BitarSheyamFinal

August 11, 2020

[1]:
```
#import important packages
from __future__ import print_function, division
import pandas as pd
import matplotlib.pyplot as plt
import matplotlib.colors as mcolors
from mpl_toolkits.mplot3d import Axes3D
import matplotlib
import numpy as np
import nsfg
import first
import thinkstats2
import thinkplot
import random
import csv
```

[2]:
```
rm_quote = lambda x: x.replace('"', '')
NY = pd.read_csv ('Covid_Data_NY.csv',delimiter=',',
     converters={'\"j\"': rm_quote,
                 '\"x\"': rm_quote})
NY.head()
```

[2]:

	Date	Fixed_Date	String_Date	Year	Month	Day	Full_Date	Month.1	Month_Date_Format	New Tests	Cases	Negative	Hospitalized	Deaths	Total
0	Tue Jul 28 2020	Jul 28 2020	Jul 28 2020	2020	7	28	7/28/20	202007	7/1/20	57397	412878	5271668	89995.0	25126.0	5684546
1	Mon Jul 27 2020	Jul 27 2020	Jul 27 2020	2020	7	27	7/27/20	202007	7/1/20	57270	412344	5214805	89995.0		
2	Sun Jul 26 2020	Jul 26 2020	Jul 26 2020	2020	7	26	7/26/20	202007	7/1/20	53568	411736	5158143	89995.0		
3	Sat Jul 25 2020	Jul 25 2020	Jul 25 2020	2020	7	25	7/25/20	202007	7/1/20	71466	411200	5105111	89995.0		
4	Fri Jul 24 2020	Jul 24 2020	Jul 24 2020	2020	7	24	7/24/20	202007	7/1/20	76507	410450	5034395	89995.0		

```
1  25117.0  5627149
2  25106.0  5569879
3  25103.0  5516311
4  25090.0  5444845
```

[3]:
```
NY = NY.rename(columns={'Month.1': 'MNTH'})
```

[4]:
```
NY.head()
```

[4]:
```
              Date   Fixed_Date  String_Date  Year  Month  Day Full_Date  \
0  Tue Jul 28 2020  Jul 28 2020  Jul 28 2020  2020      7   28   7/28/20
1  Mon Jul 27 2020  Jul 27 2020  Jul 27 2020  2020      7   27   7/27/20
2  Sun Jul 26 2020  Jul 26 2020  Jul 26 2020  2020      7   26   7/26/20
3  Sat Jul 25 2020  Jul 25 2020  Jul 25 2020  2020      7   25   7/25/20
4  Fri Jul 24 2020  Jul 24 2020  Jul 24 2020  2020      7   24   7/24/20

     MNTH Month_Date_Format  New Tests   Cases  Negative  Hospitalized  \
0  202007            7/1/20      57397  412878   5271668       89995.0
1  202007            7/1/20      57270  412344   5214805       89995.0
2  202007            7/1/20      53568  411736   5158143       89995.0
3  202007            7/1/20      71466  411200   5105111       89995.0
4  202007            7/1/20      76507  410450   5034395       89995.0

    Deaths    Total
0  25126.0  5684546
1  25117.0  5627149
2  25106.0  5569879
3  25103.0  5516311
4  25090.0  5444845
```

[5]:
```
NY.dtypes
```

[5]:
```
Date                  object
Fixed_Date            object
String_Date           object
Year                   int64
Month                  int64
Day                    int64
Full_Date             object
MNTH                   int64
Month_Date_Format     object
New Tests              int64
Cases                  int64
Negative               int64
Hospitalized         float64
Deaths               float64
Total                  int64
```

```
dtype: object
```

[6]:
```
NY['Full_Date'] = pd.to_datetime(NY['Full_Date'])
NY['Month_Date_Format'] = pd.to_datetime(NY['Month_Date_Format'])
```

[7]:
```
NY.head()
```

[7]:

	Date	Fixed_Date	String_Date	Year	Month	Day	Full_Date	MNTH	Month_Date_Format	New Tests	Cases	Negative	Hospitalized	Deaths	Total
0	Tue Jul 28 2020	Jul 28 2020	Jul 28 2020	2020	7	28	2020-07-28	202007	2020-07-01	57397	412878	5271668	89995.0	25126.0	5684546
1	Mon Jul 27 2020	Jul 27 2020	Jul 27 2020	2020	7	27	2020-07-27	202007	2020-07-01	57270	412344	5214805	89995.0	25117.0	5627149
2	Sun Jul 26 2020	Jul 26 2020	Jul 26 2020	2020	7	26	2020-07-26	202007	2020-07-01	53568	411736	5158143	89995.0	25106.0	5569879
3	Sat Jul 25 2020	Jul 25 2020	Jul 25 2020	2020	7	25	2020-07-25	202007	2020-07-01	71466	411200	5105111	89995.0	25103.0	5516311
4	Fri Jul 24 2020	Jul 24 2020	Jul 24 2020	2020	7	24	2020-07-24	202007	2020-07-01	76507	410450	5034395	89995.0	25090.0	5444845

[8]:
```
IL = pd.read_csv ('Covid_Data_IL.csv')
IL = IL.rename(columns={'Full Date': 'Full_Date'})
IL['Full_Date'] = pd.to_datetime(IL['Full_Date'])
IL.head()
```

[8]:

	Full_Date	Month	Cases	Negative	Hospitalized	Deaths	Total
0	2020-07-28	7	175124.0	2433528	1491.0	7462.0	2609894
1	2020-07-27	7	173731.0	2396734	1383.0	7446.0	2571707
2	2020-07-26	7	172655.0	2369479	1417.0	7416.0	2543376
3	2020-07-25	7	171424.0	2340143	1394.0	7398.0	2512809
4	2020-07-24	7	169883.0	2300840	1438.0	7397.0	2471965

[9]:
```
IL.dtypes
```

[9]:
```
Full_Date       datetime64[ns]
Month                    int64
Cases                  float64
Negative                 int64
Hospitalized           float64
```

```
Deaths                 float64
Total                    int64
dtype: object
```

[10]:
```
for col in IL:
    print(col)
```

```
Full_Date
Month
Cases
Negative
Hospitalized
Deaths
Total
```

[11]:
```
AZ = pd.read_csv ('Covid_Data_Arizona.csv')
AZ.head()
```

[11]:

	Original_Date	Fixed_Date	String Date	Year	Month	Day	Full_Date
0	Tue Jul 28 2020	Jul 28 2020	Jul 28 2020	2020	7	28	7/28/20
1	Mon Jul 27 2020	Jul 27 2020	Jul 27 2020	2020	7	27	7/27/20
2	Sun Jul 26 2020	Jul 26 2020	Jul 26 2020	2020	7	26	7/26/20
3	Sat Jul 25 2020	Jul 25 2020	Jul 25 2020	2020	7	25	7/25/20
4	Fri Jul 24 2020	Jul 24 2020	Jul 24 2020	2020	7	24	7/24/20

	Month.1	Month_Date_Format	New Tests	Cases	Negative	Hospitalized
0	202007	7/1/20	12598	165934	724997	9394
1	202007	7/1/20	11230	163827	714506	7751
2	202007	7/1/20	9494	162014	705089	7706
3	202007	7/1/20	20792	160041	697568	7627
4	202007	7/1/20	14104	156301	680516	7461

	Deaths	Total
0	3408.0	890931
1	3304.0	878333
2	3305.0	867103
3	3286.0	857609
4	3142.0	836817

[12]:
```
AZ = AZ.rename(columns={'Month.1': 'MNTH'})
```

[13]:
```
AZ.head()
```

[13]:

	Original_Date	Fixed_Date	String Date	Year	Month	Day	Full_Date
0	Tue Jul 28 2020	Jul 28 2020	Jul 28 2020	2020	7	28	7/28/20
1	Mon Jul 27 2020	Jul 27 2020	Jul 27 2020	2020	7	27	7/27/20
2	Sun Jul 26 2020	Jul 26 2020	Jul 26 2020	2020	7	26	7/26/20

```
3  Sat Jul 25 2020  Jul 25 2020  Jul 25 2020  2020      7   25   7/25/20
4  Fri Jul 24 2020  Jul 24 2020  Jul 24 2020  2020      7   24   7/24/20

     MNTH Month_Date_Format  New Tests   Cases  Negative  Hospitalized  \
0  202007            7/1/20      12598  165934    724997          9394
1  202007            7/1/20      11230  163827    714506          7751
2  202007            7/1/20       9494  162014    705089          7706
3  202007            7/1/20      20792  160041    697568          7627
4  202007            7/1/20      14104  156301    680516          7461

   Deaths   Total
0  3408.0  890931
1  3304.0  878333
2  3305.0  867103
3  3286.0  857609
4  3142.0  836817
```

[14]:
```
AZ.dtypes
```

[14]:
```
Original_Date         object
Fixed_Date            object
String Date           object
Year                   int64
Month                  int64
Day                    int64
Full_Date             object
MNTH                   int64
Month_Date_Format     object
New Tests              int64
Cases                  int64
Negative               int64
Hospitalized           int64
Deaths               float64
Total                  int64
dtype: object
```

[15]:
```
AZ['Full_Date'] = pd.to_datetime(AZ['Full_Date'])
AZ['Month_Date_Format'] = pd.to_datetime(AZ['Month_Date_Format'])
```

[16]:
```
AZ.head()
```

[16]:
```
     Original_Date   Fixed_Date  String Date  Year  Month  Day  Full_Date  \
0  Tue Jul 28 2020  Jul 28 2020  Jul 28 2020  2020      7   28 2020-07-28
1  Mon Jul 27 2020  Jul 27 2020  Jul 27 2020  2020      7   27 2020-07-27
2  Sun Jul 26 2020  Jul 26 2020  Jul 26 2020  2020      7   26 2020-07-26
3  Sat Jul 25 2020  Jul 25 2020  Jul 25 2020  2020      7   25 2020-07-25
4  Fri Jul 24 2020  Jul 24 2020  Jul 24 2020  2020      7   24 2020-07-24
```

```
     MNTH Month_Date_Format  New Tests   Cases  Negative  Hospitalized  \
0  202007        2020-07-01      12598  165934    724997          9394
1  202007        2020-07-01      11230  163827    714506          7751
2  202007        2020-07-01       9494  162014    705089          7706
3  202007        2020-07-01      20792  160041    697568          7627
4  202007        2020-07-01      14104  156301    680516          7461

   Deaths   Total
0  3408.0  890931
1  3304.0  878333
2  3305.0  867103
3  3286.0  857609
4  3142.0  836817
```

[17]:
```
for col in AZ:
    print(col)
```

```
Original_Date
Fixed_Date
String Date
Year
Month
Day
Full_Date
MNTH
Month_Date_Format
New Tests
Cases
Negative
Hospitalized
Deaths
Total
```

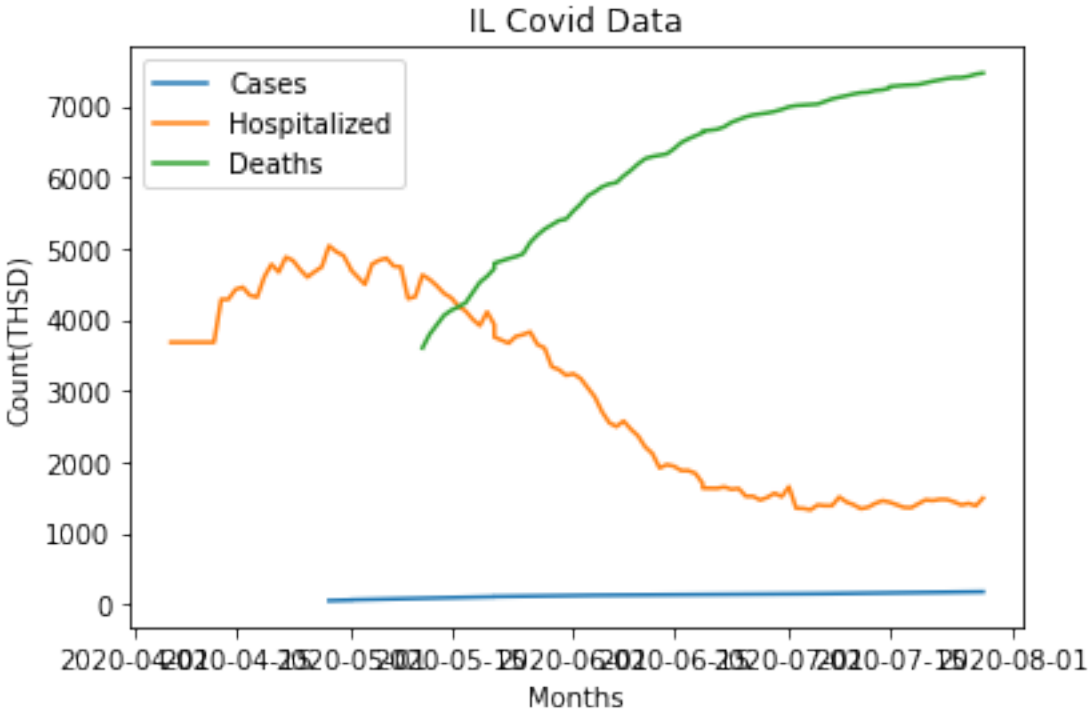
[18]:
```
for col in NY:
    print (col)
```

```
Date
Fixed_Date
String_Date
Year
Month
Day
Full_Date
MNTH
Month_Date_Format
New Tests
Cases
```

```
Negative
Hospitalized
Deaths
Total
```

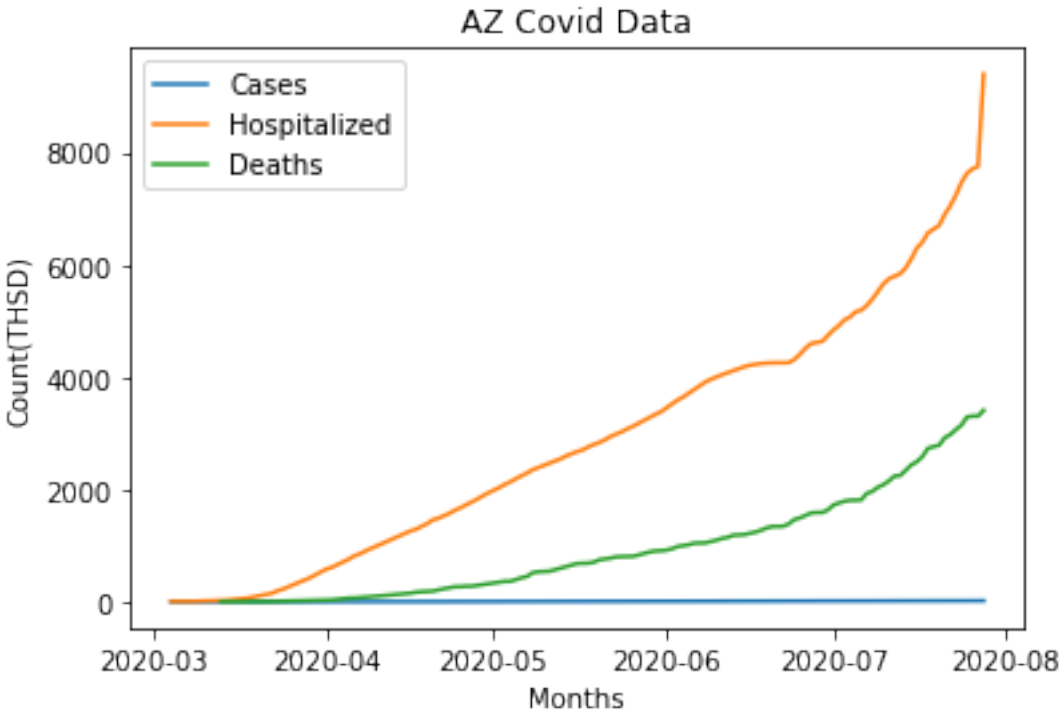
[19]:
```
plt.plot(IL.Full_Date, IL.Cases/1000)
plt.plot(IL.Full_Date,IL.Hospitalized)
plt.plot(IL.Full_Date,IL.Deaths)
plt.title("IL Covid Data")
plt.legend(["Cases", "Hospitalized", "Deaths"])
plt.xlabel("Months")
plt.ylabel("Count(THSD)")
plt.show
```

[19]:
```
<function matplotlib.pyplot.show(*args, **kw)>
```



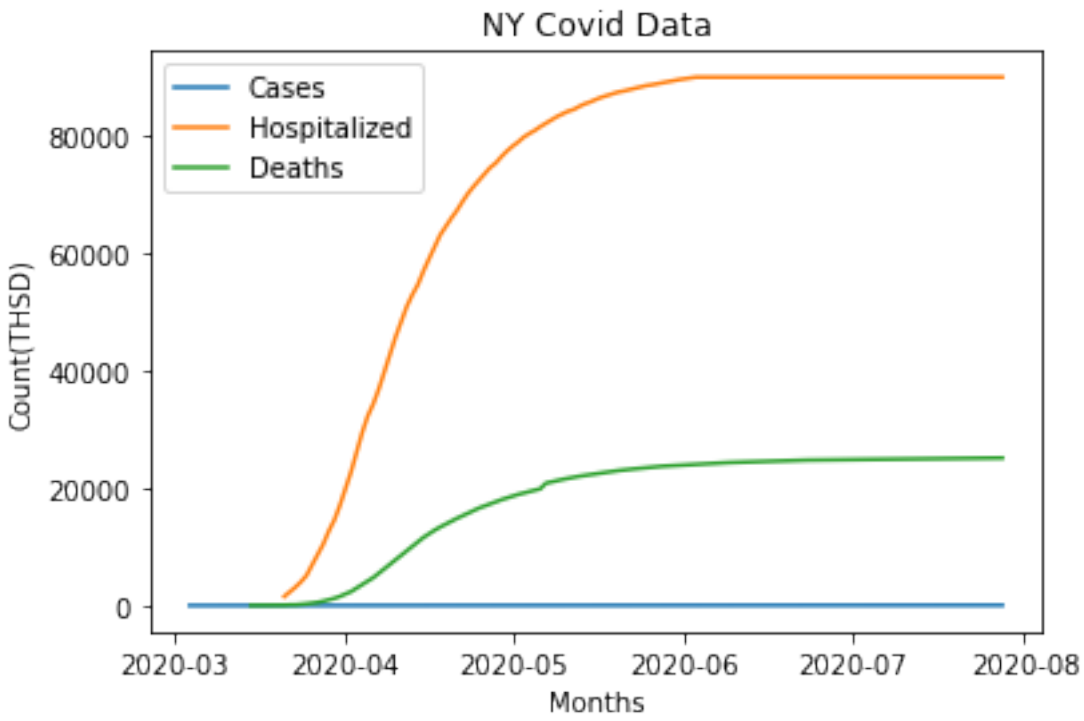
[20]:
```
plt.plot(AZ.Full_Date, AZ.Cases/10000)
plt.plot(AZ.Full_Date,AZ.Hospitalized)
plt.plot(AZ.Full_Date,AZ.Deaths)
plt.title("AZ Covid Data")
plt.legend(["Cases", "Hospitalized", "Deaths"])
plt.xlabel("Months")
plt.ylabel("Count(THSD)")
plt.show
```

[20]: <function matplotlib.pyplot.show(*args, **kw)>



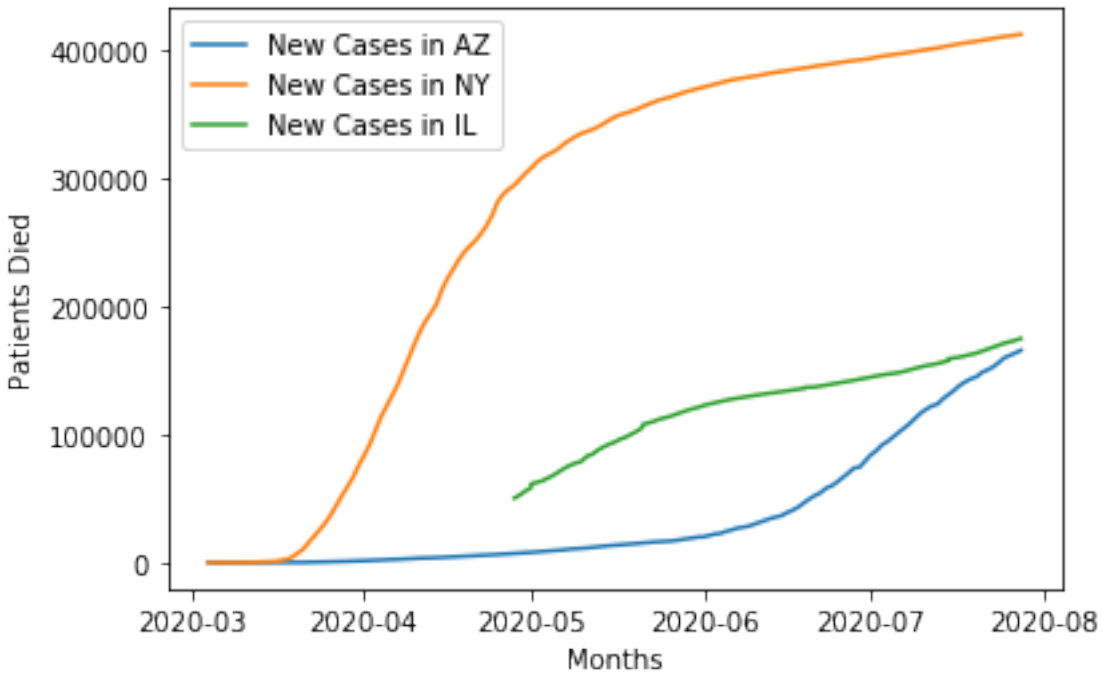
[21]:
```
plt.plot(NY.Full_Date, NY.Cases/10000)
plt.plot(NY.Full_Date,NY.Hospitalized)
plt.plot(NY.Full_Date,NY.Deaths)
plt.title("NY Covid Data")
plt.legend(["Cases", "Hospitalized", "Deaths"])
plt.xlabel("Months")
plt.ylabel("Count(THSD)")
plt.show
```

[21]: <function matplotlib.pyplot.show(*args, **kw)>



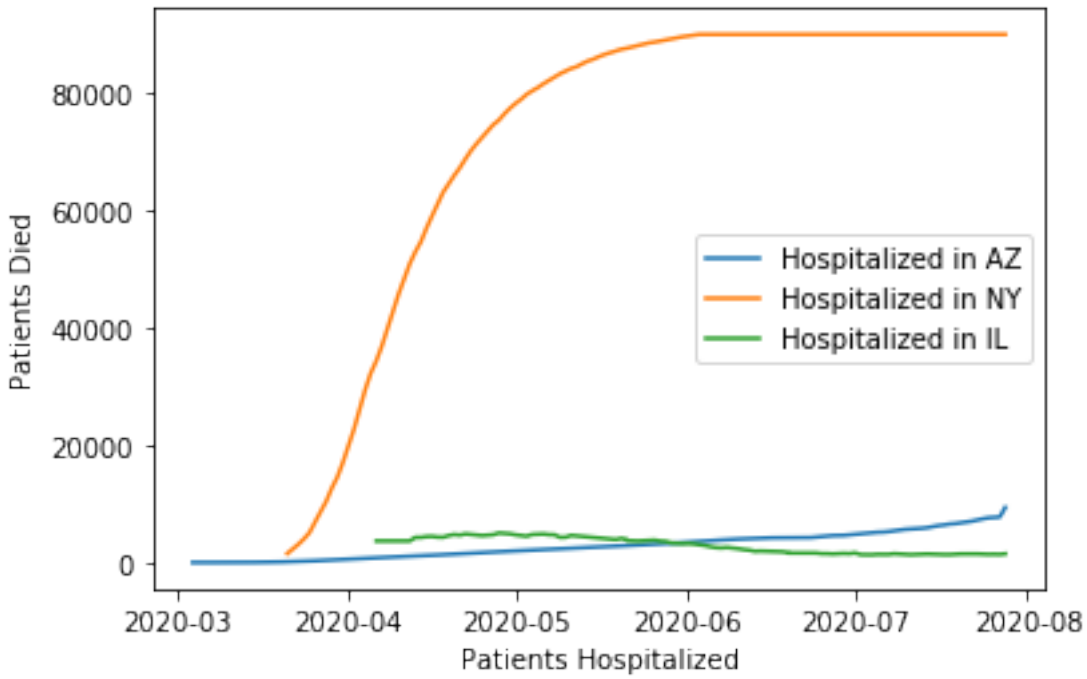
[22]:
```
plt.plot(AZ.Full_Date, AZ.Cases)
plt.plot(NY.Full_Date,NY.Cases)
plt.plot(IL.Full_Date,IL.Cases)
plt.legend(["New Cases in AZ", "New Cases in NY", "New Cases in IL"])
plt.xlabel("Months")
plt.ylabel("Patients Died")
plt.show
```

[22]:
```
<function matplotlib.pyplot.show(*args, **kw)>
```



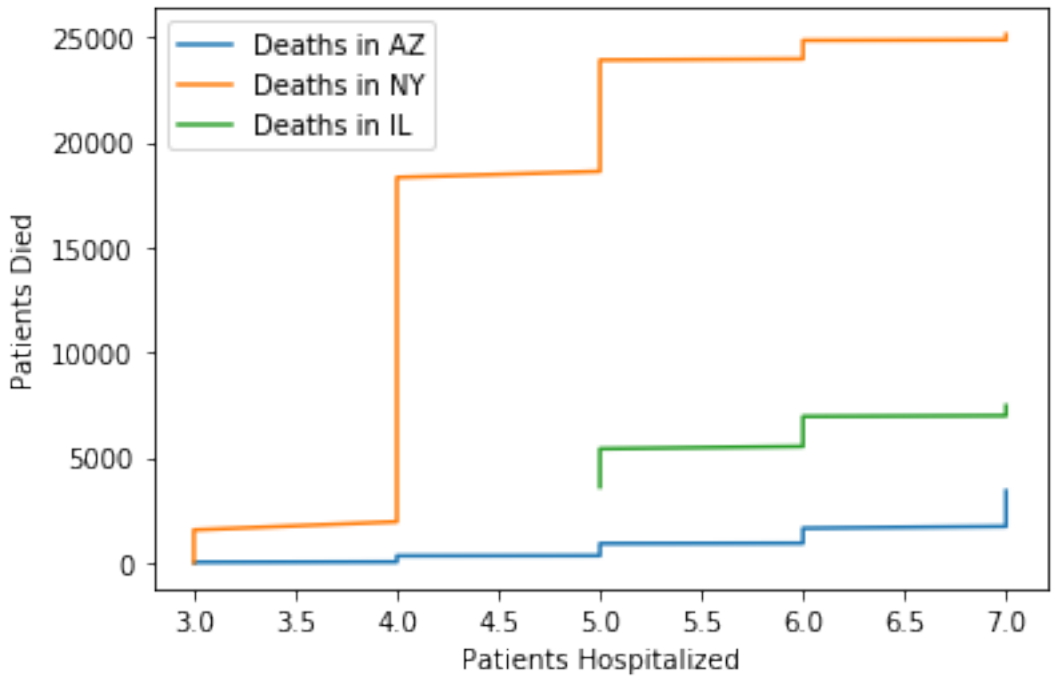
[23]:
```
plt.plot(AZ.Full_Date, AZ.Hospitalized)
plt.plot(NY.Full_Date,NY.Hospitalized)
plt.plot(IL.Full_Date,IL.Hospitalized)

plt.legend(["Hospitalized in AZ", "Hospitalized in NY","Hospitalized in IL"])
plt.xlabel("Patients Hospitalized")
plt.ylabel("Patients Died")
plt.show
```

[23]:
```
<function matplotlib.pyplot.show(*args, **kw)>
```



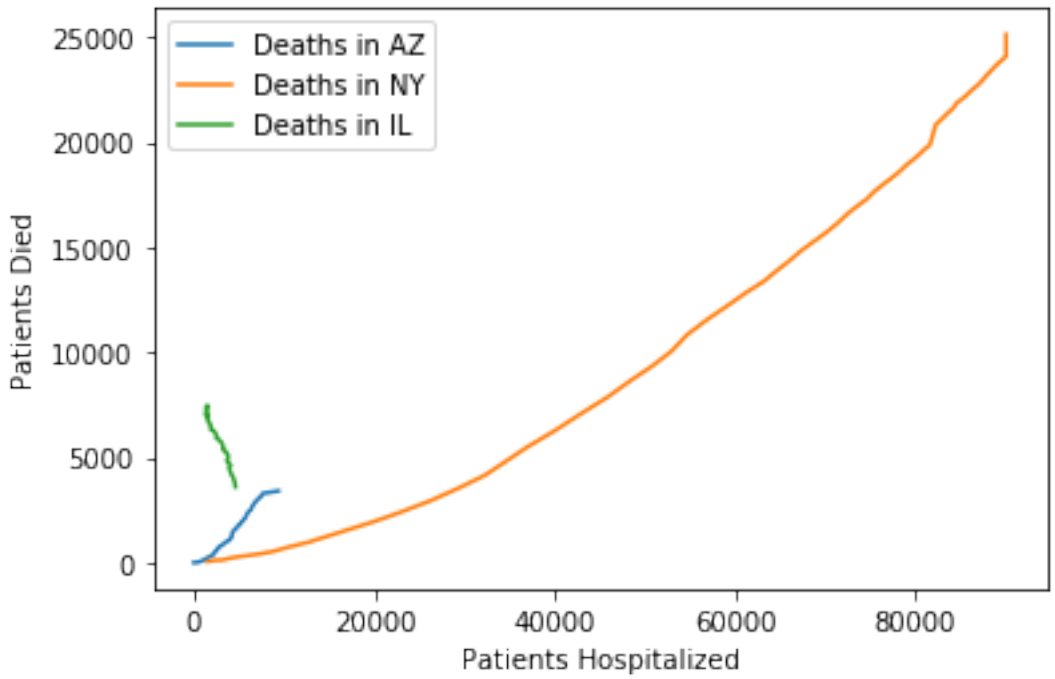
[24]:
```
plt.plot(AZ.Month, AZ.Deaths)
plt.plot(NY.Month,NY.Deaths)
plt.plot(IL.Month,IL.Deaths)

plt.legend(["Deaths in AZ", "Deaths in NY","Deaths in IL"])
plt.xlabel("Patients Hospitalized")
plt.ylabel("Patients Died")
plt.show
```

[24]:
```
<function matplotlib.pyplot.show(*args, **kw)>
```



[25]:
```
plt.plot(AZ.Hospitalized, AZ.Deaths)
plt.plot(NY.Hospitalized,NY.Deaths)
plt.plot(IL.Hospitalized,IL.Deaths)

plt.legend(["Deaths in AZ", "Deaths in NY", "Deaths in IL"])
plt.xlabel("Patients Hospitalized")
plt.ylabel("Patients Died")

plt.show
```

[25]:
```
<function matplotlib.pyplot.show(*args, **kw)>
```

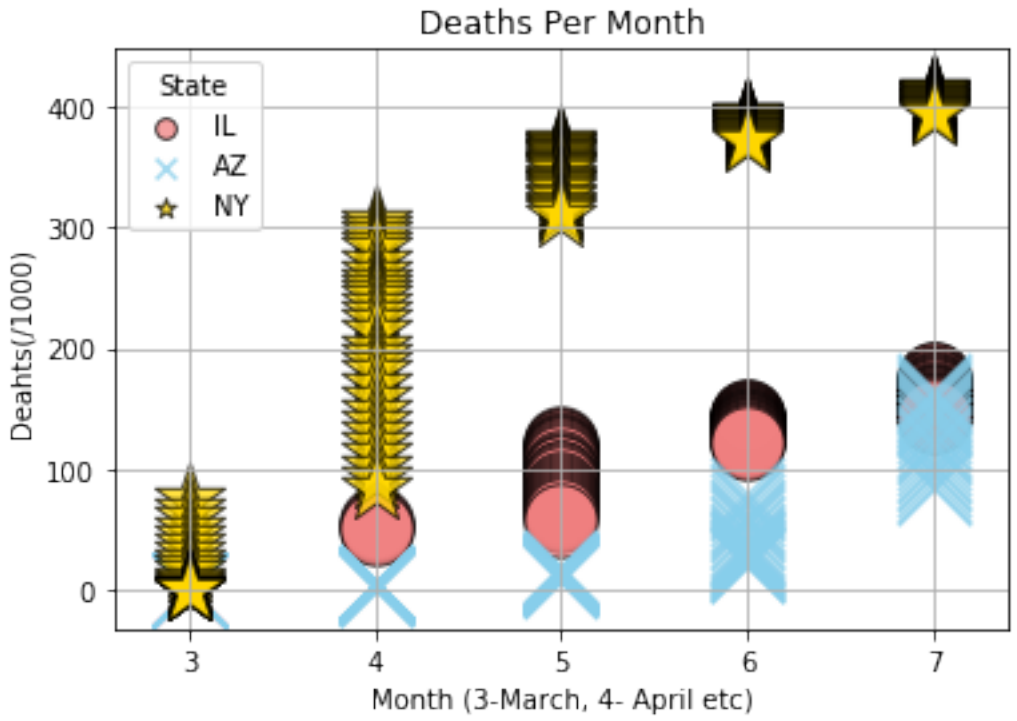


[26]:
```
IL_Avg_Death = IL["Deaths"].mean()
AZ_Avg_Death = AZ["Deaths"].mean()
NY_Avg_Death = NY["Deaths"].mean()

IL_Avg_Hospitalized = IL["Hospitalized"].mean()
AZ_Avg_Hospitalized = AZ["Hospitalized"].mean()
NY_Avg_Hospitalized = NY["Hospitalized"].mean()

IL_Avg_Death/IL_Avg_Hospitalized, AZ_Avg_Death/AZ_Avg_Hospitalized,␣
↪NY_Avg_Death/NY_Avg_Hospitalized
```

[26]:
```
(2.084234946154866, 0.329597270586949, 0.24477147766416849)
```

[27]:
```
plt.scatter(IL.Month, IL.Cases/10**3, marker="o", facecolors="lightcoral",␣
↪edgecolors="black",
        s= 750, alpha=.75, label="IL")
plt.scatter(AZ.Month, AZ.Cases/10**3, marker="x", facecolors="skyblue",␣
↪edgecolors="black",
          s= 750, alpha=0.75, label="AZ")
plt.scatter(NY.Month, NY.Cases/10**3, marker="*", facecolors="gold",␣
↪edgecolors="black",
          s= 750, alpha=0.75, label="NY")

plt.title("Deaths Per Month")
```

```
plt.ylabel("Deahts(/1000)")
plt.xlabel("Month (3-March, 4- April etc)")
plt.grid()

legend = plt.legend(loc="upper left", title= "State")
legend.legendHandles[0]._sizes = [60]
legend.legendHandles[1]._sizes = [60]
legend.legendHandles[2]._sizes = [60]

plt.savefig("Pyber Bubble Graph.png",bbox_inches = "tight")
plt.show()
```



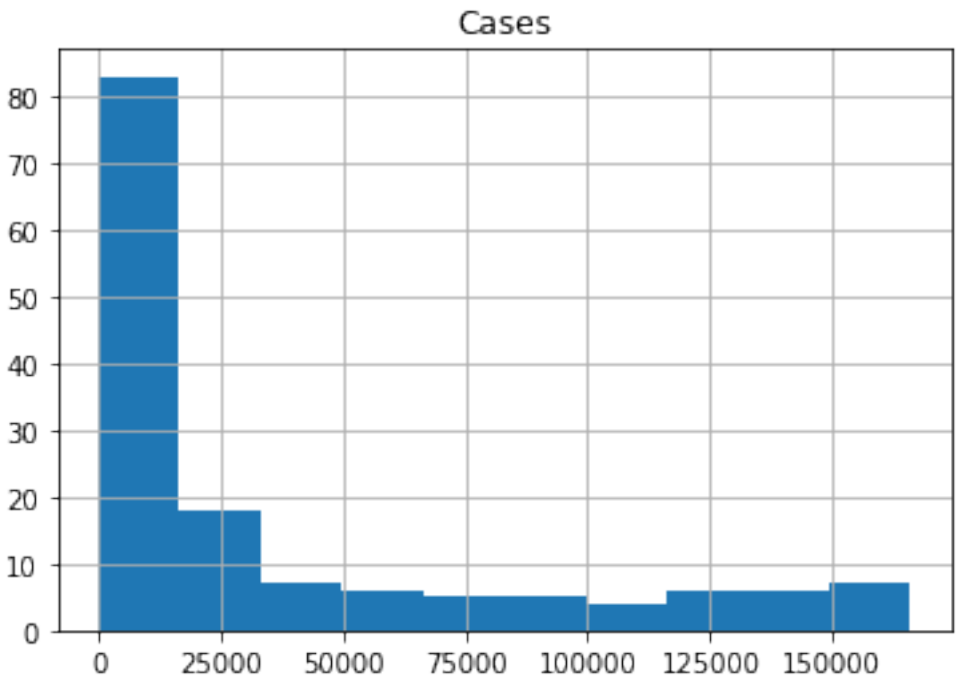
[28]:
```
IL_df = pd.DataFrame(IL,columns = ['Cases'])
AZ_df = pd.DataFrame(AZ,columns = ['Cases'])
NY_df = pd.DataFrame(NY,columns = ['Cases'])

IL_df, AZ_df, NY_df
```

[28]:
```
(        Cases
 0    175124.0
 1    173731.0
 2    172655.0
 3    171424.0
```

```
4    169883.0
..        …
135       NaN
136       NaN
137       NaN
138       NaN
139       NaN

[140 rows x 1 columns],
      Cases
0    165934
1    163827
2    162014
3    160041
4    156301
..      …
142       5
143       5
144       3
145       2
146       2

[147 rows x 1 columns],
      Cases
0    412878
1    412344
2    411736
3    411200
4    410450
..      …
142     105
143      76
144      33
145      22
146       6

[147 rows x 1 columns])
```

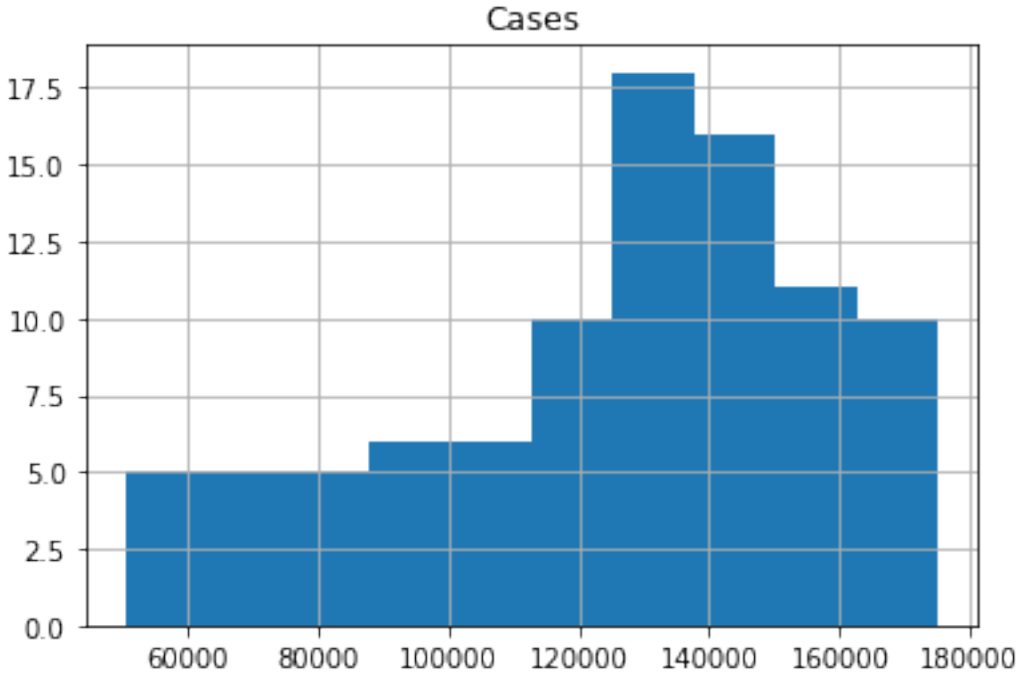
[29]:
```
AZ_df.hist(column='Cases')
```

[29]:
```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x1a1f0bae50>]],
      dtype=object)
```



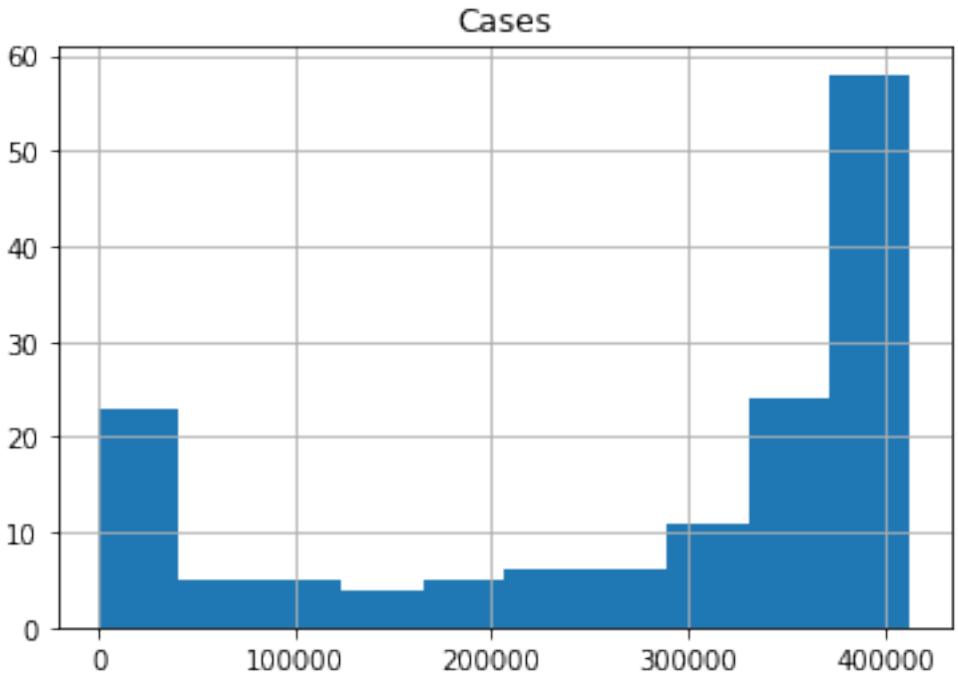
[30]:
```
IL_df.hist(column='Cases')
```

[30]:
```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x1a1f347550>]],
      dtype=object)
```



[31]:
```
NY_df.hist(column='Cases')
```

[31]:
```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x1a1f442190>]],
      dtype=object)
```



[32]:
```
IL_df.mean(),AZ_df.mean(),NY_df.mean()
```

[32]:
```
(Cases    124924.423913
 dtype: float64,
 Cases    36973.578231
 dtype: float64,
 Cases    273434.163265
 dtype: float64)
```

[33]:
```
IL_df.min(),IL_df.max()
```

[33]:
```
(Cases    50355.0
 dtype: float64,
 Cases    175124.0
 dtype: float64)
```

[34]:
```
AZ_df.min(),AZ_df.max()
```

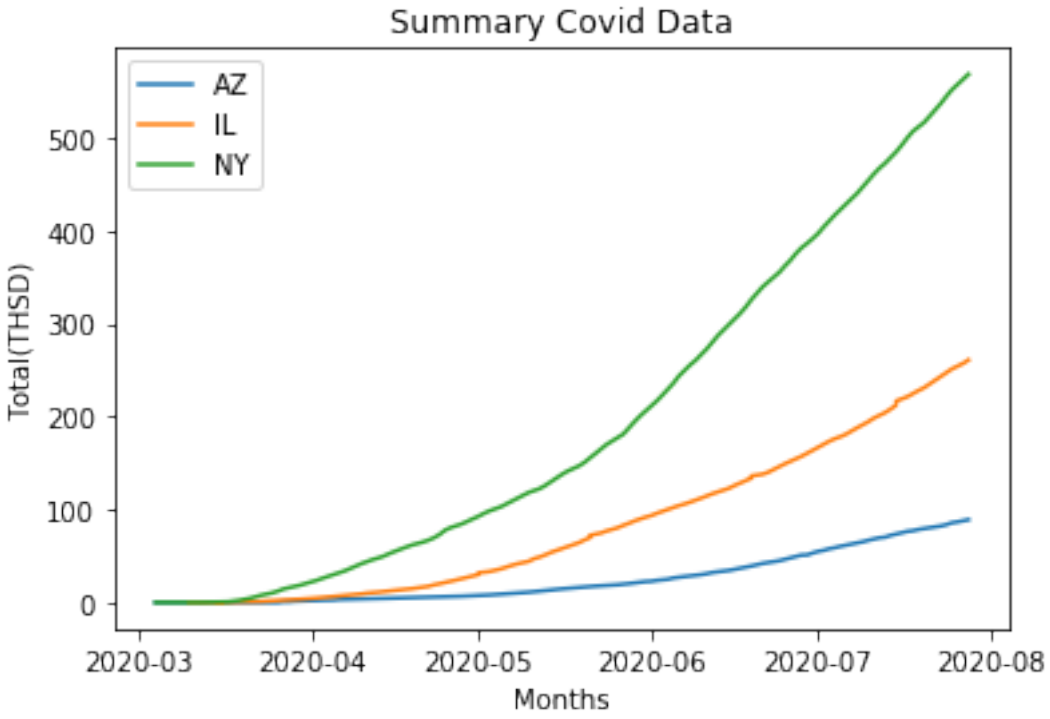
[34]:
```
(Cases    2
 dtype: int64,
 Cases    165934
 dtype: int64)
```

[35]:
```
NY_df.min(),NY_df.max()
```

[35]:
```
(Cases    6
 dtype: int64,
 Cases    412878
 dtype: int64)
```

[37]:
```
plt.plot(AZ.Full_Date, AZ.Total/10000)
plt.plot(IL.Full_Date,IL.Total/10000)
plt.plot(NY.Full_Date,NY.Total/10000)
plt.title("Summary Covid Data")
plt.legend(["AZ", "IL", "NY"])
plt.xlabel("Months")
plt.ylabel("Total(THSD)")
plt.show
```

[37]:
```
<function matplotlib.pyplot.show(*args, **kw)>
```



[ ]:

[ ]: