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COVID-19 World Vaccination Progress

Abstract: Corona also known as Covid-19 was first introduced in December 2019 in Wuhan, commercial city of Hubei province, China. Then gradually it spread through all over the world. But fortunately vaccine manufacturers has invented and tested their vaccine successfully and got approved by World Health Organization and many government.
And for that reason Covid-19 vaccination process has taken place in a massive scale worldwide recently. And that is the subject of our report. We took data from Kaggle.com and and we have processed that data in python with the help of Jupyter Notebook .

Introduction: We all are aware of the current pandemic situation going on all over the world Because of Deadly Corona virus. Recently many Government are encouraging their citizens to take vaccine for free of cost.

Jupyter Notebook: It's an open-source web application that allows us to create and share documents that contain live code, equations, visualizations and narrative text. Also it's include data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning, and much more.

Methodology: We loaded the dataset which we gathered from Kaggle.com. After that we preprocessed that data and began to work on our project.
We used Pandas library. So that, we can analyze and present those data in simple way for better understanding .

Results and Discussion: From our research we got that every day approximately 4M to 8M doses are being given. And all total 734M doses are being given worldwide and among them 159M people are fully vaccinated from today's research. In Bangladesh 5.6M people has received Oxford-AstraZeneca's Vaccines

```
In [1]: import pandas as pd
        import seaborn as sns
```

```
In [2]: dataset=pd.read_csv('country_vaccinations.csv')
```

```
In [3]: dataset
```

Out[3]:

	Country	ISO Code	Date	Total Vaccinations	1st Dose	2nd Dose	Daily Vaccinations	Vaccines	Source Name
0	Afghanistan	AFG	22-02-21	0.0	0.0	NaN	NaN	Oxford/AstraZeneca	Government of Afghanistan
1	Afghanistan	AFG	23-02-21	NaN	NaN	NaN	1367.0	Oxford/AstraZeneca	Government of Afghanistan
2	Afghanistan	AFG	24-02-21	NaN	NaN	NaN	1367.0	Oxford/AstraZeneca	Government of Afghanistan
3	Afghanistan	AFG	25-02-21	NaN	NaN	NaN	1367.0	Oxford/AstraZeneca	Government of Afghanistan
4	Afghanistan	AFG	26-02-21	NaN	NaN	NaN	1367.0	Oxford/AstraZeneca	Government of Afghanistan
...	...	...	...	...	...	...	...	...	...
9571	Zimbabwe	ZWE	29-03-21	81610.0	69751.0	11859.0	5434.0	Sinopharm/Beijing	Ministry of Health
9572	Zimbabwe	ZWE	30-03-21	85866.0	72944.0	12922.0	5810.0	Sinopharm/Beijing	Ministry of Health
9573	Zimbabwe	ZWE	31-03-21	91880.0	76995.0	14885.0	5712.0	Sinopharm/Beijing	Ministry of Health
9574	Zimbabwe	ZWE	01-04-21	105307.0	87791.0	17516.0	6617.0	Sinopharm/Beijing	Ministry of Health
9575	Zimbabwe	ZWE	02-04-21	124753.0	103815.0	20938.0	8156.0	Sinopharm/Beijing	Ministry of Health

9576 rows × 9 columns

```
In [4]: dataset.head()
```

Out[4]:

	Country	ISO Code	Date	Total Vaccinations	1st Dose	2nd Dose	Daily Vaccinations	Vaccines	Source Name
0	Afghanistan	AFG	22-02-21	0.0	0.0	NaN	NaN	Oxford/AstraZeneca	Government of Afghanistan
1	Afghanistan	AFG	23-02-21	NaN	NaN	NaN	1367.0	Oxford/AstraZeneca	Government of Afghanistan
2	Afghanistan	AFG	24-02-21	NaN	NaN	NaN	1367.0	Oxford/AstraZeneca	Government of Afghanistan
3	Afghanistan	AFG	25-02-21	NaN	NaN	NaN	1367.0	Oxford/AstraZeneca	Government of Afghanistan
4	Afghanistan	AFG	26-02-21	NaN	NaN	NaN	1367.0	Oxford/AstraZeneca	Government of Afghanistan

```
In [5]: dataset.tail()
```

Out[5]:

	Country	ISO Code	Date	Total Vaccinations	1st Dose	2nd Dose	Daily Vaccinations	Vaccines	Source Name
9571	Zimbabwe	ZWE	29-03-21	81610.0	69751.0	11859.0	5434.0	Sinopharm/Beijing	Ministry of Health
9572	Zimbabwe	ZWE	30-03-21	85866.0	72944.0	12922.0	5810.0	Sinopharm/Beijing	Ministry of Health
9573	Zimbabwe	ZWE	31-03-21	91880.0	76995.0	14885.0	5712.0	Sinopharm/Beijing	Ministry of Health
9574	Zimbabwe	ZWE	01-04-21	105307.0	87791.0	17516.0	6617.0	Sinopharm/Beijing	Ministry of Health
9575	Zimbabwe	ZWE	02-04-21	124753.0	103815.0	20938.0	8156.0	Sinopharm/Beijing	Ministry of Health

```
In [6]: dataset.dtypes
```

```
Out[6]: Country              object
        ISO Code             object
        Date                 object
        Total Vaccinations   float64
        1st Dose             float64
        2nd Dose             float64
        Daily Vaccinations   float64
        Vaccines             object
        Source Name          object
        dtype: object
```

```
In [7]: dataset.columns
```

```
Out[7]: Index(['Country', 'ISO Code', 'Date', 'Total Vaccinations', '1st Dose',
               '2nd Dose', 'Daily Vaccinations', 'Vaccines', 'Source Name'],
              dtype='object')
```

```
In [8]: dataset.index
```

```
Out[8]: RangeIndex(start=0, stop=9576, step=1)
```

```
In [9]: dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9576 entries, 0 to 9575
Data columns (total 9 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   Country             9576 non-null   object
 1   ISO Code            9576 non-null   object
 2   Date                9576 non-null   object
 3   Total Vaccinations  5772 non-null   float64
 4   1st Dose            5167 non-null   float64
 5   2nd Dose            3608 non-null   float64
 6   Daily Vaccinations  9393 non-null   float64
 7   Vaccines            9576 non-null   object
 8   Source Name         9576 non-null   object
dtypes: float64(4), object(5)
memory usage: 673.4+ KB
```

```
In [10]: dataset.mean()
```

```
Out[10]: Total Vaccinations    3.223423e+06
         1st Dose              2.406510e+06
         2nd Dose              1.076638e+06
         Daily Vaccinations    6.705204e+04
         dtype: float64
```

```
In [11]: dataset.groupby(["Country"]).mean()
```

Out[11]:

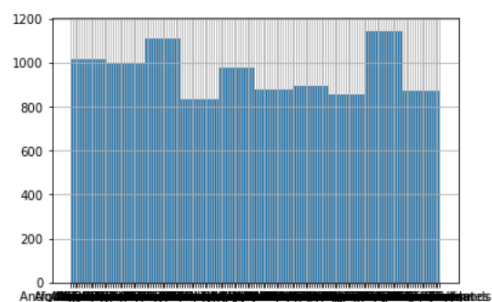| Country	Total Vaccinations	1st Dose	2nd Dose	Daily Vaccinations
Afghanistan	20733.333333	20733.333333	NaN	2250.409091
Albania	33633.294118	906.312500	463.200000	1442.853659
Algeria	25010.000000	NaN	NaN	3289.047619
Andorra	3432.545455	2471.444444	1233.666667	151.339623
Angola	54588.200000	54588.200000	NaN	3839.178571
...	...	...	...	...
Uruguay	296817.944444	288594.166667	37007.000000	19694.828571
Venezuela	6643.500000	6643.500000	NaN	380.108108
Vietnam	28758.071429	28758.071429	NaN	1878.333333
Wales	888290.435294	763368.505882	129492.243902	16961.618182
Zimbabwe	41879.146341	39166.756098	9267.333333	2162.116279

166 rows × 4 columns

```
In [14]:    dataset["Vaccines"].hist()
```

Out[14]: <AxesSubplot:>
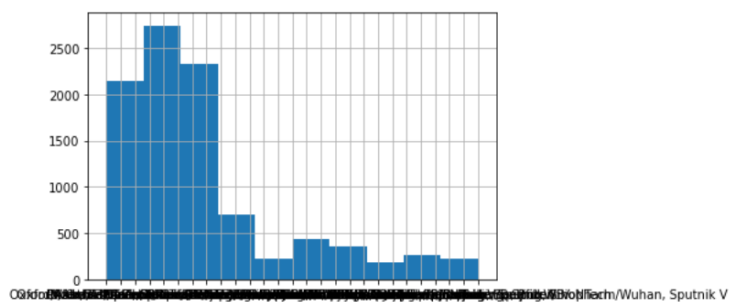

```
In [15]:    dataset["Country"].hist()
```

Out[15]: <AxesSubplot:>


```
In [17]:  display(dataset[dataset["Vaccines"]=="Pfizer/BioNTech"][['Country','ISO Code','Date','Vaccines','Total Vaccinations','1st Dose',
```

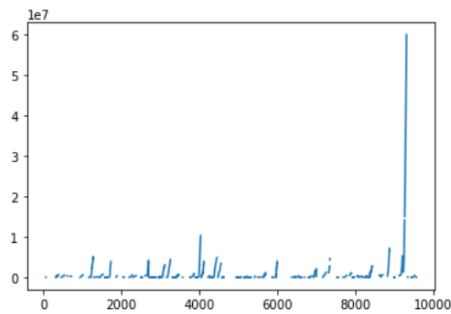|	Country	ISO Code	Date	Vaccines	Total Vaccinations	1st Dose	2nd Dose	Daily Vaccinations	Source Name
4616	Japan	JPN	02-04-21	Pfizer/BioNTech	1096698.000000	913341.000000	183357.000000	39118.000000	Ministry of Health, Labour and Welfare
4615	Japan	JPN	01-04-21	Pfizer/BioNTech	1050112.000000	893315.000000	156797.000000	39284.000000	Ministry of Health, Labour and Welfare
8166	Slovakia	SVK	02-04-21	Pfizer/BioNTech	1006605.000000	742890.000000	263715.000000	15449.000000	Ministry of Health
4614	Japan	JPN	31-03-21	Pfizer/BioNTech	1002739.000000	877159.000000	125580.000000	37366.000000	Ministry of Health, Labour and Welfare
8165	Slovakia	SVK	01-04-21	Pfizer/BioNTech	1002268.000000	738628.000000	263640.000000	17478.000000	Ministry of Health
8164	Slovakia	SVK	31-03-21	Pfizer/BioNTech	981489.000000	719418.000000	262071.000000	17141.000000	Ministry of Health
8163	Slovakia	SVK	30-03-21	Pfizer/BioNTech	962041.000000	701847.000000	260194.000000	17450.000000	Ministry of Health
4613	Japan	JPN	30-03-21	Pfizer/BioNTech	949731.000000	852946.000000	96785.000000	35801.000000	Ministry of Health, Labour and Welfare
8162	Slovakia	SVK	29-03-21	Pfizer/BioNTech	941555.000000	684327.000000	257228.000000	17694.000000	Ministry of Health
8161	Slovakia	SVK	28-03-21	Pfizer/BioNTech	922099.000000	666070.000000	256029.000000	17954.000000	Ministry of Health

```
In [23]:    dataset["1st Dose"].plot()
```

Out[23]: <AxesSubplot:>
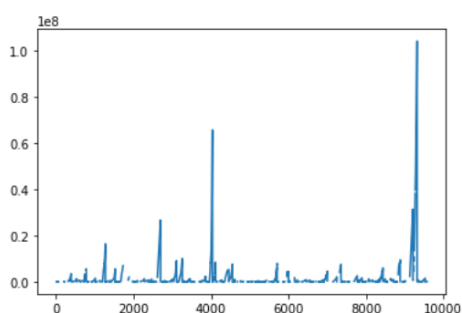
```
In [24]: dataset["2nd Dose"].plot()
```

Out[24]: <AxesSubplot:>


```
In [21]: display(dataset[['Country','Vaccines','Total Vaccinations']].groupby(['Country','Vaccines']).agg(["max",'mean',"min"]).style.back
```

| | | Total Vaccinations | | |
| | | max | mean | min |
Country	Vaccines			
Afghanistan	Oxford/AstraZeneca	54000.000000	20733.333333	0.000000
Albania	Pfizer/BioNTech, Sinovac	172486.000000	33633.294118	0.000000
Algeria	Sputnik V	75000.000000	25010.000000	0.000000
Andorra	Pfizer/BioNTech	9288.000000	3432.545455	576.000000
Angola	Oxford/AstraZeneca	130750.000000	54588.200000	0.000000
Anguilla	Oxford/AstraZeneca	5348.000000	3063.333333	0.000000
Antigua and Barbuda	Oxford/AstraZeneca	26424.000000	19066.250000	0.000000
Argentina	Oxford/AstraZeneca, Sinopharm/Beijing, Sputnik V	4178896.000000	1429166.815789	700.000000
Australia	Oxford/AstraZeneca, Pfizer/BioNTech	754435.000000	203860.812500	0.000000
Austria	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech	1727020.000000	575411.701031	720.000000

```
In [28]:    dataset["Total Vaccinations"].sum()
```

Out[28]: 18605597985.0

```
In [ ]:
```

Conclusion: From our research we came to a conclusion that the vaccination process is going moderately worldwide along with our country. But governments should take significant steps to make vaccinate more and more people, especially the frontline workers and senior citizens.
Thank You.

Dataset   : https://bit.ly/3296u61
Github link   : https://bit.ly/3a1kza9