommons-logging-java.
Preparing to unpack …/20-libcommons-logging-java_1.2-2_all.deb …
Unpacking libcommons-logging-java (1.2-2) …
Selecting previously unselected package libfontenc1:amd64.
Preparing to unpack …/21-libfontenc1_1%3a1.1.4-1build3_amd64.deb …
Unpacking libfontenc1:amd64 (1:1.1.4-1build3) …
Selecting previously unselected package libptexenc1:amd64.
Preparing to unpack …/22-libptexenc1_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
Unpacking libptexenc1:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package rubygems-integration.
Preparing to unpack …/23-rubygems-integration_1.18_all.deb …
Unpacking rubygems-integration (1.18) …
Selecting previously unselected package ruby3.0.
Preparing to unpack …/24-ruby3.0_3.0.2-7ubuntu2.8_amd64.deb …
Unpacking ruby3.0 (3.0.2-7ubuntu2.8) …
Selecting previously unselected package ruby-rubygems.
Preparing to unpack …/25-ruby-rubygems_3.3.5-2_all.deb …
Unpacking ruby-rubygems (3.3.5-2) …
Selecting previously unselected package ruby.
Preparing to unpack …/26-ruby_1%3a3.0~exp1_amd64.deb …
Unpacking ruby (1:3.0~exp1) …
Selecting previously unselected package rake.
Preparing to unpack …/27-rake_13.0.6-2_all.deb …
Unpacking rake (13.0.6-2) …
Selecting previously unselected package ruby-net-telnet.
Preparing to unpack …/28-ruby-net-telnet_0.1.1-2_all.deb …
Unpacking ruby-net-telnet (0.1.1-2) …
Selecting previously unselected package ruby-webrick.
Preparing to unpack …/29-ruby-webrick_1.7.0-3ubuntu0.1_all.deb …
Unpacking ruby-webrick (1.7.0-3ubuntu0.1) …
Selecting previously unselected package ruby-xmlrpc.
Preparing to unpack …/30-ruby-xmlrpc_0.3.2-1ubuntu0.1_all.deb …
Unpacking ruby-xmlrpc (0.3.2-1ubuntu0.1) …
Selecting previously unselected package libruby3.0:amd64.
Preparing to unpack …/31-libruby3.0_3.0.2-7ubuntu2.8_amd64.deb …
Unpacking libruby3.0:amd64 (3.0.2-7ubuntu2.8) …
Selecting previously unselected package libsynctex2:amd64.
Preparing to unpack …/32-libsynctex2_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
Unpacking libsynctex2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libteckit0:amd64.
```

```
Preparing to unpack …/33-libteckit0_2.5.11+ds1-1_amd64.deb …
Unpacking libteckit0:amd64 (2.5.11+ds1-1) …
Selecting previously unselected package libtexlua53:amd64.
Preparing to unpack …/34-libtexlua53_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
Unpacking libtexlua53:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libtexluajit2:amd64.
Preparing to unpack
…/35-libtexluajit2_2021.20210626.59705-1ubuntu0.2_amd64.deb …
Unpacking libtexluajit2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libzzip-0-13:amd64.
Preparing to unpack …/36-libzzip-0-13_0.13.72+dfsg.1-1.1_amd64.deb …
Unpacking libzzip-0-13:amd64 (0.13.72+dfsg.1-1.1) …
Selecting previously unselected package xfonts-encodings.
Preparing to unpack …/37-xfonts-encodings_1%3a1.0.5-0ubuntu2_all.deb …
Unpacking xfonts-encodings (1:1.0.5-0ubuntu2) …
Selecting previously unselected package xfonts-utils.
Preparing to unpack …/38-xfonts-utils_1%3a7.7+6build2_amd64.deb …
Unpacking xfonts-utils (1:7.7+6build2) …
Selecting previously unselected package lmodern.
Preparing to unpack …/39-lmodern_2.004.5-6.1_all.deb …
Unpacking lmodern (2.004.5-6.1) …
Selecting previously unselected package pandoc-data.
Preparing to unpack …/40-pandoc-data_2.9.2.1-3ubuntu2_all.deb …
Unpacking pandoc-data (2.9.2.1-3ubuntu2) …
Selecting previously unselected package pandoc.
Preparing to unpack …/41-pandoc_2.9.2.1-3ubuntu2_amd64.deb …
Unpacking pandoc (2.9.2.1-3ubuntu2) …
Selecting previously unselected package preview-latex-style.
Preparing to unpack …/42-preview-latex-style_12.2-1ubuntu1_all.deb …
Unpacking preview-latex-style (12.2-1ubuntu1) …
Selecting previously unselected package t1utils.
Preparing to unpack …/43-t1utils_1.41-4build2_amd64.deb …
Unpacking t1utils (1.41-4build2) …
Selecting previously unselected package teckit.
Preparing to unpack …/44-teckit_2.5.11+ds1-1_amd64.deb …
Unpacking teckit (2.5.11+ds1-1) …
Selecting previously unselected package tex-gyre.
Preparing to unpack …/45-tex-gyre_20180621-3.1_all.deb …
Unpacking tex-gyre (20180621-3.1) …
Selecting previously unselected package texlive-binaries.
Preparing to unpack …/46-texlive-
binaries_2021.20210626.59705-1ubuntu0.2_amd64.deb …
Unpacking texlive-binaries (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package texlive-base.
Preparing to unpack …/47-texlive-base_2021.20220204-1_all.deb …
Unpacking texlive-base (2021.20220204-1) …
Selecting previously unselected package texlive-fonts-recommended.
```

```
Preparing to unpack …/48-texlive-fonts-recommended_2021.20220204-1_all.deb …
Unpacking texlive-fonts-recommended (2021.20220204-1) …
Selecting previously unselected package texlive-latex-base.
Preparing to unpack …/49-texlive-latex-base_2021.20220204-1_all.deb …
Unpacking texlive-latex-base (2021.20220204-1) …
Selecting previously unselected package libfontbox-java.
Preparing to unpack …/50-libfontbox-java_1%3a1.8.16-2_all.deb …
Unpacking libfontbox-java (1:1.8.16-2) …
Selecting previously unselected package libpdfbox-java.
Preparing to unpack …/51-libpdfbox-java_1%3a1.8.16-2_all.deb …
Unpacking libpdfbox-java (1:1.8.16-2) …
Selecting previously unselected package texlive-latex-recommended.
Preparing to unpack …/52-texlive-latex-recommended_2021.20220204-1_all.deb …
Unpacking texlive-latex-recommended (2021.20220204-1) …
Selecting previously unselected package texlive-pictures.
Preparing to unpack …/53-texlive-pictures_2021.20220204-1_all.deb …
Unpacking texlive-pictures (2021.20220204-1) …
Selecting previously unselected package texlive-latex-extra.
Preparing to unpack …/54-texlive-latex-extra_2021.20220204-1_all.deb …
Unpacking texlive-latex-extra (2021.20220204-1) …
Selecting previously unselected package texlive-plain-generic.
Preparing to unpack …/55-texlive-plain-generic_2021.20220204-1_all.deb …
Unpacking texlive-plain-generic (2021.20220204-1) …
Selecting previously unselected package tipa.
Preparing to unpack …/56-tipa_2%3a1.3-21_all.deb …
Unpacking tipa (2:1.3-21) …
Selecting previously unselected package texlive-xetex.
Preparing to unpack …/57-texlive-xetex_2021.20220204-1_all.deb …
Unpacking texlive-xetex (2021.20220204-1) …
Setting up fonts-lato (2.0-2.1) …
Setting up fonts-noto-mono (20201225-1build1) …
Setting up libwoff1:amd64 (1.0.2-1build4) …
Setting up libtexlua53:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up libijs-0.35:amd64 (0.35-15build2) …
Setting up libtexluajit2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up libfontbox-java (1:1.8.16-2) …
Setting up rubygems-integration (1.18) …
Setting up libzzip-0-13:amd64 (0.13.72+dfsg.1-1.1) …
Setting up fonts-urw-base35 (20200910-1) …
Setting up poppler-data (0.4.11-1) …
Setting up tex-common (6.17) …
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line
78.)
debconf: falling back to frontend: Readline
update-language: texlive-base not installed and configured, doing nothing!
Setting up libfontenc1:amd64 (1:1.1.4-1build3) …
```

```
Setting up libjbig2dec0:amd64 (0.19-3build2) …
Setting up libteckit0:amd64 (2.5.11+ds1-1) …
Setting up libapache-pom-java (18-1) …
Setting up ruby-net-telnet (0.1.1-2) …
Setting up xfonts-encodings (1:1.0.5-0ubuntu2) …
Setting up t1utils (1.41-4build2) …
Setting up libidn12:amd64 (1.38-4ubuntu1) …
Setting up fonts-texgyre (20180621-3.1) …
Setting up libkpathsea6:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up ruby-webrick (1.7.0-3ubuntu0.1) …
Setting up libcmark-gfm0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) …
Setting up fonts-lmodern (2.004.5-6.1) …
Setting up libcmark-gfm-extensions0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) …
Setting up fonts-droid-fallback (1:6.0.1r16-1.1build1) …
Setting up pandoc-data (2.9.2.1-3ubuntu2) …
Setting up ruby-xmlrpc (0.3.2-1ubuntu0.1) …
Setting up libsynctex2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up libgs9-common (9.55.0~dfsg1-0ubuntu5.10) …
Setting up teckit (2.5.11+ds1-1) …
Setting up libpdfbox-java (1:1.8.16-2) …
Setting up libgs9:amd64 (9.55.0~dfsg1-0ubuntu5.10) …
Setting up preview-latex-style (12.2-1ubuntu1) …
Setting up libcommons-parent-java (43-1) …
Setting up dvisvgm (2.13.1-1) …
Setting up libcommons-logging-java (1.2-2) …
Setting up xfonts-utils (1:7.7+6build2) …
Setting up libptexenc1:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up pandoc (2.9.2.1-3ubuntu2) …
Setting up texlive-binaries (2021.20210626.59705-1ubuntu0.2) …
update-alternatives: using /usr/bin/xdvi-xaw to provide /usr/bin/xdvi.bin
(xdvi.bin) in auto mode
update-alternatives: using /usr/bin/bibtex.original to provide /usr/bin/bibtex
(bibtex) in auto mode
Setting up lmodern (2.004.5-6.1) …
Setting up texlive-base (2021.20220204-1) …
/usr/bin/ucfr
/usr/bin/ucfr
/usr/bin/ucfr
/usr/bin/ucfr
mktexlsr: Updating /var/lib/texmf/ls-R-TEXLIVEDIST…
mktexlsr: Updating /var/lib/texmf/ls-R-TEXMFMAIN…
mktexlsr: Updating /var/lib/texmf/ls-R…
mktexlsr: Done.
tl-paper: setting paper size for dvips to a4:
/var/lib/texmf/dvips/config/config-paper.ps
tl-paper: setting paper size for dvipdfmx to a4:
/var/lib/texmf/dvipdfmx/dvipdfmx-paper.cfg
tl-paper: setting paper size for xdvi to a4: /var/lib/texmf/xdvi/XDvi-paper
```

```
tl-paper: setting paper size for pdftex to a4: /var/lib/texmf/tex/generic/tex-
ini-files/pdftexconfig.tex
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line
78.)
debconf: falling back to frontend: Readline
Setting up tex-gyre (20180621-3.1) …
Setting up texlive-plain-generic (2021.20220204-1) …
Setting up texlive-latex-base (2021.20220204-1) …
Setting up texlive-latex-recommended (2021.20220204-1) …
Setting up texlive-pictures (2021.20220204-1) …
Setting up texlive-fonts-recommended (2021.20220204-1) …
Setting up tipa (2:1.3-21) …
Setting up texlive-latex-extra (2021.20220204-1) …
Setting up texlive-xetex (2021.20220204-1) …
Setting up rake (13.0.6-2) …
Setting up libruby3.0:amd64 (3.0.2-7ubuntu2.8) …
Setting up ruby3.0 (3.0.2-7ubuntu2.8) …
Setting up ruby (1:3.0~exp1) …
Setting up ruby-rubygems (3.3.5-2) …
Processing triggers for man-db (2.10.2-1) …
Processing triggers for mailcap (3.70+nmu1ubuntu1) …
Processing triggers for fontconfig (2.13.1-4.2ubuntu5) …
Processing triggers for libc-bin (2.35-0ubuntu3.8) …
/sbin/ldconfig.real: /usr/local/lib/libtbb.so.12 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_5.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libur_adapter_opencl.so.0 is not a symbolic
link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_0.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc.so.2 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libumf.so.0 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libur_loader.so.0 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtcm.so.1 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libhwloc.so.15 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtcm_debug.so.1 is not a symbolic link
```

```
/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc_proxy.so.2 is not a symbolic
link

/sbin/ldconfig.real: /usr/local/lib/libur_adapter_level_zero.so.0 is not a
symbolic link

Processing triggers for tex-common (6.17) …
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line
78.)
debconf: falling back to frontend: Readline
Running updmap-sys. This may take some time… done.
Running mktexlsr /var/lib/texmf … done.
Building format(s) --all.
        This may take some time… done.
```

[2]:
```
!jupyter nbconvert --to pdf "/content/drive/MyDrive/Colab_Notebooks/Projects/
↪Covid-19 Analysis and Visualization.ipynb"
```

```
[NbConvertApp] WARNING | pattern
'/content/drive/MyDrive/Colab_Notebooks/Projects/Covid-19 Analysis and
Visualization.ipynb' matched no files
This application is used to convert notebook files (*.ipynb)
        to various other formats.

        WARNING: THE COMMANDLINE INTERFACE MAY CHANGE IN FUTURE RELEASES.

Options
=======
The options below are convenience aliases to configurable class-options,
as listed in the "Equivalent to" description-line of the aliases.
To see all configurable class-options for some <cmd>, use:
    <cmd> --help-all

--debug
    set log level to logging.DEBUG (maximize logging output)
    Equivalent to: [--Application.log_level=10]
--show-config
    Show the application's configuration (human-readable format)
    Equivalent to: [--Application.show_config=True]
--show-config-json
    Show the application's configuration (json format)
    Equivalent to: [--Application.show_config_json=True]
--generate-config
    generate default config file
    Equivalent to: [--JupyterApp.generate_config=True]
-y
```

```
    Answer yes to any questions instead of prompting.
    Equivalent to: [--JupyterApp.answer_yes=True]
--execute
    Execute the notebook prior to export.
    Equivalent to: [--ExecutePreprocessor.enabled=True]
--allow-errors
    Continue notebook execution even if one of the cells throws an error and
include the error message in the cell output (the default behaviour is to abort
conversion). This flag is only relevant if '--execute' was specified, too.
    Equivalent to: [--ExecutePreprocessor.allow_errors=True]
--stdin
    read a single notebook file from stdin. Write the resulting notebook with
default basename 'notebook.*'
    Equivalent to: [--NbConvertApp.from_stdin=True]
--stdout
    Write notebook output to stdout instead of files.
    Equivalent to: [--NbConvertApp.writer_class=StdoutWriter]
--inplace
    Run nbconvert in place, overwriting the existing notebook (only
            relevant when converting to notebook format)
    Equivalent to: [--NbConvertApp.use_output_suffix=False
--NbConvertApp.export_format=notebook --FilesWriter.build_directory=]
--clear-output
    Clear output of current file and save in place,
            overwriting the existing notebook.
    Equivalent to: [--NbConvertApp.use_output_suffix=False
--NbConvertApp.export_format=notebook --FilesWriter.build_directory=
--ClearOutputPreprocessor.enabled=True]
--coalesce-streams
    Coalesce consecutive stdout and stderr outputs into one stream (within each
cell).
    Equivalent to: [--NbConvertApp.use_output_suffix=False
--NbConvertApp.export_format=notebook --FilesWriter.build_directory=
--CoalesceStreamsPreprocessor.enabled=True]
--no-prompt
    Exclude input and output prompts from converted document.
    Equivalent to: [--TemplateExporter.exclude_input_prompt=True
--TemplateExporter.exclude_output_prompt=True]
--no-input
    Exclude input cells and output prompts from converted document.
            This mode is ideal for generating code-free reports.
    Equivalent to: [--TemplateExporter.exclude_output_prompt=True
--TemplateExporter.exclude_input=True
--TemplateExporter.exclude_input_prompt=True]
--allow-chromium-download
    Whether to allow downloading chromium if no suitable version is found on the
system.
    Equivalent to: [--WebPDFExporter.allow_chromium_download=True]
```

```
--disable-chromium-sandbox
    Disable chromium security sandbox when converting to PDF..
    Equivalent to: [--WebPDFExporter.disable_sandbox=True]
--show-input
    Shows code input. This flag is only useful for dejavu users.
    Equivalent to: [--TemplateExporter.exclude_input=False]
--embed-images
    Embed the images as base64 dataurls in the output. This flag is only useful
for the HTML/WebPDF/Slides exports.
    Equivalent to: [--HTMLExporter.embed_images=True]
--sanitize-html
    Whether the HTML in Markdown cells and cell outputs should be sanitized..
    Equivalent to: [--HTMLExporter.sanitize_html=True]
--log-level=<Enum>
    Set the log level by value or name.
    Choices: any of [0, 10, 20, 30, 40, 50, 'DEBUG', 'INFO', 'WARN', 'ERROR',
'CRITICAL']
    Default: 30
    Equivalent to: [--Application.log_level]
--config=<Unicode>
    Full path of a config file.
    Default: ''
    Equivalent to: [--JupyterApp.config_file]
--to=<Unicode>
    The export format to be used, either one of the built-in formats
            ['asciidoc', 'custom', 'html', 'latex', 'markdown', 'notebook',
'pdf', 'python', 'qtpdf', 'qtpng', 'rst', 'script', 'slides', 'webpdf']
            or a dotted object name that represents the import path for an
            ``Exporter`` class
    Default: ''
    Equivalent to: [--NbConvertApp.export_format]
--template=<Unicode>
    Name of the template to use
    Default: ''
    Equivalent to: [--TemplateExporter.template_name]
--template-file=<Unicode>
    Name of the template file to use
    Default: None
    Equivalent to: [--TemplateExporter.template_file]
--theme=<Unicode>
    Template specific theme(e.g. the name of a JupyterLab CSS theme distributed
    as prebuilt extension for the lab template)
    Default: 'light'
    Equivalent to: [--HTMLExporter.theme]
--sanitize_html=<Bool>
    Whether the HTML in Markdown cells and cell outputs should be sanitized.This
    should be set to True by nbviewer or similar tools.
    Default: False
```

```
    Equivalent to: [--HTMLExporter.sanitize_html]
--writer=<DottedObjectName>
    Writer class used to write the
                                        results of the conversion
    Default: 'FilesWriter'
    Equivalent to: [--NbConvertApp.writer_class]
--post=<DottedOrNone>
    PostProcessor class used to write the
                                        results of the conversion
    Default: ''
    Equivalent to: [--NbConvertApp.postprocessor_class]
--output=<Unicode>
    Overwrite base name use for output files.
                Supports pattern replacements '{notebook_name}'.
    Default: '{notebook_name}'
    Equivalent to: [--NbConvertApp.output_base]
--output-dir=<Unicode>
    Directory to write output(s) to. Defaults
                                    to output to the directory of each notebook.
To recover
                                    previous default behaviour (outputting to the
current
                                    working directory) use . as the flag value.
    Default: ''
    Equivalent to: [--FilesWriter.build_directory]
--reveal-prefix=<Unicode>
    The URL prefix for reveal.js (version 3.x).
            This defaults to the reveal CDN, but can be any url pointing to a
copy
            of reveal.js.
            For speaker notes to work, this must be a relative path to a local
            copy of reveal.js: e.g., "reveal.js".
            If a relative path is given, it must be a subdirectory of the
            current directory (from which the server is run).
            See the usage documentation
            (https://nbconvert.readthedocs.io/en/latest/usage.html#reveal-js-
html-slideshow)
            for more details.
    Default: ''
    Equivalent to: [--SlidesExporter.reveal_url_prefix]
--nbformat=<Enum>
    The nbformat version to write.
            Use this to downgrade notebooks.
    Choices: any of [1, 2, 3, 4]
    Default: 4
    Equivalent to: [--NotebookExporter.nbformat_version]

Examples
```

```
--------

    The simplest way to use nbconvert is

            > jupyter nbconvert mynotebook.ipynb --to html

            Options include ['asciidoc', 'custom', 'html', 'latex', 'markdown',
'notebook', 'pdf', 'python', 'qtpdf', 'qtpng', 'rst', 'script', 'slides',
'webpdf'].

            > jupyter nbconvert --to latex mynotebook.ipynb

            Both HTML and LaTeX support multiple output templates. LaTeX
includes
            'base', 'article' and 'report'.  HTML includes 'basic', 'lab' and
            'classic'. You can specify the flavor of the format used.

            > jupyter nbconvert --to html --template lab mynotebook.ipynb

            You can also pipe the output to stdout, rather than a file

            > jupyter nbconvert mynotebook.ipynb --stdout

            PDF is generated via latex

            > jupyter nbconvert mynotebook.ipynb --to pdf

            You can get (and serve) a Reveal.js-powered slideshow

            > jupyter nbconvert myslides.ipynb --to slides --post serve

            Multiple notebooks can be given at the command line in a couple of
            different ways:

            > jupyter nbconvert notebook*.ipynb
            > jupyter nbconvert notebook1.ipynb notebook2.ipynb

            or you can specify the notebooks list in a config file, containing::

                c.NbConvertApp.notebooks = ["my_notebook.ipynb"]

            > jupyter nbconvert --config mycfg.py

To see all available configurables, use `--help-all`.
```