COVID-19 in India

Use covid_19_india.csv to do the following:

● For each Indian state, find maximum cases reported for confirmed, deaths and recovered individually along with date on which these cases were reported for any three months of year 2020. Display the result in the self-explanatory format.

● Use appropriate year-month string date conversions for example: Identify the no. of cases on the 6th day of the month by converting year-month string to dates.

● Create subplots (line graph) for showing total number of cured cases month-wise from April 2020 to March 2021 in four states namely Karnataka, Gujarat, Haryana, and Uttar Pradesh.

● Compare the deaths due to Covid-19 in the months of May 2020 and May 2021 for the states namely Karnataka, Delhi, and Madhya Pradesh using stacked bars.

● Make a graph to show the month wise relation (Positive/Negative/Neutral) between number of confirmed Covid-19 cases and Deaths in Uttar Pradesh. Display correlation value too in the graph.

In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
import seaborn as sns
import datetime as dt

%matplotlib inline
%matplotlib notebook
```

In [2]:
```
covid19_df = pd.read_csv("./datasets/covid_19_india.csv")
individuals_df = pd.read_csv("./datasets/IndividualDetails.csv")

excel_file = pd.ExcelFile("./datasets/Indian States Population and Area.xlsx")
indian_states_df = excel_file.parse('Sheet1')
```

I am using three different sources of data in this analysis.

Let us have a look at the first few records from the COVID 19 dataset sourced from Kaggle.

In [3]:
```
covid19_df.head()
```

Out[3]:

	Sno	Date	Time	State/UnionTerritory	ConfirmedIndianNational	ConfirmedForeignNational	Cured
0	1	2020-01-30	6:00 PM	Kerala	1	0	0
1	2	2020-01-31	6:00 PM	Kerala	1	0	0

	Sno	Date	Time	State/UnionTerritory	ConfirmedIndianNational	ConfirmedForeignNational	Cured
2	3	2020-02-01	6:00 PM	Kerala	2	0	0
3	4	2020-02-02	6:00 PM	Kerala	3	0	0
4	5	2020-02-03	6:00 PM	Kerala	3	0	0

In [4]:
```
covid19_df.tail()
```

Out[4]:

	Sno	Date	Time	State/UnionTerritory	ConfirmedIndianNational	ConfirmedForeignNational
18105	18106	2021-08-11	8:00 AM	Telangana	-	-
18106	18107	2021-08-11	8:00 AM	Tripura	-	-
18107	18108	2021-08-11	8:00 AM	Uttarakhand	-	-
18108	18109	2021-08-11	8:00 AM	Uttar Pradesh	-	-
18109	18110	2021-08-11	8:00 AM	West Bengal	-	-

In [5]:
```
covid19_df.shape
```

Out[5]:
```
(18110, 9)
```

In [6]:
```
covid19_df.isna().sum()
```

Out[6]:
```
Sno                         0
Date                        0
Time                        0
State/UnionTerritory        0
ConfirmedIndianNational     0
ConfirmedForeignNational    0
Cured                       0
Deaths                      0
Confirmed                   0
dtype: int64
```

PART A

For each Indian state, find maximum cases reported for confirmed, deaths and recovered individually along with date on which these cases were reported for any three months of year 2020. Display the result in the self-explanatory format.

In [7]:
```
start_date='2020-01-01' # range of 3 month
end_date='2020-03-31'
covid19_df_latest = covid19_df[(covid19_df['Date']>start_date) &
                               (covid19_df['Date']<=end_date)]
covid19_df_latest.head()
```

Out[7]:

	Sno	Date	Time	State/UnionTerritory	ConfirmedIndianNational	ConfirmedForeignNational	Cured
0	1	2020-01-30	6:00 PM	Kerala	1	0	0
1	2	2020-01-31	6:00 PM	Kerala	1	0	0
2	3	2020-02-01	6:00 PM	Kerala	2	0	0
3	4	2020-02-02	6:00 PM	Kerala	3	0	0
4	5	2020-02-03	6:00 PM	Kerala	3	0	0

In [8]:
```
covid19_df_latest.tail()
```

Out[8]:

	Sno	Date	Time	State/UnionTerritory	ConfirmedIndianNational	ConfirmedForeignNational	Cure
524	525	2020-03-31	8:30 PM	Telengana	-	-	
525	526	2020-03-31	8:30 PM	Uttarakhand	-	-	
526	527	2020-03-31	8:30 PM	Uttar Pradesh	-	-	1
527	528	2020-03-31	8:30 PM	West Bengal	-	-	
528	529	2020-03-31	8:30 PM	Unassigned	-	-	

In [9]:
```
hi=covid19_df_latest['State/UnionTerritory'].unique()
print(hi)
hi.size
```

```
['Kerala' 'Telengana' 'Delhi' 'Rajasthan' 'Uttar Pradesh' 'Haryana'
 'Ladakh' 'Tamil Nadu' 'Karnataka' 'Maharashtra' 'Punjab'
 'Jammu and Kashmir' 'Andhra Pradesh' 'Uttarakhand' 'Odisha' 'Puducherry'
 'West Bengal' 'Chhattisgarh' 'Chandigarh' 'Gujarat' 'Himachal Pradesh'
 'Madhya Pradesh' 'Bihar' 'Manipur' 'Mizoram'
 'Andaman and Nicobar Islands' 'Goa' 'Unassigned']
```

Out[9]:
```
28
```

In [10]:
```
covid19_df_latest['Confirmed'].sum()
```

Out[10]:
```
9775
```

In [11]:
```
covid19_df_latest.groupby(by=['State/UnionTerritory'])['Cured'].max()
```

Out[11]:
```
State/UnionTerritory
Andaman and Nicobar Islands     0
Andhra Pradesh                  1
Bihar                           0
Chandigarh                      0
Chhattisgarh                    0
Delhi                           6
Goa                             0
Gujarat                         3
Haryana                        21
Himachal Pradesh                0
Jammu and Kashmir               2
Karnataka                       5
Kerala                         19
Ladakh                          3
Madhya Pradesh                  0
Maharashtra                    39
Manipur                         0
Mizoram                         0
Odisha                          0
Puducherry                      0
Punjab                          1
Rajasthan                       3
Tamil Nadu                      4
Telengana                       1
Unassigned                      0
Uttar Pradesh                  14
Uttarakhand                     2
West Bengal                     0
Name: Cured, dtype: int64
```

In [12]:
```
covid19_df_latest.groupby(by=['State/UnionTerritory'])['Deaths'].max()
```

Out[12]:
```
State/UnionTerritory
Andaman and Nicobar Islands    0
Andhra Pradesh                 0
Bihar                          1
Chandigarh                     0
Chhattisgarh                   0
Delhi                          2
Goa                            0
Gujarat                        6
Haryana                        0
Himachal Pradesh               1
Jammu and Kashmir              2
Karnataka                      3
Kerala                         1
Ladakh                         0
Madhya Pradesh                 3
Maharashtra                    9
Manipur                        0
Mizoram                        0
```

```
Odisha                          0
Puducherry                      0
Punjab                          3
Rajasthan                       0
Tamil Nadu                      1
Telengana                       1
Unassigned                      0
Uttar Pradesh                   0
Uttarakhand                     0
West Bengal                     2
Name: Deaths, dtype: int64
```

In [13]:
```
covid19_df_latest.groupby(by=['State/UnionTerritory'])['Confirmed'].max()
```

Out[13]:
```
State/UnionTerritory
Andaman and Nicobar Islands     10
Andhra Pradesh                  40
Bihar                           15
Chandigarh                      13
Chhattisgarh                     8
Delhi                           97
Goa                              5
Gujarat                         73
Haryana                         40
Himachal Pradesh                 3
Jammu and Kashmir               54
Karnataka                       83
Kerala                         234
Ladakh                          13
Madhya Pradesh                  47
Maharashtra                    216
Manipur                          1
Mizoram                          1
Odisha                           3
Puducherry                       1
Punjab                          41
Rajasthan                       74
Tamil Nadu                      74
Telengana                       79
Unassigned                      46
Uttar Pradesh                  101
Uttarakhand                      7
West Bengal                     26
Name: Confirmed, dtype: int64
```

In [14]:
```
covid19_df_latest.groupby(by=['State/UnionTerritory'])
['Cured','Deaths','Confirmed'].max()
```

```
C:\Users\UJJAWA~1\AppData\Local\Temp/ipykernel_2404/3048936530.py:1: FutureWarning: Inde
xing with multiple keys (implicitly converted to a tuple of keys) will be deprecated, us
e a list instead.
  covid19_df_latest.groupby(by=['State/UnionTerritory'])['Cured','Deaths','Confirmed'].m
ax()
```

Out[14]:

State/UnionTerritory	Cured	Deaths	Confirmed
Andaman and Nicobar Islands	0	0	10

State/UnionTerritory	Cured	Deaths	Confirmed
Andhra Pradesh	1	0	40
Bihar	0	1	15
Chandigarh	0	0	13
Chhattisgarh	0	0	8
Delhi	6	2	97
Goa	0	0	5
Gujarat	3	6	73
Haryana	21	0	40
Himachal Pradesh	0	1	3
Jammu and Kashmir	2	2	54
Karnataka	5	3	83
Kerala	19	1	234
Ladakh	3	0	13
Madhya Pradesh	0	3	47
Maharashtra	39	9	216
Manipur	0	0	1
Mizoram	0	0	1
Odisha	0	0	3
Puducherry	0	0	1
Punjab	1	3	41
Rajasthan	3	0	74
Tamil Nadu	4	1	74
Telengana	1	1	79
Unassigned	0	0	46
Uttar Pradesh	14	0	101
Uttarakhand	2	0	7
West Bengal	0	2	26

In [15]:
```
covid19_df_latest.groupby(by=['State/UnionTerritory']).max()
```

Out[15]:

State/UnionTerritory	Sno	Date	Time	ConfirmedIndianNational	ConfirmedForeignNational	Cured	De

State/UnionTerritory	Sno	Date	Time	ConfirmedIndianNational	ConfirmedForeignNational	Cured	De
Andaman and Nicobar Islands	503	2020-03-31	9:30 PM	6	0	0	
Andhra Pradesh	502	2020-03-31	9:30 PM	9	0	1	
Bihar	504	2020-03-31	9:30 PM	9	0	0	
Chandigarh	505	2020-03-31	9:30 PM	8	0	0	
Chhattisgarh	506	2020-03-31	9:30 PM	6	0	0	
Delhi	507	2020-03-31	9:30 PM	9	1	6	
Goa	508	2020-03-31	9:30 PM	3	0	0	
Gujarat	509	2020-03-31	9:30 PM	7	1	3	
Haryana	510	2020-03-31	9:30 PM	7	2	21	
Himachal Pradesh	511	2020-03-31	9:30 PM	3	0	0	
Jammu and Kashmir	512	2020-03-31	9:30 PM	7	0	2	
Karnataka	513	2020-03-31	9:30 PM	6	0	5	
Kerala	514	2020-03-31	9:30 PM	9	8	19	
Ladakh	515	2020-03-31	9:30 PM	8	0	3	
Madhya Pradesh	516	2020-03-31	9:30 PM	7	0	0	
Maharashtra	517	2020-03-31	9:30 PM	86	3	39	
Manipur	518	2020-03-31	9:30 PM	1	0	0	
Mizoram	519	2020-03-31	9:30 PM	1	0	0	
Odisha	520	2020-03-31	9:30 PM	3	0	0	
Puducherry	521	2020-03-31	9:30 PM	1	0	0	

State/UnionTerritory	Sno	Date	Time	ConfirmedIndianNational	ConfirmedForeignNational	Cured	De
Punjab	522	2020-03-31	9:30 PM	38	0	1	
Rajasthan	523	2020-03-31	9:30 PM	52	2	3	
Tamil Nadu	524	2020-03-31	9:30 PM	7	6	4	
Telengana	525	2020-03-31	9:30 PM	8	9	1	
Unassigned	529	2020-03-31	9:30 PM	-	-	0	
Uttar Pradesh	527	2020-03-31	9:30 PM	9	1	14	
Uttarakhand	526	2020-03-31	9:30 PM	4	1	2	
West Bengal	528	2020-03-31	9:30 PM	9	0	0	

PART B

Use appropriate year-month string date conversions for example: Identify the no. of cases on the 6th day of the month by converting year-month string to dates.

In [16]:
```
import datetime as dt
def read_as_datetime(str_date):
    return dt.datetime.strptime(str_date,'%Y-%m-%d')
```

In [17]:
```
case=covid19_df.copy()
```

In [18]:
```
case['Date']=case.Date.apply(read_as_datetime)
```

In [19]:
```
cas=case[(case['Date'].dt.month==6) & (case['Date'].dt.day==6)]
```

In [20]:
```
cas
```

Out[20]:

	Sno	Date	Time	State/UnionTerritory	ConfirmedIndianNational	ConfirmedForeignNational
2702	2703	2020-06-06	8:00 AM	Andaman and Nicobar Islands	-	-
2703	2704	2020-06-06	8:00 AM	Andhra Pradesh	-	-

	Sno	Date	Time	State/UnionTerritory	ConfirmedIndianNational	ConfirmedForeignNational
2704	2705	2020-06-06	8:00 AM	Arunachal Pradesh	-	-
2705	2706	2020-06-06	8:00 AM	Assam	-	-
2706	2707	2020-06-06	8:00 AM	Bihar	-	-
...	...	...	...	...	...	...
15729	15730	2021-06-06	8:00 AM	Telangana	-	-
15730	15731	2021-06-06	8:00 AM	Tripura	-	-
15731	15732	2021-06-06	8:00 AM	Uttarakhand	-	-
15732	15733	2021-06-06	8:00 AM	Uttar Pradesh	-	-
15733	15734	2021-06-06	8:00 AM	West Bengal	-	-

72 rows × 9 columns

In [21]:
```
cas[['Date','State/UnionTerritory','Confirmed']].head()
```

Out[21]:

	Date	State/UnionTerritory	Confirmed
2702	2020-06-06	Andaman and Nicobar Islands	33
2703	2020-06-06	Andhra Pradesh	4303
2704	2020-06-06	Arunachal Pradesh	45
2705	2020-06-06	Assam	2153
2706	2020-06-06	Bihar	4596

In [22]:
```
cas[['Date','State/UnionTerritory','Confirmed']].tail()
```

Out[22]:

	Date	State/UnionTerritory	Confirmed
15729	2021-06-06	Telangana	589734
15730	2021-06-06	Tripura	55234
15731	2021-06-06	Uttarakhand	333578
15732	2021-06-06	Uttar Pradesh	1697352
15733	2021-06-06	West Bengal	1419130

In [23]:
```
cas.groupby(by=['State/UnionTerritory']).sum()
```

Out[23]:

State/UnionTerritory	Sno	Cured	Deaths	Confirmed
Andaman and Nicobar Islands	18402	6909	122	7138
Andhra Pradesh	18404	1612455	11449	1753666
Arunachal Pradesh	18406	25238	123	29158
Assam	18408	376841	3625	434867
Bihar	18410	699454	5369	716793
Cases being reassigned to states	2738	0	0	8192
Chandigarh	18412	59114	773	60889
Chhattisgarh	18414	941733	13194	980455
Dadra and Nagar Haveli and Daman and Diu	18416	10262	4	10401
Delhi	18418	1407890	25265	1455197
Goa	18420	148095	2744	159186
Gujarat	18422	798381	11111	834480
Haryana	18424	745133	8688	765234
Himachal Pradesh	18426	182168	3284	195135
Jammu and Kashmir	18428	267662	4087	302374
Jharkhand	18430	330050	5053	341806
Karnataka	18432	2385446	31317	2688149
Kerala	18434	2441354	9733	2620109
Ladakh	18436	17830	196	19244
Lakshadweep	15717	7469	38	8667
Madhya Pradesh	18439	770700	8679	793457
Maharashtra	18441	5563990	102361	5899453
Manipur	18443	44560	872	54539
Meghalaya	18445	31794	653	38263
Mizoram	18447	10152	53	13589
Nagaland	18449	17455	422	22790
Odisha	18451	733622	2960	808702
Puducherry	18453	98079	1613	108538
Punjab	18455	540603	15057	580458
Rajasthan	18457	922620	8849	955526
Sikkim	18459	12285	268	16774

State/UnionTerritory	Sno	Cured	Deaths	Confirmed
Tamil Nadu	18461	1948540	26803	2245506
Telangana	15730	557162	3364	589734
Telengana	2733	1627	113	3290
Tripura	18465	48368	558	55926
Uttar Pradesh	18469	1662411	21408	1707085
Uttarakhand	18467	309953	6675	334793
West Bengal	18471	1361449	16518	1426433

Part C

Create subplots (line graph) for showing total number of cured cases month-wise from April 2020 to March 2021 in four states namely Karnataka, Gujarat, Haryana, and Uttar Pradesh.

In [24]:
```
covid19_Karnataka = covid19_df[covid19_df['State/UnionTerritory'] == "Karnataka"]
covid19_Karnataka.reset_index(inplace = True)
covid19_Karnataka = covid19_Karnataka.drop(['index','Sno', 'Time',
                                            'ConfirmedIndianNational',
                                            'ConfirmedForeignNational',
                                          'Deaths', 'Confirmed'], axis = 1)
covid19_Karnataka.reset_index(inplace = True)
covid19_Karnataka.columns = ['Day Count', 'Date', 'State/UnionTerritory','Cured' ]
print(covid19_Karnataka.shape)
covid19_Karnataka.head()
```

```
(520, 4)
```

Out[24]:

	Day Count	Date	State/UnionTerritory	Cured
0	0	2020-03-09	Karnataka	0
1	1	2020-03-10	Karnataka	0
2	2	2020-03-11	Karnataka	0
3	3	2020-03-12	Karnataka	0
4	4	2020-03-13	Karnataka	0

In [25]:
```
covid19_gujarat = covid19_df[covid19_df['State/UnionTerritory'] == "Gujarat"]
covid19_gujarat.reset_index(inplace = True)
covid19_gujarat = covid19_gujarat.drop(['index','Sno', 'Time',
                                        'ConfirmedIndianNational',
                                        'ConfirmedForeignNational',
                                        'Deaths', 'Confirmed'], axis = 1)
covid19_gujarat.reset_index(inplace = True)
covid19_gujarat.columns = ['Day Count', 'Date', 'State/UnionTerritory','Cured' ]
```

```
print(covid19_gujarat.shape)
covid19_gujarat.head()
```

```
(510, 4)
```

Out[25]:

	Day Count	Date	State/UnionTerritory	Cured
0	0	2020-03-20	Gujarat	0
1	1	2020-03-21	Gujarat	0
2	2	2020-03-22	Gujarat	0
3	3	2020-03-23	Gujarat	0
4	4	2020-03-24	Gujarat	0

In [26]:

```
covid19_h = covid19_df[covid19_df['State/UnionTerritory'] == "Haryana"]
covid19_h.reset_index(inplace = True)
covid19_h = covid19_h.drop(['index','Sno', 'Time',
                            'ConfirmedIndianNational',
                            'ConfirmedForeignNational',
                             'Deaths', 'Confirmed'], axis = 1)
covid19_h.reset_index(inplace = True)
covid19_h.columns = ['Day Count', 'Date', 'State/UnionTerritory','Cured' ]
print(covid19_h.shape)
covid19_h.head()
```

```
(526, 4)
```

Out[26]:

	Day Count	Date	State/UnionTerritory	Cured
0	0	2020-03-04	Haryana	0
1	1	2020-03-05	Haryana	0
2	2	2020-03-06	Haryana	0
3	3	2020-03-07	Haryana	0
4	4	2020-03-08	Haryana	0

In [27]:

```
covid19_up = covid19_df[covid19_df['State/UnionTerritory'] == "Uttar Pradesh"]
covid19_up.reset_index(inplace = True)
covid19_up = covid19_up.drop(['index','Sno', 'Time',
                              'ConfirmedIndianNational',
                              'ConfirmedForeignNational',
                             'Deaths', 'Confirmed'], axis = 1)
covid19_up.reset_index(inplace = True)
covid19_up.columns = ['Day Count', 'Date', 'State/UnionTerritory','Cured' ]
print(covid19_up.shape)
covid19_up.head()
```

```
(526, 4)
```

Out[27]:

	Day Count	Date	State/UnionTerritory	Cured
0	0	2020-03-04	Uttar Pradesh	0
1	1	2020-03-05	Uttar Pradesh	0

	Day Count	Date	State/UnionTerritory	Cured
2	2	2020-03-06	Uttar Pradesh	0
3	3	2020-03-07	Uttar Pradesh	0
4	4	2020-03-08	Uttar Pradesh	0

In [28]:
```
start_date='2020-04-01'
end_date='2021-03-31'
covid19_guj = covid19_gujarat[(covid19_gujarat['Date']>start_date) &
                              (covid19_gujarat['Date']<=end_date)]
covid19_guj.reset_index(drop=True, inplace=True)
print(covid19_guj.shape)
covid19_guj.head()
```

(364, 4)

Out[28]:

	Day Count	Date	State/UnionTerritory	Cured
0	13	2020-04-02	Gujarat	8
1	14	2020-04-03	Gujarat	10
2	15	2020-04-04	Gujarat	14
3	16	2020-04-05	Gujarat	18
4	17	2020-04-06	Gujarat	22

In [29]:
```
start_date='2020-04-01'
end_date='2021-03-31'
covid19_kar = covid19_Karnataka[(covid19_Karnataka['Date']>start_date)
                                & (covid19_Karnataka['Date']<=end_date)]
covid19_kar.reset_index(drop=True, inplace=True)
print(covid19_kar.shape)
covid19_kar.head()
```

(364, 4)

Out[29]:

	Day Count	Date	State/UnionTerritory	Cured
0	24	2020-04-02	Karnataka	9
1	25	2020-04-03	Karnataka	10
2	26	2020-04-04	Karnataka	12
3	27	2020-04-05	Karnataka	12
4	28	2020-04-06	Karnataka	12

In [30]:
```
start_date='2020-04-01'
end_date='2021-03-31'
covid19_har = covid19_h[(covid19_h['Date']>start_date)
                        & (covid19_h['Date']<=end_date)]
covid19_har.reset_index(drop=True, inplace=True)
print(covid19_har.shape)
covid19_har.head()
```

(364, 4)

Out[30]:

	Day Count	Date	State/UnionTerritory	Cured
0	29	2020-04-02	Haryana	21
1	30	2020-04-03	Haryana	24
2	31	2020-04-04	Haryana	24
3	32	2020-04-05	Haryana	25
4	33	2020-04-06	Haryana	25

In [31]:

```
start_date='2020-04-01'
end_date='2021-03-31'
covid19_uttar = covid19_up[(covid19_up['Date']>start_date)
                           & (covid19_up['Date']<=end_date)]
covid19_uttar.reset_index(drop=True, inplace=True)
print(covid19_uttar.shape)
covid19_uttar.head()
```

(364, 4)

Out[31]:

	Day Count	Date	State/UnionTerritory	Cured
0	29	2020-04-02	Uttar Pradesh	14
1	30	2020-04-03	Uttar Pradesh	14
2	31	2020-04-04	Uttar Pradesh	19
3	32	2020-04-05	Uttar Pradesh	19
4	33	2020-04-06	Uttar Pradesh	21

In [32]:

```
Gujarat=covid19_guj['Cured'].sum()

print(Gujarat)
```

45590551

In [33]:

```
Karnatka=covid19_kar['Cured'].sum()
print(Karnatka)
```

170016924

In [34]:

```
UP=covid19_uttar['Cured'].sum()
print(UP)
```

108314020

In [35]:

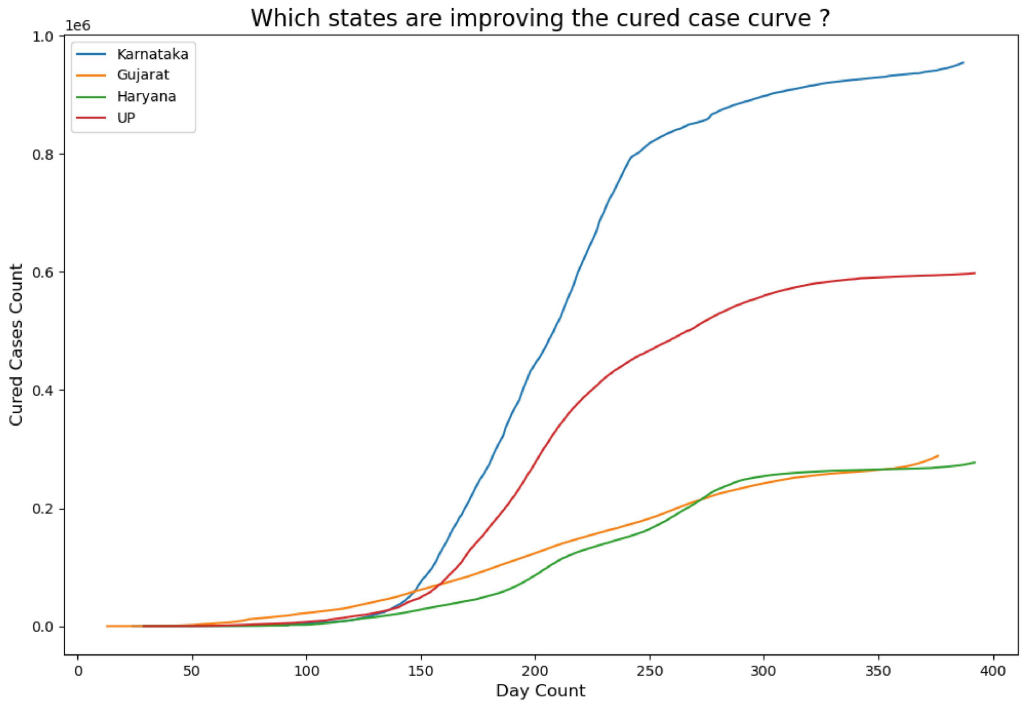
```
Haryana=covid19_har['Cured'].sum()
print(Haryana)
```

45102238

In [36]:

```
plt.figure(figsize=(12,8), dpi=80)
plt.plot(covid19_kar['Day Count'], covid19_kar['Cured'])
plt.plot(covid19_guj['Day Count'], covid19_guj['Cured'])
plt.plot(covid19_har['Day Count'], covid19_har['Cured'])
plt.plot(covid19_uttar['Day Count'], covid19_uttar['Cured'])

plt.legend(['Karnataka', 'Gujarat','Haryana','UP'], loc='upper left')
plt.xlabel('Day Count', size=12)
plt.ylabel('Cured Cases Count', size=12)
plt.title('Which states are improving the cured case curve ?', size = 16)
plt.show()
```



Part D

Compare the deaths due to Covid-19 in the months of May 2020 and May 2021 for the states namely Karnataka, Delhi, and Madhya Pradesh using stacked bars.

karnataka

In [74]:

```
covid19_Karnataka = covid19_df[covid19_df['State/UnionTerritory'] == "Karnataka"]
covid19_Karnataka.reset_index(inplace = True)
covid19_Karnataka = covid19_Karnataka.drop(['index','Sno', 'Time',
                                        'ConfirmedIndianNational',
                                            'ConfirmedForeignNational',
                                        'Cured', 'Confirmed'], axis = 1)
covid19_Karnataka.reset_index(inplace = True)
covid19_Karnataka.columns = ['Day Count', 'Date', 'State/UnionTerritory','Deaths' ]
```

```
print(covid19_Karnataka.shape)
covid19_Karnataka.head()
```

```
(520, 4)
```

Out[74]:

	Day Count	Date	State/UnionTerritory	Deaths
0	0	2020-03-09	Karnataka	0
1	1	2020-03-10	Karnataka	0
2	2	2020-03-11	Karnataka	0
3	3	2020-03-12	Karnataka	0
4	4	2020-03-13	Karnataka	1

In [75]:

```
covid19_Karnataka.Date= pd.to_datetime(covid19_Karnataka.Date).dt.to_period('m')
print (covid19_Karnataka)
```

```
     Day Count     Date State/UnionTerritory  Deaths
0            0  2020-03            Karnataka       0
1            1  2020-03            Karnataka       0
2            2  2020-03            Karnataka       0
3            3  2020-03            Karnataka       0
4            4  2020-03            Karnataka       1
..         ...      ...                  ...     ...
515        515  2021-08            Karnataka   36741
516        516  2021-08            Karnataka   36773
517        517  2021-08            Karnataka   36793
518        518  2021-08            Karnataka   36817
519        519  2021-08            Karnataka   36848

[520 rows x 4 columns]
```

In [76]:

```
state1=covid19_Karnataka[(covid19_Karnataka['Date']==('2020-05')) ]
state1
```

Out[76]:

	Day Count	Date	State/UnionTerritory	Deaths
53	53	2020-05	Karnataka	22
54	54	2020-05	Karnataka	22
55	55	2020-05	Karnataka	25
56	56	2020-05	Karnataka	26
57	57	2020-05	Karnataka	28
58	58	2020-05	Karnataka	29
59	59	2020-05	Karnataka	29
60	60	2020-05	Karnataka	30
61	61	2020-05	Karnataka	30
62	62	2020-05	Karnataka	30
63	63	2020-05	Karnataka	31

	Day Count	Date	State/UnionTerritory	Deaths
64	64	2020-05	Karnataka	31
65	65	2020-05	Karnataka	31
66	66	2020-05	Karnataka	33
67	67	2020-05	Karnataka	35
68	68	2020-05	Karnataka	36
69	69	2020-05	Karnataka	36
70	70	2020-05	Karnataka	37
71	71	2020-05	Karnataka	37
72	72	2020-05	Karnataka	40
73	73	2020-05	Karnataka	41
74	74	2020-05	Karnataka	41
75	75	2020-05	Karnataka	41
76	76	2020-05	Karnataka	42
77	77	2020-05	Karnataka	42
78	78	2020-05	Karnataka	44
79	79	2020-05	Karnataka	44
80	80	2020-05	Karnataka	47
81	81	2020-05	Karnataka	47
82	82	2020-05	Karnataka	48
83	83	2020-05	Karnataka	48

In [77]:
```
m=state1['Deaths'].sum()
```

In [78]:
```
statea=covid19_Karnataka[(covid19_Karnataka['Date']==('2021-05')) ]
statea
```

Out[78]:

	Day Count	Date	State/UnionTerritory	Deaths
418	418	2021-05	Karnataka	15523
419	419	2021-05	Karnataka	15794
420	420	2021-05	Karnataka	16011
421	421	2021-05	Karnataka	16250
422	422	2021-05	Karnataka	16538
423	423	2021-05	Karnataka	16884
424	424	2021-05	Karnataka	17212

	Day Count	Date	State/UnionTerritory	Deaths
425	425	2021-05	Karnataka	17804
426	426	2021-05	Karnataka	18286
427	427	2021-05	Karnataka	18776
428	428	2021-05	Karnataka	19372
429	429	2021-05	Karnataka	19852
430	430	2021-05	Karnataka	20368
431	431	2021-05	Karnataka	20712
432	432	2021-05	Karnataka	21085
433	433	2021-05	Karnataka	21434
434	434	2021-05	Karnataka	21837
435	435	2021-05	Karnataka	22313
436	436	2021-05	Karnataka	22838
437	437	2021-05	Karnataka	23306
438	438	2021-05	Karnataka	23854
439	439	2021-05	Karnataka	24207
440	440	2021-05	Karnataka	24658
441	441	2021-05	Karnataka	25282
442	442	2021-05	Karnataka	25811
443	443	2021-05	Karnataka	26399
444	444	2021-05	Karnataka	26929
445	445	2021-05	Karnataka	27405
446	446	2021-05	Karnataka	27806
447	447	2021-05	Karnataka	28298
448	448	2021-05	Karnataka	28679

In [79]:
```
n=statea['Deaths'].sum()
```

In [80]:
```
a=pd.concat([state1, statea], ignore_index=True, axis=0)
a
```

Out[80]:

	Day Count	Date	State/UnionTerritory	Deaths
0	53	2020-05	Karnataka	22
1	54	2020-05	Karnataka	22
2	55	2020-05	Karnataka	25

	Day Count	Date	State/UnionTerritory	Deaths
3	56	2020-05	Karnataka	26
4	57	2020-05	Karnataka	28
...	...	...	...	...
57	444	2021-05	Karnataka	26929
58	445	2021-05	Karnataka	27405
59	446	2021-05	Karnataka	27806
60	447	2021-05	Karnataka	28298
61	448	2021-05	Karnataka	28679

62 rows × 4 columns

MP

In [83]:
```
covid19_mp = covid19_df[covid19_df['State/UnionTerritory'] == "Madhya Pradesh"]
covid19_mp.reset_index(inplace = True)
covid19_mp = covid19_mp.drop(['index','Sno', 'Time',
                              'ConfirmedIndianNational',
                              'ConfirmedForeignNational',
                              'Cured', 'Confirmed'], axis = 1)
covid19_mp.reset_index(inplace = True)
covid19_mp.columns = ['Day Count', 'Date', 'State/UnionTerritory','Deaths' ]
print(covid19_mp.shape)
covid19_mp.head()
```

```
(508, 4)
```

Out[83]:

	Day Count	Date	State/UnionTerritory	Deaths
0	0	2020-03-21	Madhya Pradesh	0
1	1	2020-03-22	Madhya Pradesh	0
2	2	2020-03-23	Madhya Pradesh	0
3	3	2020-03-24	Madhya Pradesh	0
4	4	2020-03-25	Madhya Pradesh	0

In [86]:
```
covid19_mp.Date= pd.to_datetime(covid19_mp.Date).dt.to_period('m')
print (covid19_mp)
```

```
     Day Count     Date State/UnionTerritory  Deaths
0            0  2020-03       Madhya Pradesh       0
1            1  2020-03       Madhya Pradesh       0
2            2  2020-03       Madhya Pradesh       0
3            3  2020-03       Madhya Pradesh       0
4            4  2020-03       Madhya Pradesh       0
..         ...      ...                  ...     ...
503        503  2021-08       Madhya Pradesh   10514
```

```
504         504  2021-08       Madhya Pradesh   10514
505         505  2021-08       Madhya Pradesh   10514
506         506  2021-08       Madhya Pradesh   10514
507         507  2021-08       Madhya Pradesh   10514

[508 rows x 4 columns]
```

In [89]:

```
state2=covid19_mp[(covid19_mp['Date']==('2020-05')) ]
state2
```

Out[89]:

	Day Count	Date	State/UnionTerritory	Deaths
41	41	2020-05	Madhya Pradesh	137
42	42	2020-05	Madhya Pradesh	145
43	43	2020-05	Madhya Pradesh	156
44	44	2020-05	Madhya Pradesh	165
45	45	2020-05	Madhya Pradesh	176
46	46	2020-05	Madhya Pradesh	176
47	47	2020-05	Madhya Pradesh	185
48	48	2020-05	Madhya Pradesh	193
49	49	2020-05	Madhya Pradesh	200
50	50	2020-05	Madhya Pradesh	215
51	51	2020-05	Madhya Pradesh	215
52	52	2020-05	Madhya Pradesh	221
53	53	2020-05	Madhya Pradesh	225
54	54	2020-05	Madhya Pradesh	232
55	55	2020-05	Madhya Pradesh	237
56	56	2020-05	Madhya Pradesh	239
57	57	2020-05	Madhya Pradesh	243
58	58	2020-05	Madhya Pradesh	248
59	59	2020-05	Madhya Pradesh	252
60	60	2020-05	Madhya Pradesh	258
61	61	2020-05	Madhya Pradesh	267
62	62	2020-05	Madhya Pradesh	270
63	63	2020-05	Madhya Pradesh	272
64	64	2020-05	Madhya Pradesh	281
65	65	2020-05	Madhya Pradesh	290
66	66	2020-05	Madhya Pradesh	300
67	67	2020-05	Madhya Pradesh	305

	Day Count	Date	State/UnionTerritory	Deaths
68	68	2020-05	Madhya Pradesh	313
69	69	2020-05	Madhya Pradesh	321
70	70	2020-05	Madhya Pradesh	334
71	71	2020-05	Madhya Pradesh	343

In [90]:
```
o=state2['Deaths'].sum()
```

In [91]:
```
stateb=covid19_mp[(covid19_mp['Date']==('2021-05')) ]
stateb
```

Out[91]:

	Day Count	Date	State/UnionTerritory	Deaths
406	406	2021-05	Madhya Pradesh	5616
407	407	2021-05	Madhya Pradesh	5718
408	408	2021-05	Madhya Pradesh	5812
409	409	2021-05	Madhya Pradesh	5905
410	410	2021-05	Madhya Pradesh	6003
411	411	2021-05	Madhya Pradesh	6074
412	412	2021-05	Madhya Pradesh	6160
413	413	2021-05	Madhya Pradesh	6244
414	414	2021-05	Madhya Pradesh	6334
415	415	2021-05	Madhya Pradesh	6420
416	416	2021-05	Madhya Pradesh	6501
417	417	2021-05	Madhya Pradesh	6595
418	418	2021-05	Madhya Pradesh	6679
419	419	2021-05	Madhya Pradesh	6753
420	420	2021-05	Madhya Pradesh	6841
421	421	2021-05	Madhya Pradesh	6913
422	422	2021-05	Madhya Pradesh	6992
423	423	2021-05	Madhya Pradesh	7069
424	424	2021-05	Madhya Pradesh	7139
425	425	2021-05	Madhya Pradesh	7227
426	426	2021-05	Madhya Pradesh	7315
427	427	2021-05	Madhya Pradesh	7394
428	428	2021-05	Madhya Pradesh	7483

	Day Count	Date	State/UnionTerritory	Deaths
429	429	2021-05	Madhya Pradesh	7558
430	430	2021-05	Madhya Pradesh	7618
431	431	2021-05	Madhya Pradesh	7686
432	432	2021-05	Madhya Pradesh	7758
433	433	2021-05	Madhya Pradesh	7828
434	434	2021-05	Madhya Pradesh	7891
435	435	2021-05	Madhya Pradesh	7959
436	436	2021-05	Madhya Pradesh	8019

In [92]:
```
p=stateb['Deaths'].sum()
```

Delhi

In [84]:
```
covid19_del = covid19_df[covid19_df['State/UnionTerritory'] == "Delhi"]
covid19_del.reset_index(inplace = True)
covid19_del = covid19_del.drop(['index','Sno', 'Time',
                                'ConfirmedIndianNational',
                                'ConfirmedForeignNational',
                                'Cured', 'Confirmed'], axis = 1)
covid19_del.reset_index(inplace = True)
covid19_del.columns = ['Day Count', 'Date', 'State/UnionTerritory','Deaths' ]
print(covid19_del.shape)
covid19_del.head()
```

(528, 4)

Out[84]:

	Day Count	Date	State/UnionTerritory	Deaths
0	0	2020-03-02	Delhi	0
1	1	2020-03-03	Delhi	0
2	2	2020-03-04	Delhi	0
3	3	2020-03-05	Delhi	0
4	4	2020-03-06	Delhi	0

In [94]:
```
covid19_del.Date= pd.to_datetime(covid19_del.Date).dt.to_period('m')
print (covid19_del)
```

```
     Day Count     Date State/UnionTerritory  Deaths
0            0  2020-03                Delhi       0
1            1  2020-03                Delhi       0
2            2  2020-03                Delhi       0
3            3  2020-03                Delhi       0
4            4  2020-03                Delhi       0
..         ...      ...                  ...     ...
```

```
523         523  2021-08                Delhi   25065
524         524  2021-08                Delhi   25066
525         525  2021-08                Delhi   25066
526         526  2021-08                Delhi   25067
527         527  2021-08                Delhi   25068

[528 rows x 4 columns]
```

In [95]:

```
state3=covid19_del[(covid19_del['Date']==('2020-05')) ]
state3
```

Out[95]:

	Day Count	Date	State/UnionTerritory	Deaths
60	60	2020-05	Delhi	59
61	61	2020-05	Delhi	61
62	62	2020-05	Delhi	64
63	63	2020-05	Delhi	64
64	64	2020-05	Delhi	64
65	65	2020-05	Delhi	64
66	66	2020-05	Delhi	65
67	67	2020-05	Delhi	66
68	68	2020-05	Delhi	68
69	69	2020-05	Delhi	73
70	70	2020-05	Delhi	73
71	71	2020-05	Delhi	73
72	72	2020-05	Delhi	86
73	73	2020-05	Delhi	106
74	74	2020-05	Delhi	115
75	75	2020-05	Delhi	123
76	76	2020-05	Delhi	129
77	77	2020-05	Delhi	160
78	78	2020-05	Delhi	168
79	79	2020-05	Delhi	168
80	80	2020-05	Delhi	176
81	81	2020-05	Delhi	194
82	82	2020-05	Delhi	208
83	83	2020-05	Delhi	231
84	84	2020-05	Delhi	261
85	85	2020-05	Delhi	276
86	86	2020-05	Delhi	288

	Day Count	Date	State/UnionTerritory	Deaths
87	87	2020-05	Delhi	303
88	88	2020-05	Delhi	316
89	89	2020-05	Delhi	398
90	90	2020-05	Delhi	416

In [96]:
```
q=state3['Deaths'].sum()
```

In [100…
```
statec=covid19_del[(covid19_del['Date']==('2021-05')) ]
statec
```

Out[100…

	Day Count	Date	State/UnionTerritory	Deaths
425	425	2021-05	Delhi	16147
426	426	2021-05	Delhi	16559
427	427	2021-05	Delhi	16966
428	428	2021-05	Delhi	17414
429	429	2021-05	Delhi	17752
430	430	2021-05	Delhi	18063
431	431	2021-05	Delhi	18398
432	432	2021-05	Delhi	18739
433	433	2021-05	Delhi	19071
434	434	2021-05	Delhi	19344
435	435	2021-05	Delhi	19663
436	436	2021-05	Delhi	20010
437	437	2021-05	Delhi	20310
438	438	2021-05	Delhi	20618
439	439	2021-05	Delhi	20907
440	440	2021-05	Delhi	21244
441	441	2021-05	Delhi	21506
442	442	2021-05	Delhi	21846
443	443	2021-05	Delhi	22111
444	444	2021-05	Delhi	22346
445	445	2021-05	Delhi	22579
446	446	2021-05	Delhi	22831
447	447	2021-05	Delhi	23013

	Day Count	Date	State/UnionTerritory	Deaths
448	448	2021-05	Delhi	23202
449	449	2021-05	Delhi	23409
450	450	2021-05	Delhi	23565
451	451	2021-05	Delhi	23695
452	452	2021-05	Delhi	23812
453	453	2021-05	Delhi	23951
454	454	2021-05	Delhi	24073
455	455	2021-05	Delhi	24151

In [101…

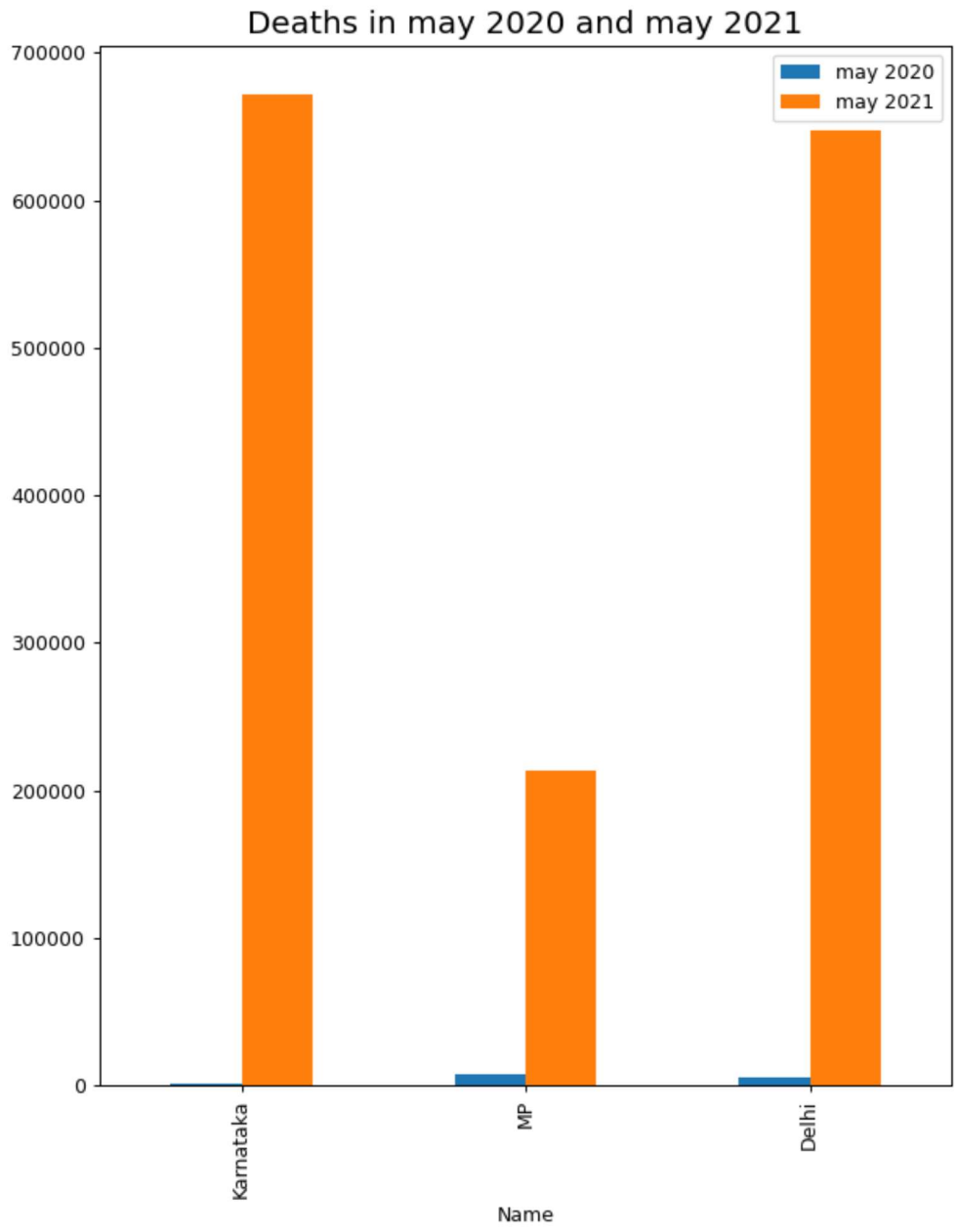
```
r=statec['Deaths'].sum()
```

In [102…

```
df = pd.DataFrame({
    'Name': ['Karnataka','MP','Delhi'],
    'may 2020':[m,o,q],
    'may 2021':[n,p,r]

})

# plotting graph
df.plot(x="Name", y=["may 2020", "may 2021"], kind="bar")
plt.title('Deaths in may 2020 and may 2021', size = 16)
plt.show()
```



Part E

Make a graph to show the relation between number of confirmed Covid-19 cases and Deaths in Uttar Pradesh.

In [103…

```
covid19_up = covid19_df[covid19_df['State/UnionTerritory'] == "Uttar Pradesh"]
covid19_up.reset_index(inplace = True)
covid19_up = covid19_up.drop(['index','Sno', 'Time',
                              'ConfirmedIndianNational',
                              'ConfirmedForeignNational',
                                       'Cured'], axis = 1)
covid19_up.reset_index(inplace = True)
```

```
covid19_up.columns = ['Day Count', 'Date', 'State/UnionTerritory', 'Deaths', 'Confirmed
print(covid19_up.shape)
covid19_up.head()
```

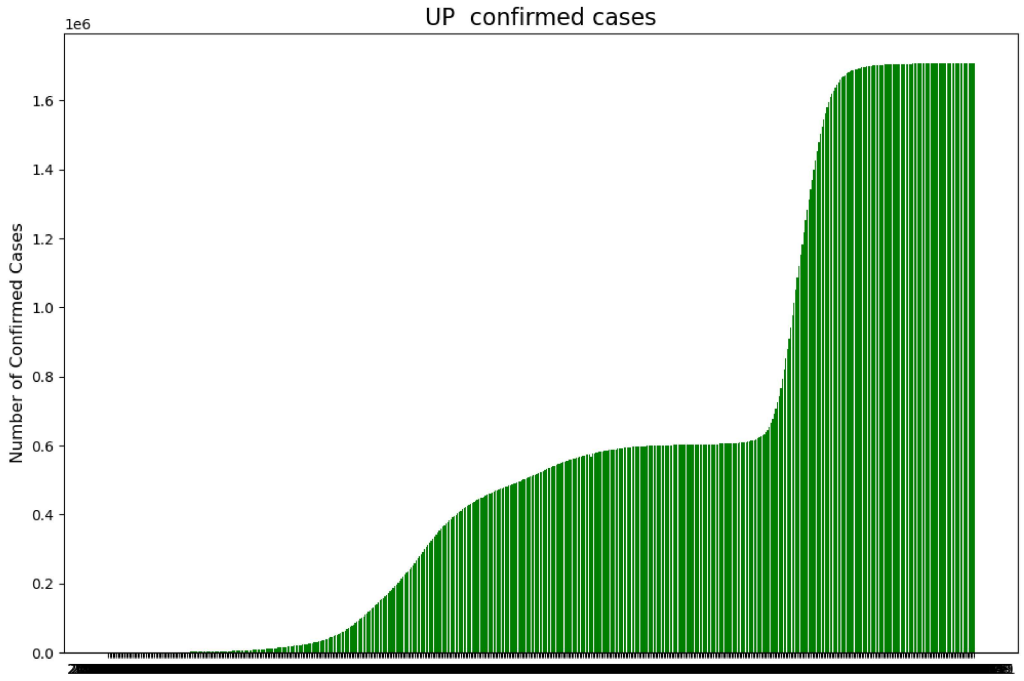
```
(526, 5)
```

Out[103…

	Day Count	Date	State/UnionTerritory	Deaths	Confirmed
0	0	2020-03-04	Uttar Pradesh	0	6
1	1	2020-03-05	Uttar Pradesh	0	7
2	2	2020-03-06	Uttar Pradesh	0	7
3	3	2020-03-07	Uttar Pradesh	0	7
4	4	2020-03-08	Uttar Pradesh	0	7

In [109…

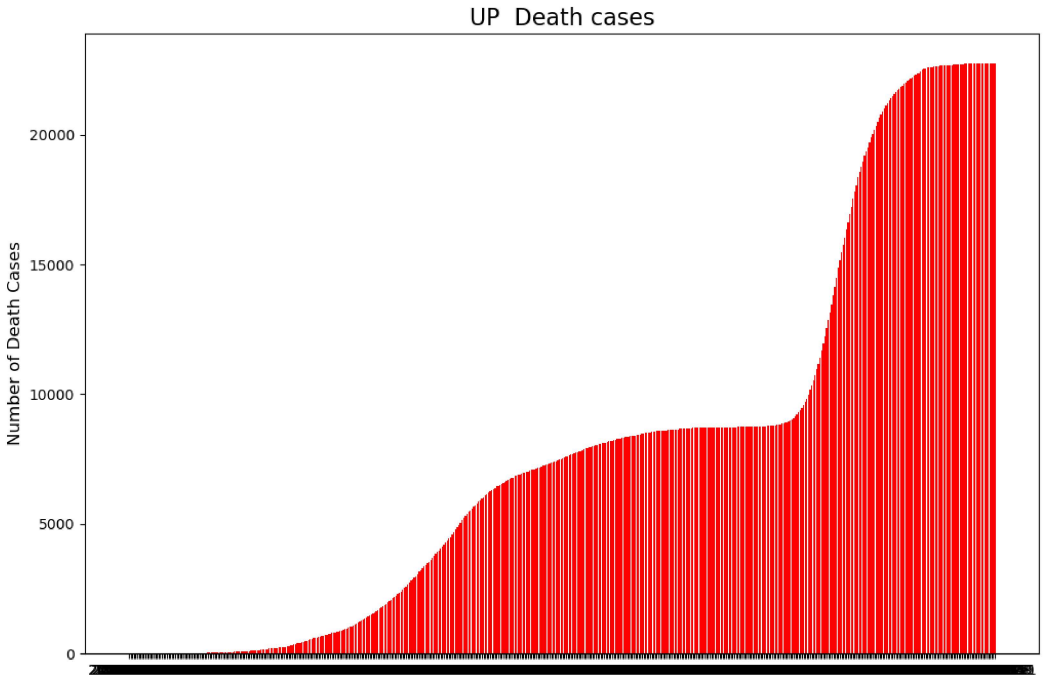
```
up = covid19_up.sort_values(by=['Confirmed'], ascending = False)
plt.figure(figsize=(12,8), dpi=80)
plt.bar(covid19_up['Date'], covid19_up['Confirmed'],
        align='center',color='Green')
plt.ylabel('Number of Confirmed Cases', size = 12)
plt.title('UP  confirmed cases', size = 16)
plt.show()
```



In [110…

```
up = covid19_up.sort_values(by=['Deaths'], ascending = False)
plt.figure(figsize=(12,8), dpi=80)
plt.bar(covid19_up['Date'], covid19_up['Deaths'],
        align='center',color='Red')
plt.ylabel('Number of Death Cases', size = 12)
```

```
plt.title('UP  Death cases', size = 16)
plt.show()
```



End