In [1]:
```
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
from sklearn.impute import SimpleImputer
```

In [2]:
```
df = pd.read_csv('D:/Programming/Jupyter/Hello/data/covid_19_data.csv')
```

In [3]:
```
df.head(50)
```

Out[3]:

	Province/State	Country/Region	Last Update	Confirmed	Deaths	Recovered
0	Hubei	Mainland China	2020-02-29T12:13:10	66337	2727	28993
1	NaN	South Korea	2020-02-29T18:13:07	3150	16	27
2	Guangdong	Mainland China	2020-02-29T15:33:03	1349	7	983
3	Henan	Mainland China	2020-02-29T12:43:05	1272	21	1170
4	Zhejiang	Mainland China	2020-02-29T09:13:10	1205	1	1016
5	NaN	Italy	2020-02-29T18:03:05	1128	29	46
6	Hunan	Mainland China	2020-02-29T15:33:03	1018	4	846
7	Anhui	Mainland China	2020-02-29T05:03:13	990	6	868
8	Jiangxi	Mainland China	2020-02-29T01:23:07	935	1	811
9	Shandong	Mainland China	2020-02-29T15:33:03	756	6	421
10	Diamond Princess cruise ship	Others	2020-02-29T01:43:02	705	6	10
11	Jiangsu	Mainland China	2020-02-29T07:23:11	631	0	523
12	NaN	Iran	2020-02-29T14:53:04	593	43	123
13	Chongqing	Mainland China	2020-02-29T23:13:06	576	6	438
14	Sichuan	Mainland China	2020-02-29T12:03:07	538	3	351
15	Heilongjiang	Mainland China	2020-02-29T12:03:07	480	13	301
16	Beijing	Mainland China	2020-02-29T03:33:02	411	8	271
17	Shanghai	Mainland China	2020-02-29T06:23:03	337	3	287
18	Hebei	Mainland China	2020-02-29T15:33:03	318	6	282
19	Fujian	Mainland China	2020-02-29T15:33:03	296	1	243
20	Guangxi	Mainland China	2020-02-29T12:03:07	252	2	176
21	Shaanxi	Mainland China	2020-02-29T09:03:06	245	1	207
22	NaN	Japan	2020-02-29T15:53:04	241	5	32
23	Yunnan	Mainland China	2020-02-29T05:03:13	174	2	157
24	Hainan	Mainland China	2020-02-29T23:43:02	168	5	148
25	Guizhou	Mainland China	2020-02-27T00:43:02	146	2	112

	Province/State	Country/Region	Last Update	Confirmed	Deaths	Recovered
26	Tianjin	Mainland China	2020-02-29T12:03:07	136	3	109
27	Shanxi	Mainland China	2020-02-29T23:13:06	133	0	114
28	Liaoning	Mainland China	2020-02-29T15:33:03	121	1	96
29	NaN	Singapore	2020-02-29T14:33:03	102	0	72
30	NaN	France	2020-02-29T19:03:04	100	2	12
31	Hong Kong	Hong Kong	2020-02-29T23:53:02	95	2	33
32	Jilin	Mainland China	2020-02-29T09:13:10	93	1	75
33	Gansu	Mainland China	2020-02-28T02:33:02	91	2	82
34	NaN	Germany	2020-02-29T14:43:03	79	0	16
35	Xinjiang	Mainland China	2020-02-29T12:03:07	76	3	62
36	Inner Mongolia	Mainland China	2020-02-29T09:03:06	75	0	49
37	Ningxia	Mainland China	2020-02-29T05:53:02	73	0	69
38	NaN	Kuwait	2020-02-28T16:23:03	45	0	0
39	NaN	Spain	2020-02-29T19:13:08	45	0	2
40	Unassigned Location (From Diamond Princess)	US	2020-02-28T20:03:03	44	0	0
41	NaN	Thailand	2020-02-29T12:33:03	42	0	28
42	NaN	Bahrain	2020-02-29T18:03:05	41	0	0
43	Taiwan	Taiwan	2020-02-29T07:13:05	39	1	9
44	NaN	Malaysia	2020-02-29T04:03:18	25	0	18
45	NaN	UK	2020-02-29T18:03:05	23	0	8
46	NaN	United Arab Emirates	2020-02-29T12:33:03	21	0	5
47	Qinghai	Mainland China	2020-02-21T04:43:02	18	0	18
48	NaN	Switzerland	2020-02-29T18:03:05	18	0	0
49	NaN	Vietnam	2020-02-25T08:53:02	16	0	16

In [4]:
```
df.drop(['Last Update'], axis=1, inplace=True)
```

In [5]:
```
df.head(50)
```

Out[5]:

	Province/State	Country/Region	Confirmed	Deaths	Recovered
0	Hubei	Mainland China	66337	2727	28993
1	NaN	South Korea	3150	16	27
2	Guangdong	Mainland China	1349	7	983
3	Henan	Mainland China	1272	21	1170
4	Zhejiang	Mainland China	1205	1	1016
5	NaN	Italy	1128	29	46
6	Hunan	Mainland China	1018	4	846
7	Anhui	Mainland China	990	6	868
8	Jiangxi	Mainland China	935	1	811
9	Shandong	Mainland China	756	6	421
10	Diamond Princess cruise ship	Others	705	6	10
11	Jiangsu	Mainland China	631	0	523
12	NaN	Iran	593	43	123
13	Chongqing	Mainland China	576	6	438
14	Sichuan	Mainland China	538	3	351
15	Heilongjiang	Mainland China	480	13	301
16	Beijing	Mainland China	411	8	271
17	Shanghai	Mainland China	337	3	287
18	Hebei	Mainland China	318	6	282
19	Fujian	Mainland China	296	1	243
20	Guangxi	Mainland China	252	2	176
21	Shaanxi	Mainland China	245	1	207
22	NaN	Japan	241	5	32
23	Yunnan	Mainland China	174	2	157
24	Hainan	Mainland China	168	5	148
25	Guizhou	Mainland China	146	2	112
26	Tianjin	Mainland China	136	3	109
27	Shanxi	Mainland China	133	0	114
28	Liaoning	Mainland China	121	1	96
29	NaN	Singapore	102	0	72
30	NaN	France	100	2	12
31	Hong Kong	Hong Kong	95	2	33
32	Jilin	Mainland China	93	1	75
33	Gansu	Mainland China	91	2	82
34	NaN	Germany	79	0	16
35	Xinjiang	Mainland China	76	3	62
36	Inner Mongolia	Mainland China	75	0	49
37	Ningxia	Mainland China	73	0	69
38	NaN	Kuwait	45	0	0
39	NaN	Spain	45	0	2
40	Unassigned Location (From Diamond Princess)	US	44	0	0

	Province/State	Country/Region	Confirmed	Deaths	Recovered
41	NaN	Thailand	42	0	28
42	NaN	Bahrain	41	0	0
43	Taiwan	Taiwan	39	1	9
44	NaN	Malaysia	25	0	18
45	NaN	UK	23	0	8
46	NaN	United Arab Emirates	21	0	5
47	Qinghai	Mainland China	18	0	18
48	NaN	Switzerland	18	0	0
49	NaN	Vietnam	16	0	16

In [6]:
```
df.rename(columns={'Province/State': 'State', 'Country/Region': 'Country'}, inplace=True)
```

In [7]:
```
df.head(50)
```

Out[7]:

	State	Country	Confirmed	Deaths	Recovered
0	Hubei	Mainland China	66337	2727	28993
1	NaN	South Korea	3150	16	27
2	Guangdong	Mainland China	1349	7	983
3	Henan	Mainland China	1272	21	1170
4	Zhejiang	Mainland China	1205	1	1016
5	NaN	Italy	1128	29	46
6	Hunan	Mainland China	1018	4	846
7	Anhui	Mainland China	990	6	868
8	Jiangxi	Mainland China	935	1	811
9	Shandong	Mainland China	756	6	421
10	Diamond Princess cruise ship	Others	705	6	10
11	Jiangsu	Mainland China	631	0	523
12	NaN	Iran	593	43	123
13	Chongqing	Mainland China	576	6	438
14	Sichuan	Mainland China	538	3	351
15	Heilongjiang	Mainland China	480	13	301
16	Beijing	Mainland China	411	8	271
17	Shanghai	Mainland China	337	3	287
18	Hebei	Mainland China	318	6	282
19	Fujian	Mainland China	296	1	243
20	Guangxi	Mainland China	252	2	176
21	Shaanxi	Mainland China	245	1	207
22	NaN	Japan	241	5	32
23	Yunnan	Mainland China	174	2	157
24	Hainan	Mainland China	168	5	148
25	Guizhou	Mainland China	146	2	112
26	Tianjin	Mainland China	136	3	109
27	Shanxi	Mainland China	133	0	114
28	Liaoning	Mainland China	121	1	96
29	NaN	Singapore	102	0	72
30	NaN	France	100	2	12
31	Hong Kong	Hong Kong	95	2	33
32	Jilin	Mainland China	93	1	75
33	Gansu	Mainland China	91	2	82
34	NaN	Germany	79	0	16
35	Xinjiang	Mainland China	76	3	62
36	Inner Mongolia	Mainland China	75	0	49
37	Ningxia	Mainland China	73	0	69
38	NaN	Kuwait	45	0	0
39	NaN	Spain	45	0	2
40	Unassigned Location (From Diamond Princess)	US	44	0	0

	State	Country	Confirmed	Deaths	Recovered
41	NaN	Thailand	42	0	28
42	NaN	Bahrain	41	0	0
43	Taiwan	Taiwan	39	1	9
44	NaN	Malaysia	25	0	18
45	NaN	UK	23	0	8
46	NaN	United Arab Emirates	21	0	5
47	Qinghai	Mainland China	18	0	18
48	NaN	Switzerland	18	0	0
49	NaN	Vietnam	16	0	16

In [8]:
```
imputer = SimpleImputer(strategy='constant')
```

In [9]:
```
df2 = pd.DataFrame(imputer.fit_transform(df), columns=df.columns)
```

In [16]:
```
df3 = df2.groupby(['Country'])[['Country', 'Confirmed', 'Deaths', 'Recovered']].sum()
```

In [17]:
```
df3.head(50)
```

Out[17]:

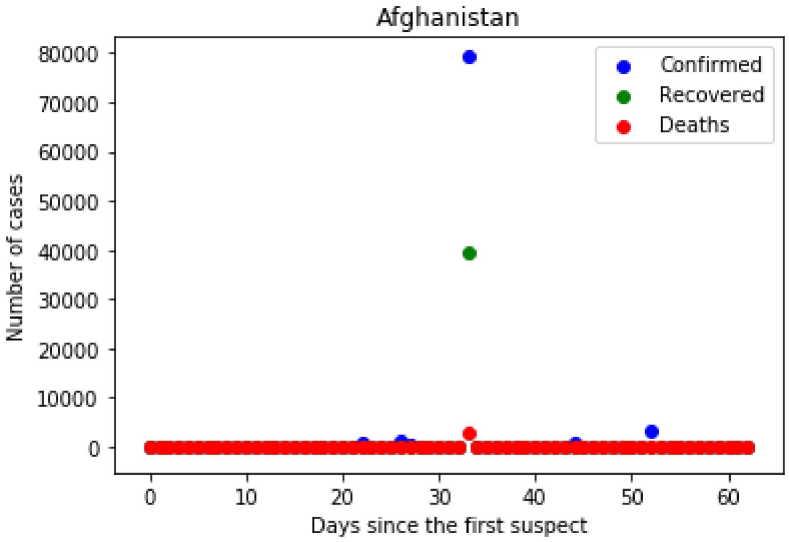
Country	Country	Confirmed	Deaths	Recovered
Afghanistan	Afghanistan	1	0	0
Algeria	Algeria	1	0	0
Australia	AustraliaAustraliaAustraliaAustraliaAustraliaA...	25	0	11
Austria	Austria	9	0	0
Bahrain	Bahrain	41	0	0
Belarus	Belarus	1	0	0
Belgium	Belgium	1	0	1
Brazil	Brazil	2	0	0
Cambodia	Cambodia	1	0	1
Canada	CanadaCanadaCanadaCanada	20	0	6
Croatia	Croatia	6	0	0
Denmark	Denmark	3	0	0
Egypt	Egypt	1	0	1
Estonia	Estonia	1	0	0
Finland	Finland	3	0	1
France	France	100	2	12
Georgia	Georgia	1	0	0
Germany	Germany	79	0	16
Greece	Greece	4	0	0
Hong Kong	Hong Kong	95	2	33
Iceland	Iceland	1	0	0
India	India	3	0	3
Iran	Iran	593	43	123
Iraq	Iraq	13	0	0
Ireland	Ireland	1	0	0
Israel	Israel	7	0	1
Italy	Italy	1128	29	46
Japan	Japan	241	5	32
Kuwait	Kuwait	45	0	0
Lebanon	Lebanon	4	0	0
Lithuania	Lithuania	1	0	0
Luxembourg	Luxembourg	1	0	0
Macau	Macau	10	0	8
Mainland China	Mainland ChinaMainland ChinaMainland ChinaMain...	79251	2835	39279
Malaysia	Malaysia	25	0	18
Mexico	Mexico	4	0	0
Monaco	Monaco	1	0	0
Nepal	Nepal	1	0	1
Netherlands	Netherlands	6	0	0
New Zealand	New Zealand	1	0	0

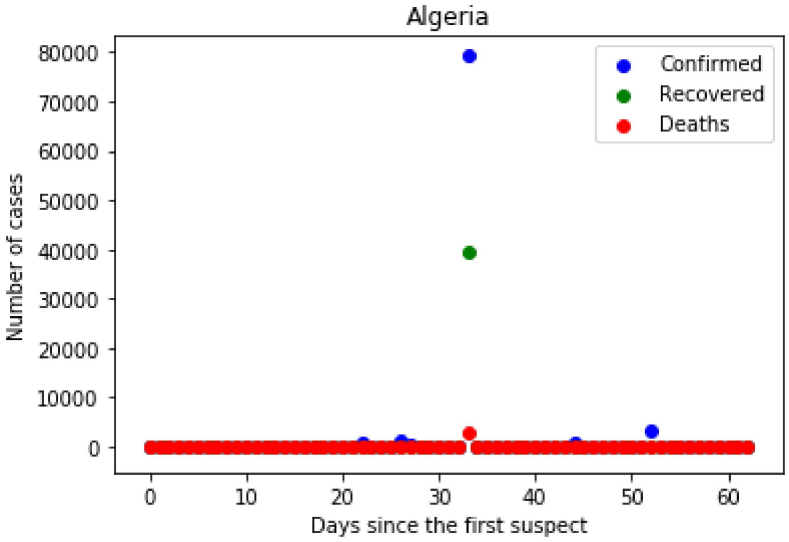
Country	Country	Confirmed	Deaths	Recovered
Nigeria	Nigeria	1	0	0
North Macedonia	North Macedonia	1	0	0
Norway	Norway	15	0	0
Oman	Oman	6	0	1
Others	Others	705	6	10
Pakistan	Pakistan	4	0	0
Philippines	Philippines	3	1	1
Qatar	Qatar	1	0	0
Romania	Romania	3	0	0
Russia	Russia	2	0	2

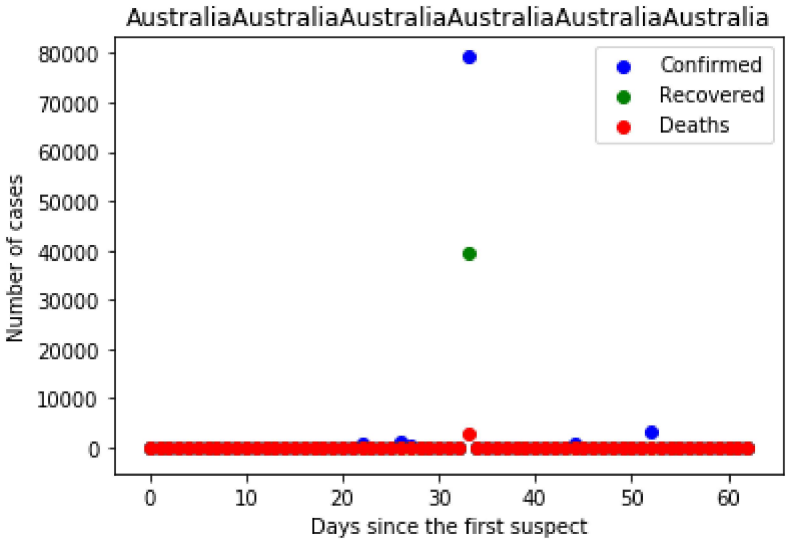
In [18]:
```
countries = df3['Country'].unique()
len(countries)
```

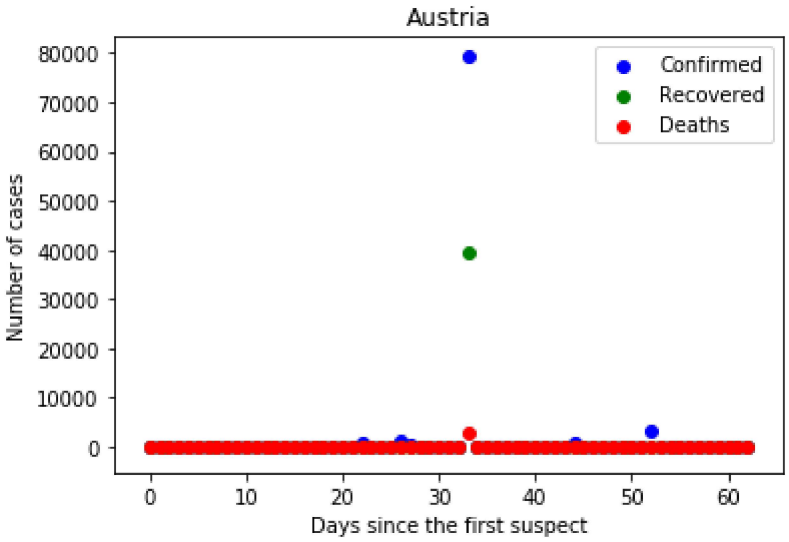
Out[18]: 63

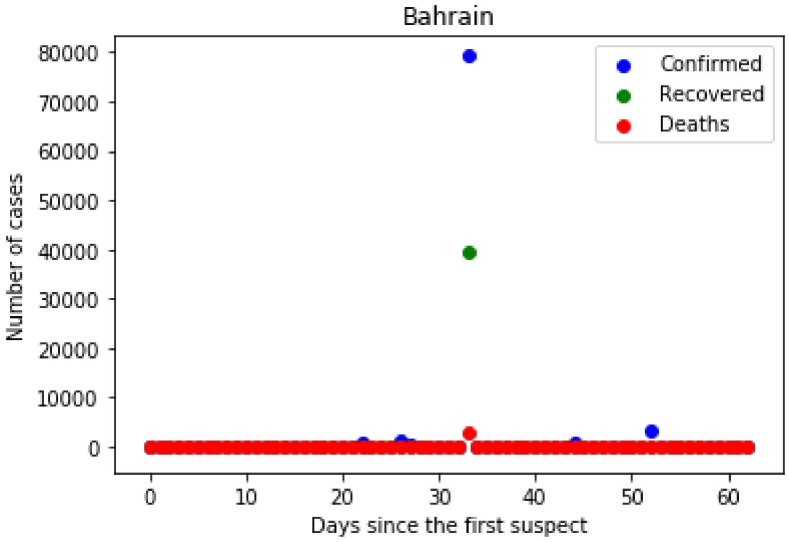
In [22]:
```
for idx in range(0, len(countries)):
#     C = df3[df3['Country']==countries[idx]].reset_index()
# This is not going to show the correct graphics
# because I did not find the data used in the example
    C = df3
    plt.scatter(np.arange(0, len(C)), C['Confirmed'], color='blue', label='Confirmed'
)
    plt.scatter(np.arange(0, len(C)), C['Recovered'], color='green', label='Recovere
d')
    plt.scatter(np.arange(0, len(C)), C['Deaths'], color='red', label='Deaths')
    plt.title(countries[idx])
    plt.xlabel('Days since the first suspect')
    plt.ylabel('Number of cases')
    plt.legend()
    plt.show()
```

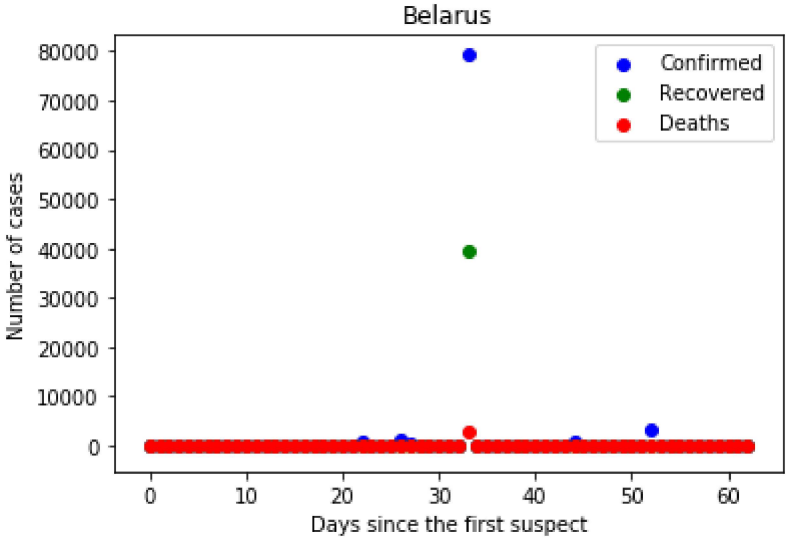

Afghanistan
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

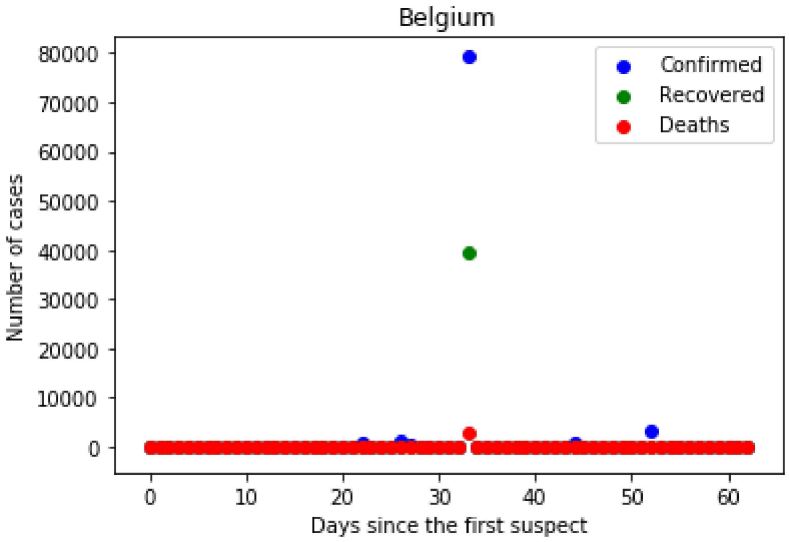

Algeria
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

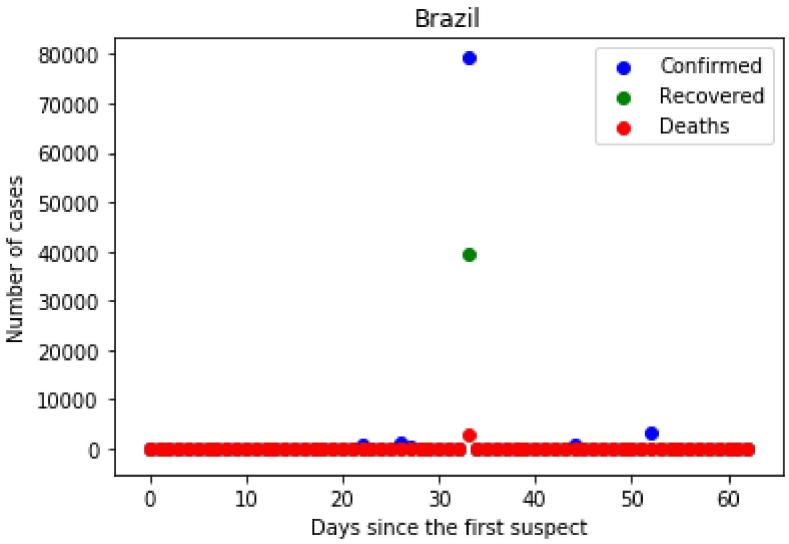

AustraliaAustraliaAustraliaAustraliaAustraliaAustralia
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

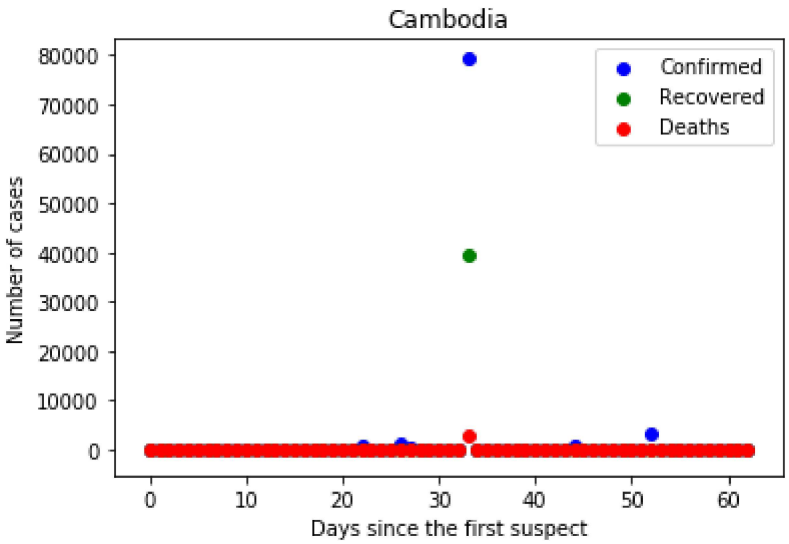

Austria
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

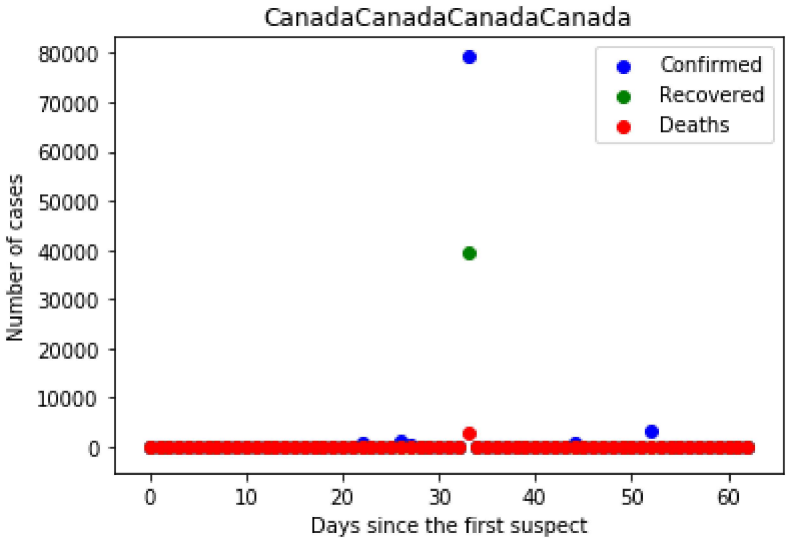

Bahrain
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

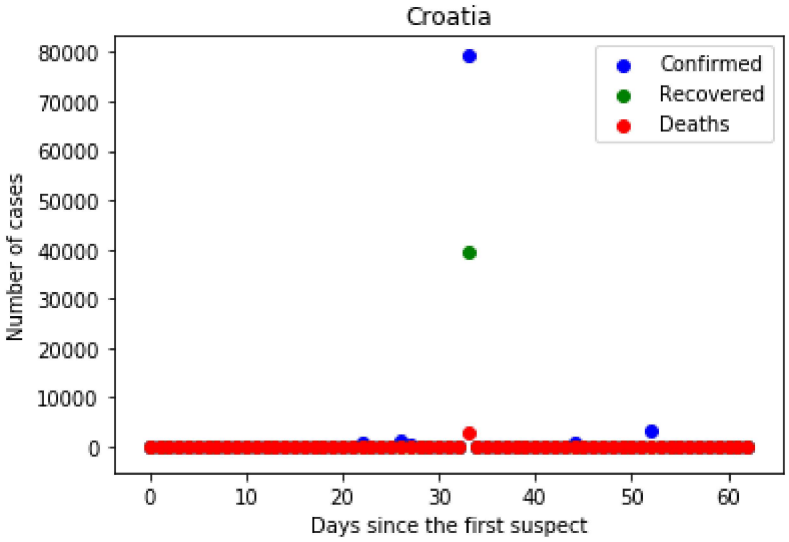

Belarus
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

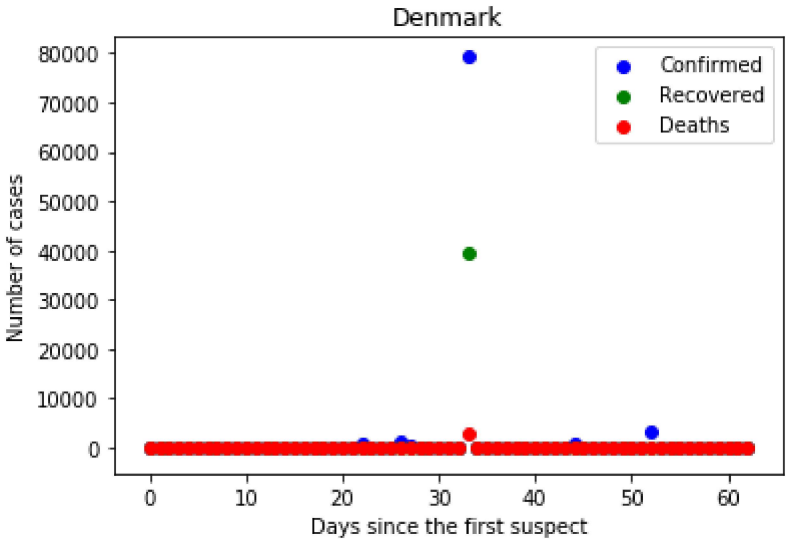

Belgium
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

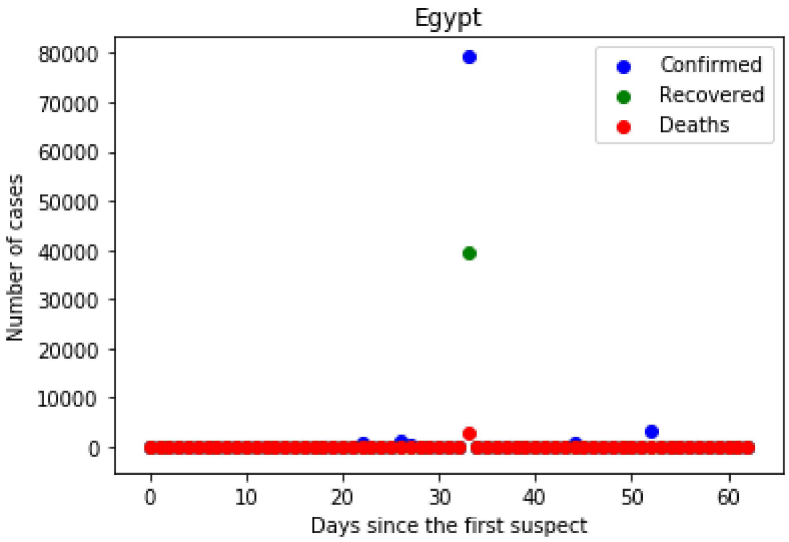

Brazil
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

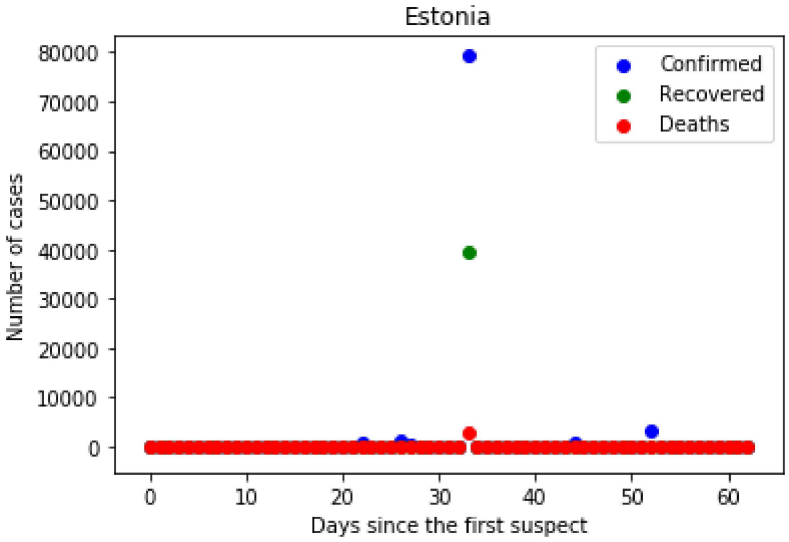

Cambodia
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

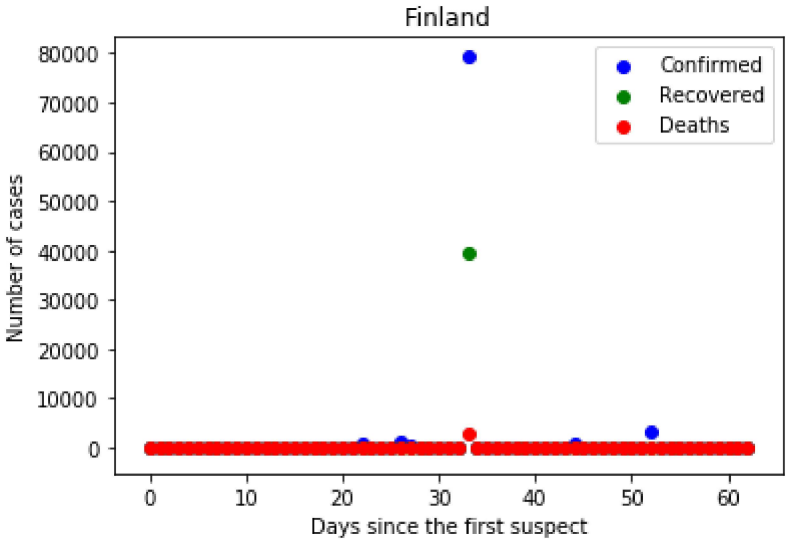

CanadaCanadaCanadaCanada
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

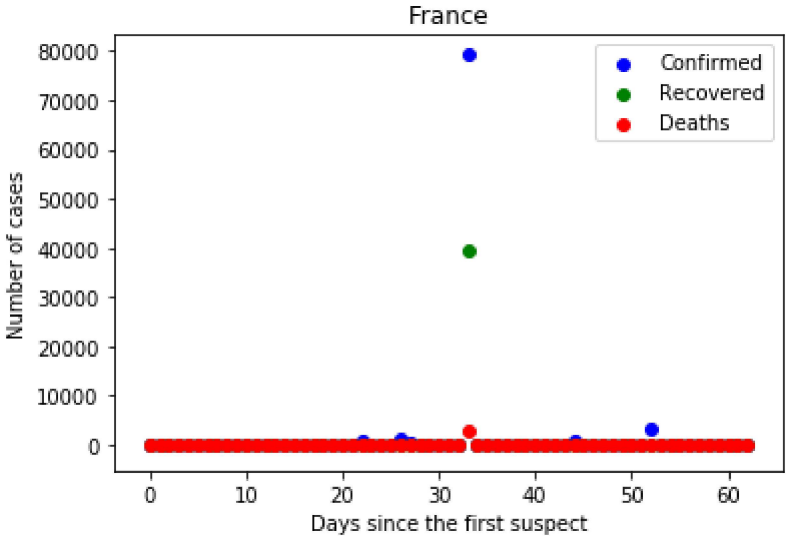

Croatia
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

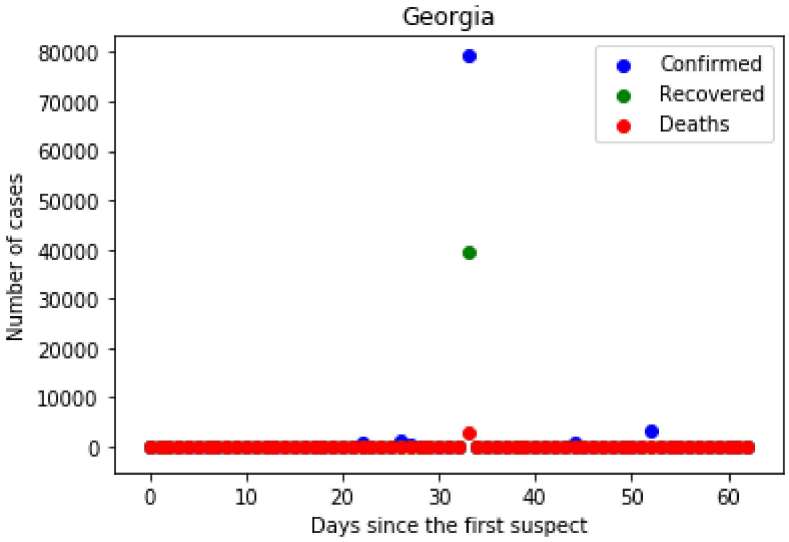

Denmark
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

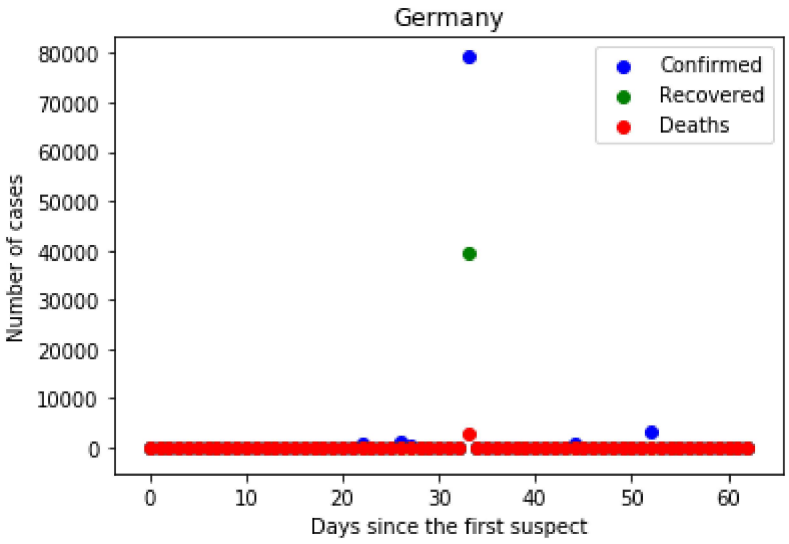

Egypt
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

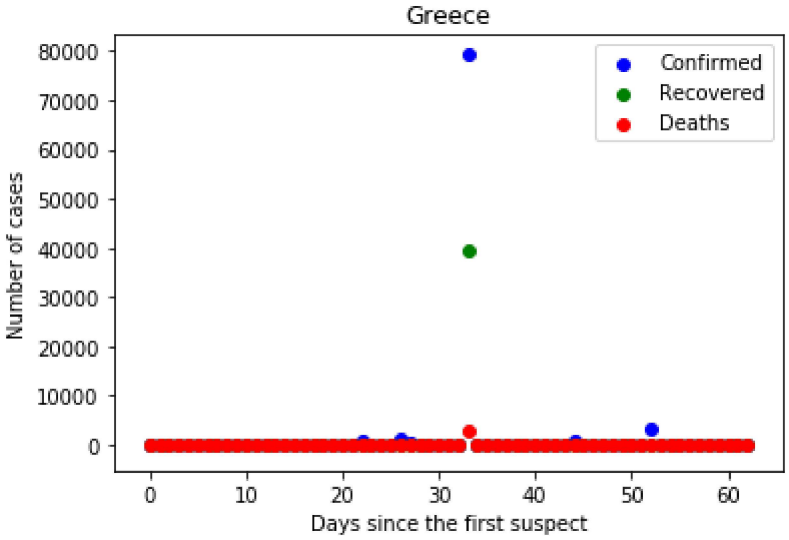

Estonia
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

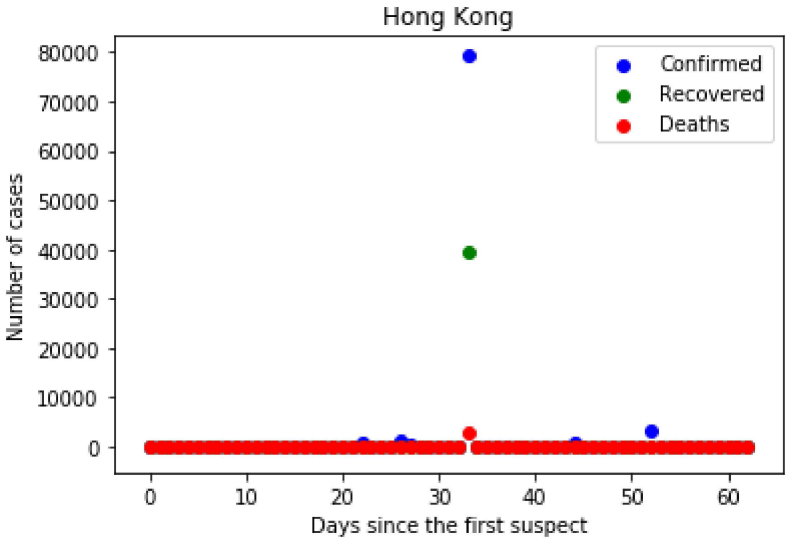

Finland
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

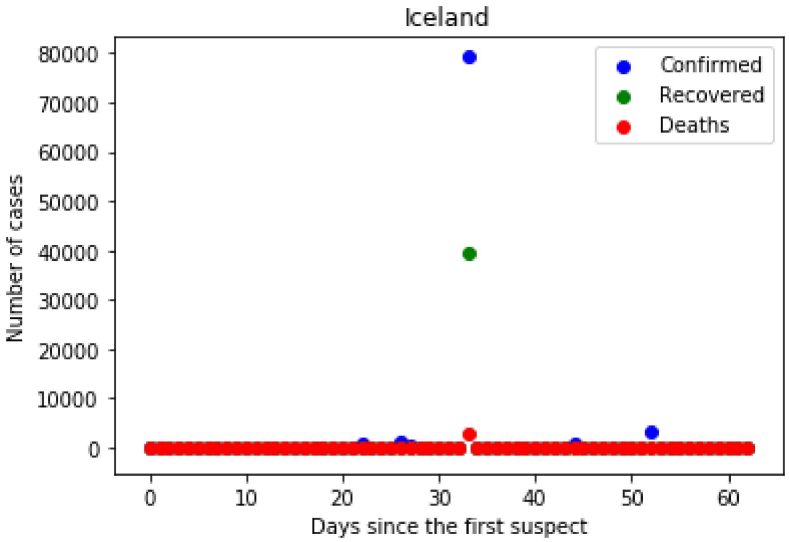

France
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

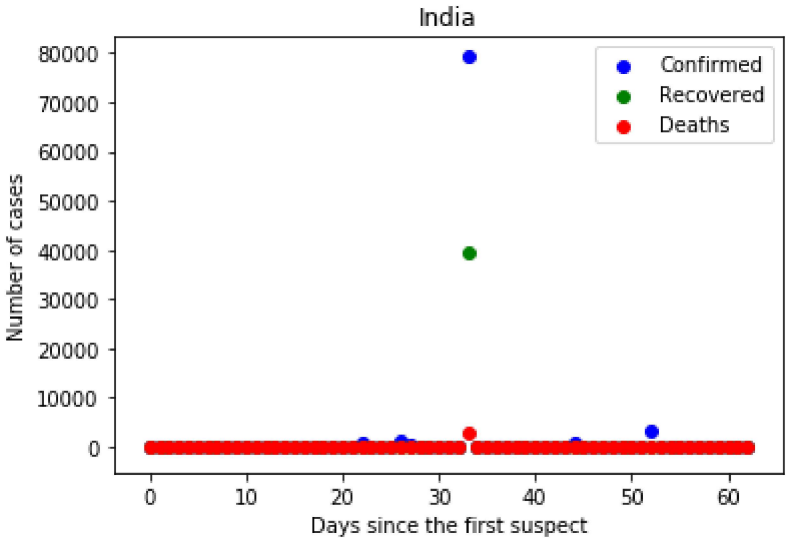

Georgia
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

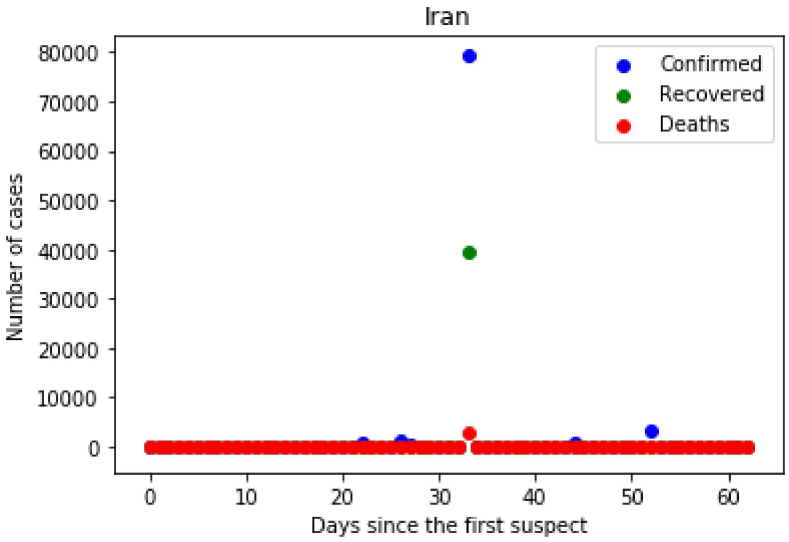

Germany
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

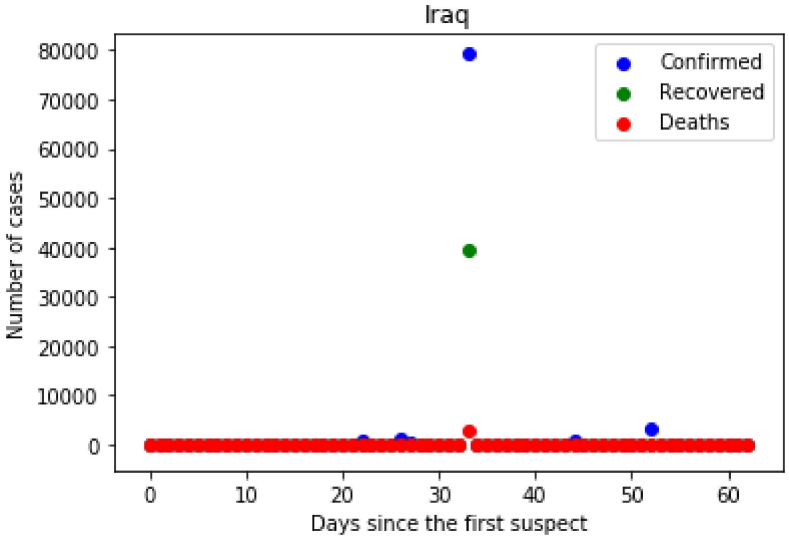

Greece
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

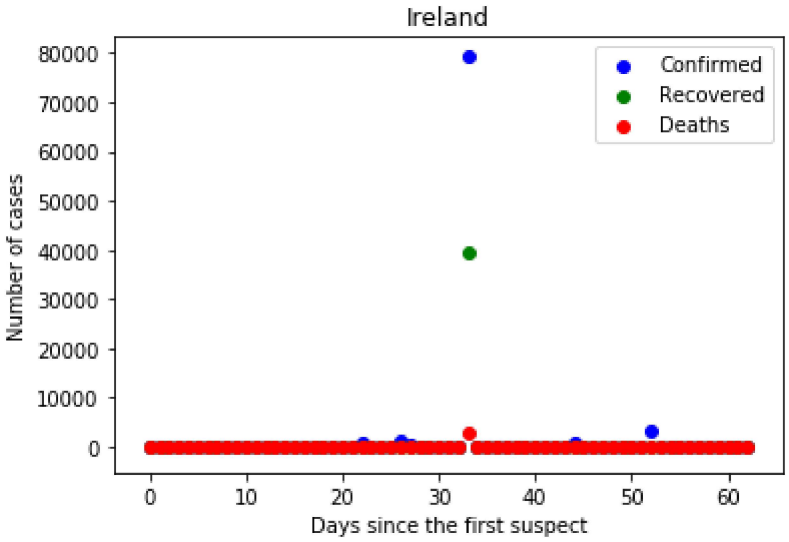

Hong Kong
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

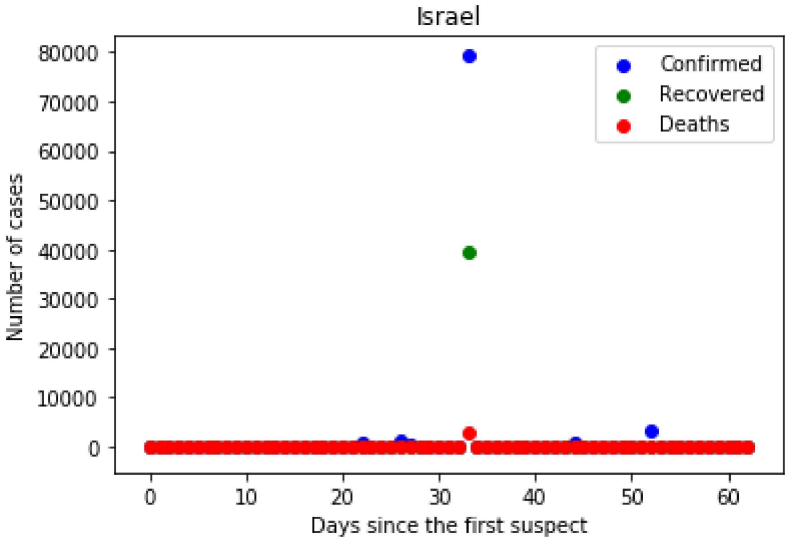

Iceland
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

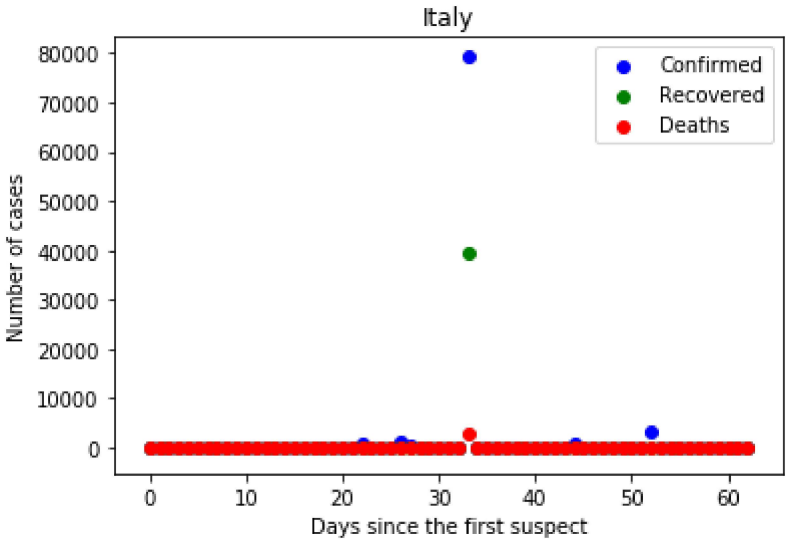

India
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

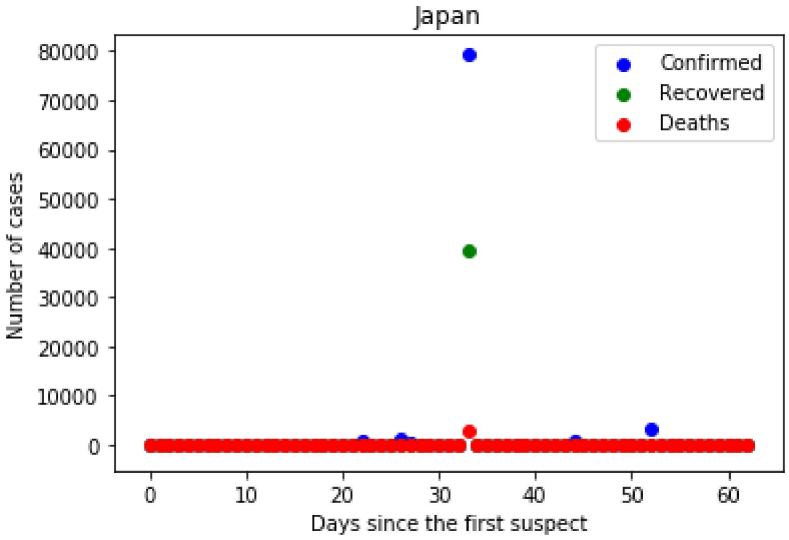

Iran
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

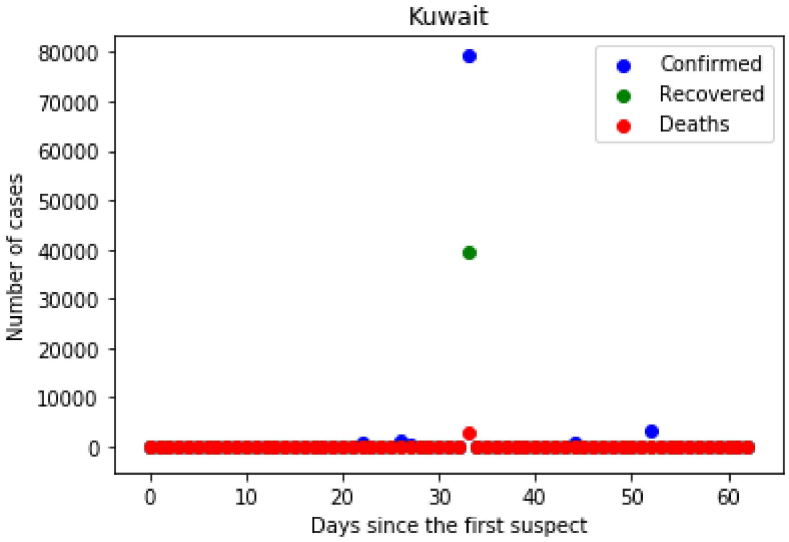

Iraq
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

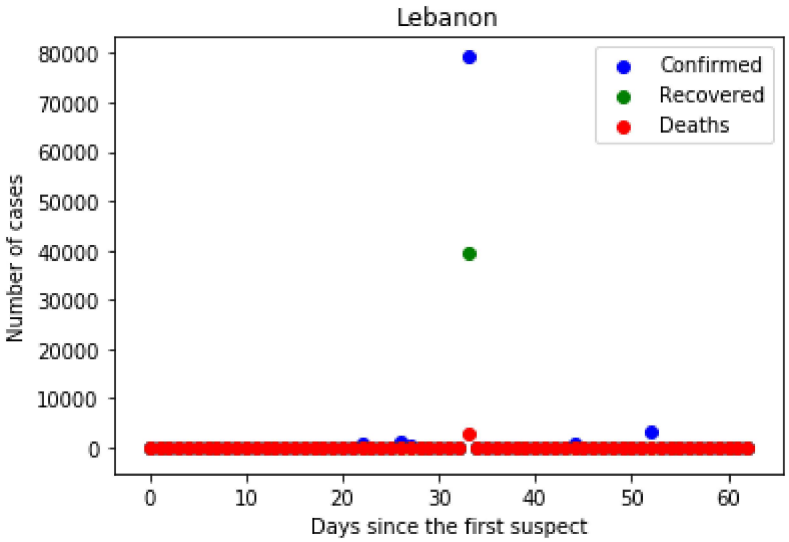

Ireland
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

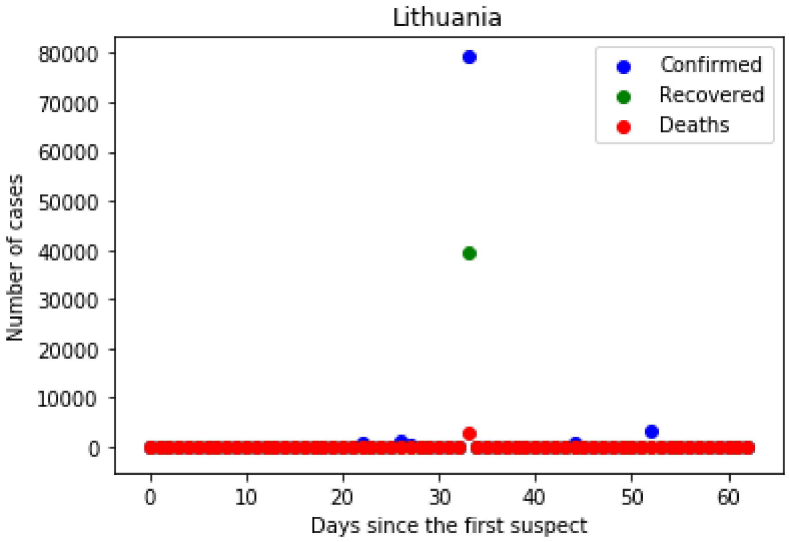

Israel
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

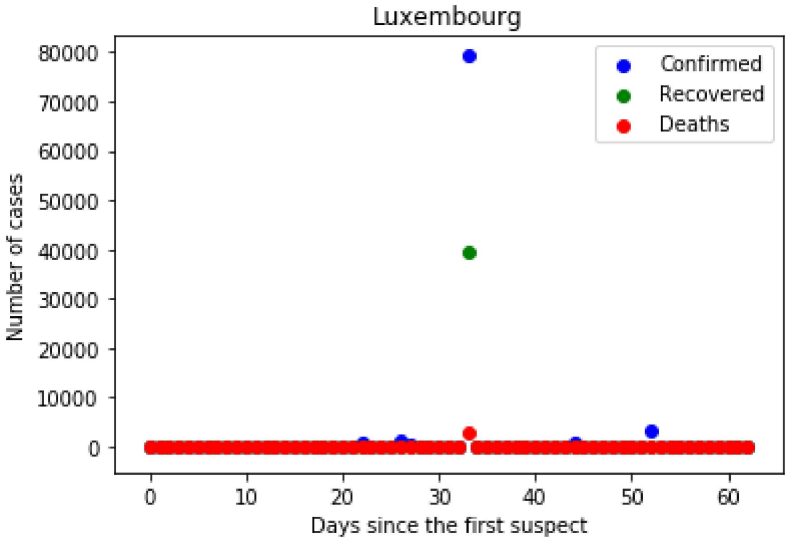

Italy
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

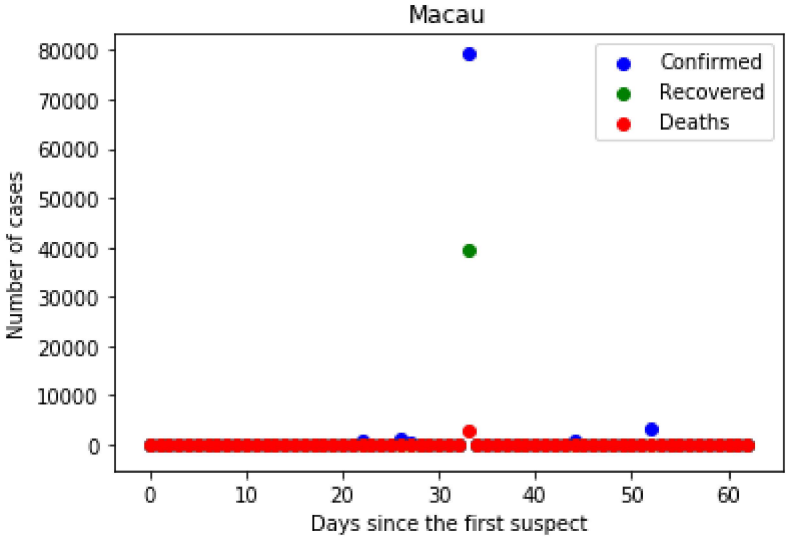

Japan
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

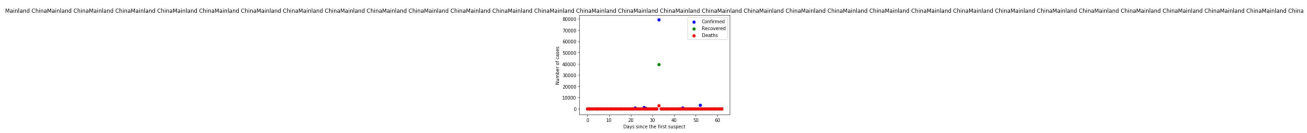

Kuwait
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

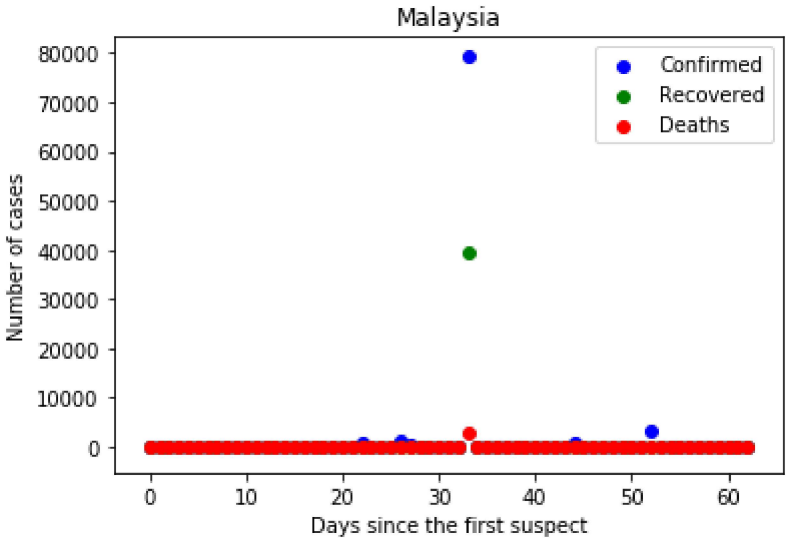

Lebanon
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

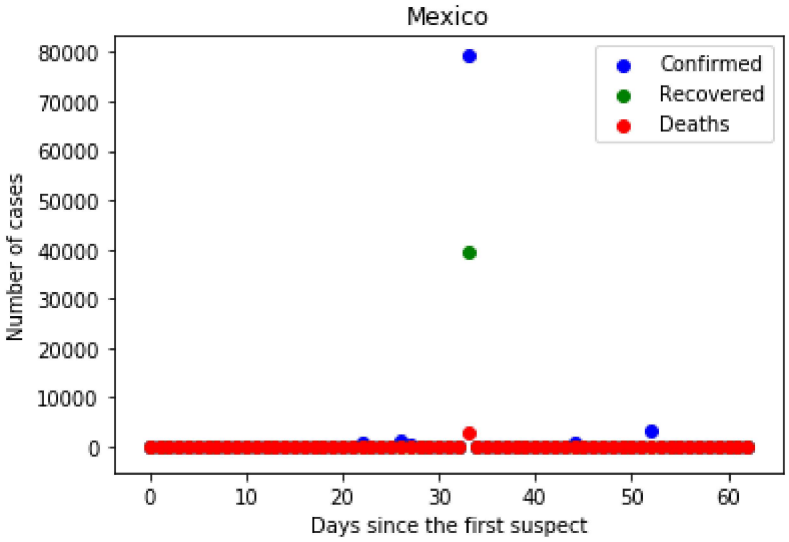

Lithuania
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

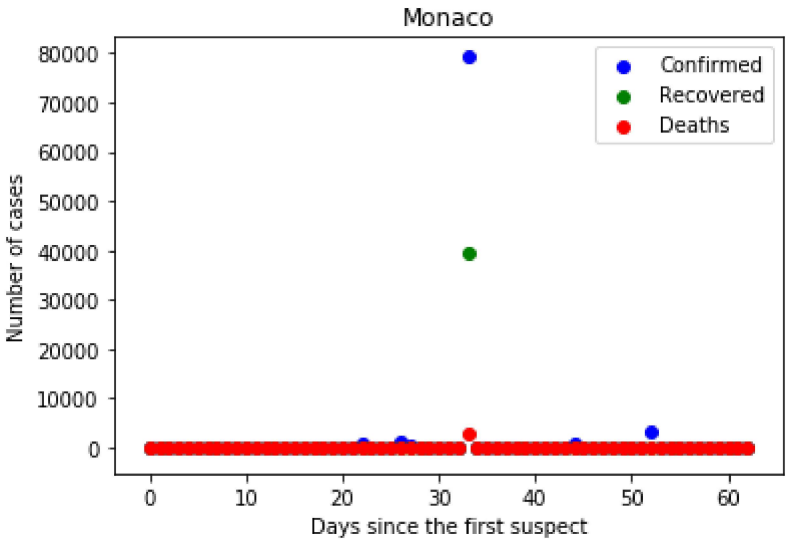

Luxembourg
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

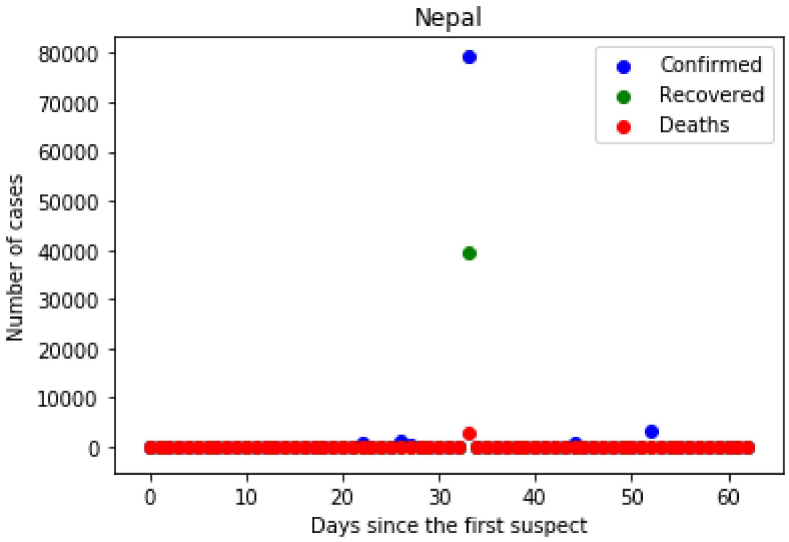

Macau
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

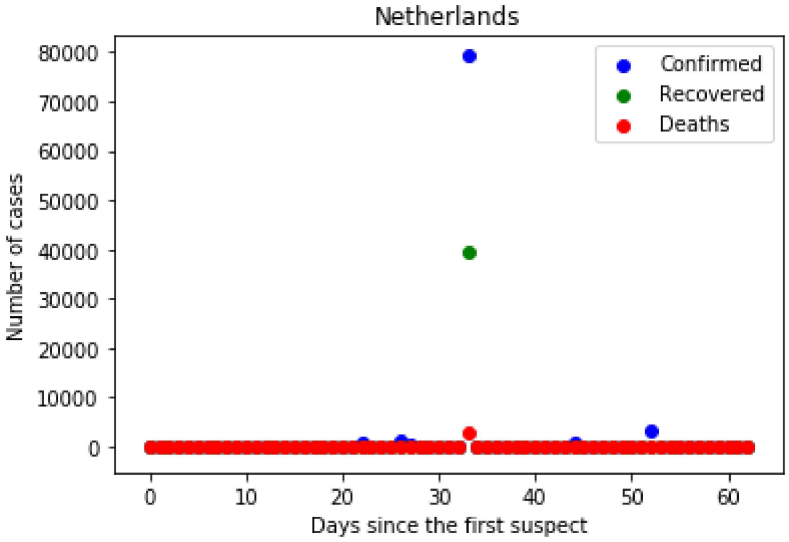


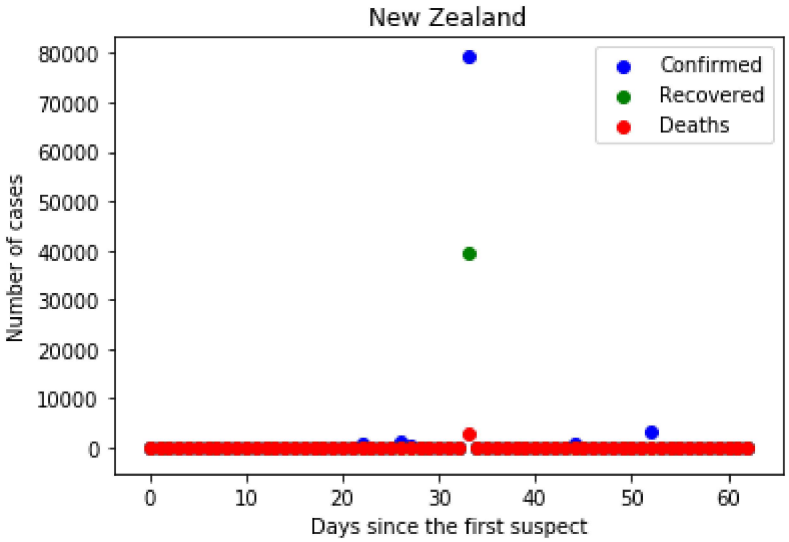

Malaysia
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

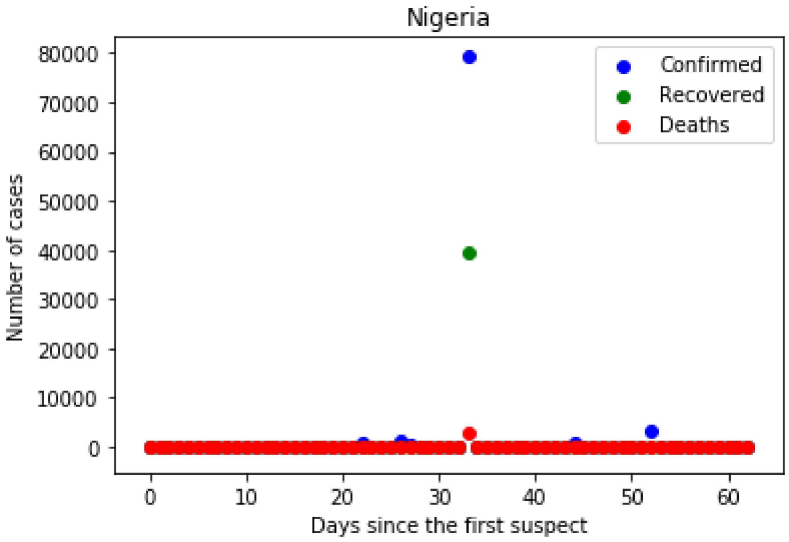

Mexico
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

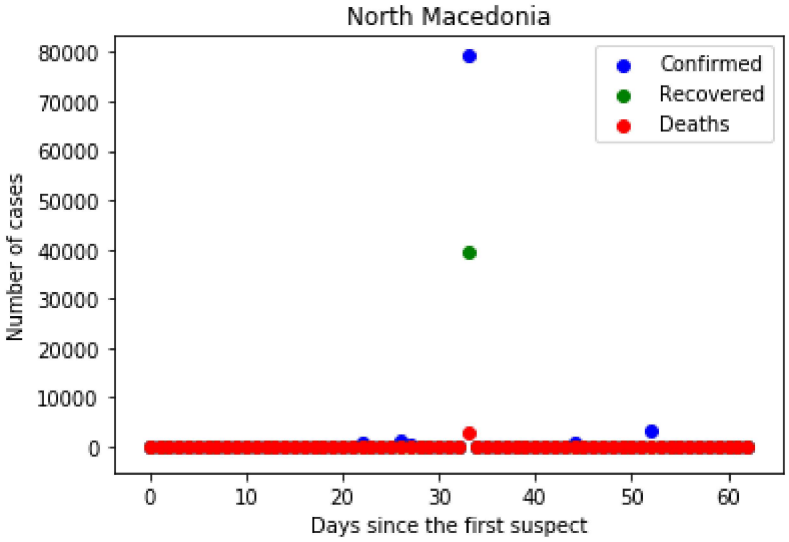

Monaco
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

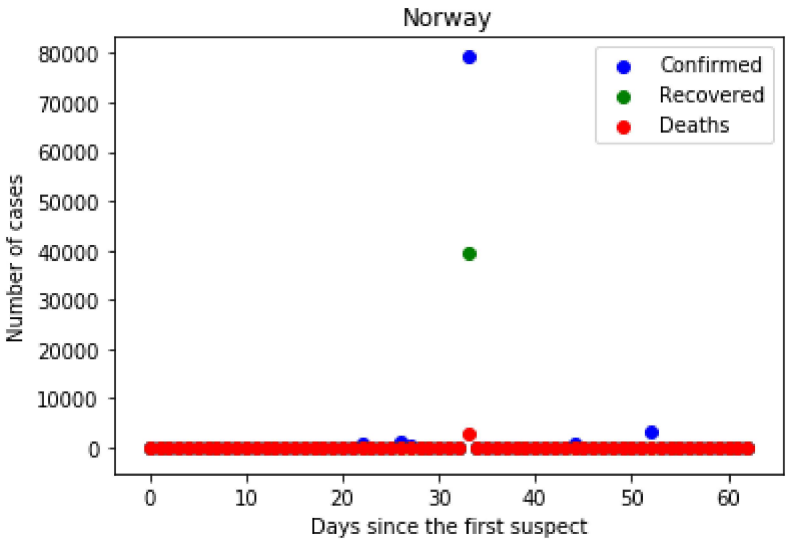

Nepal
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

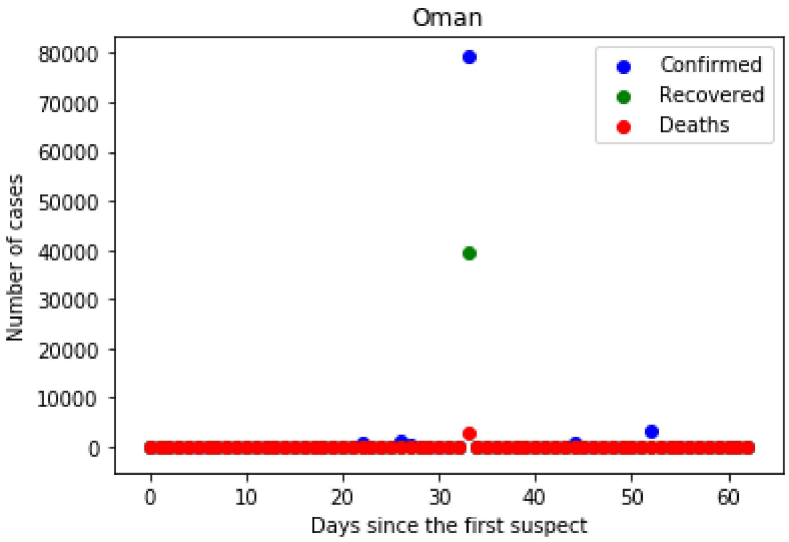

Netherlands
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

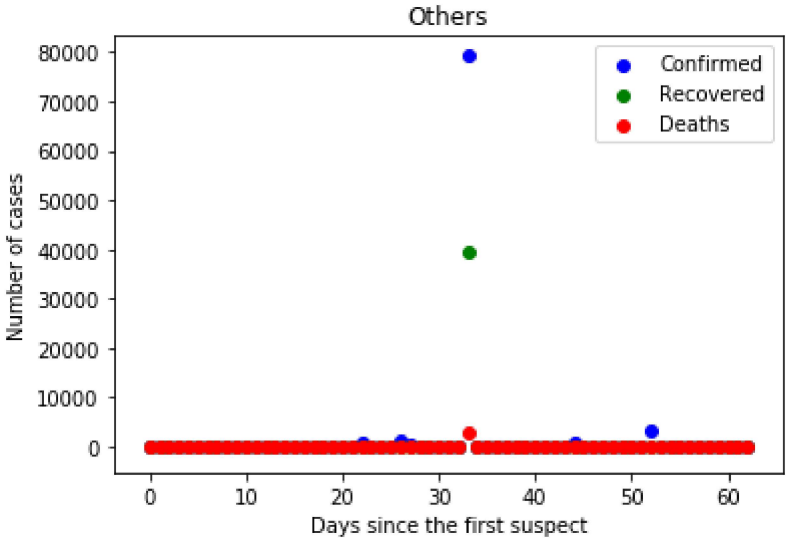

New Zealand
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

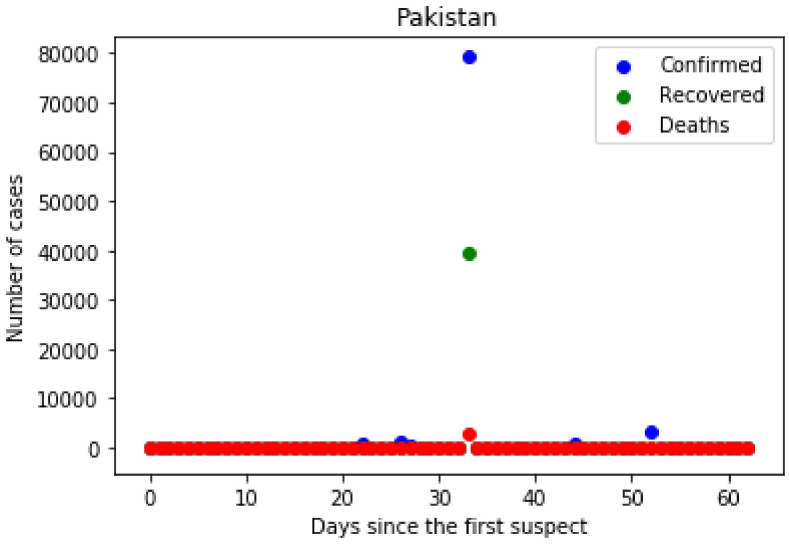

Nigeria
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

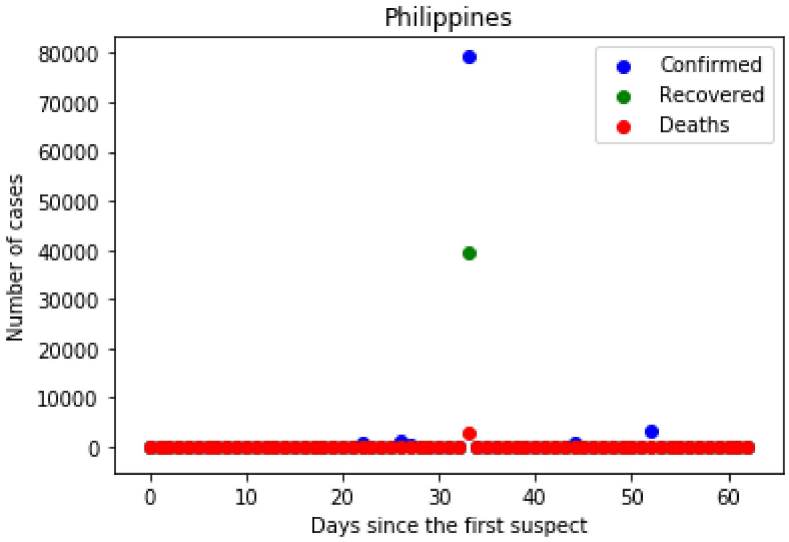

North Macedonia
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

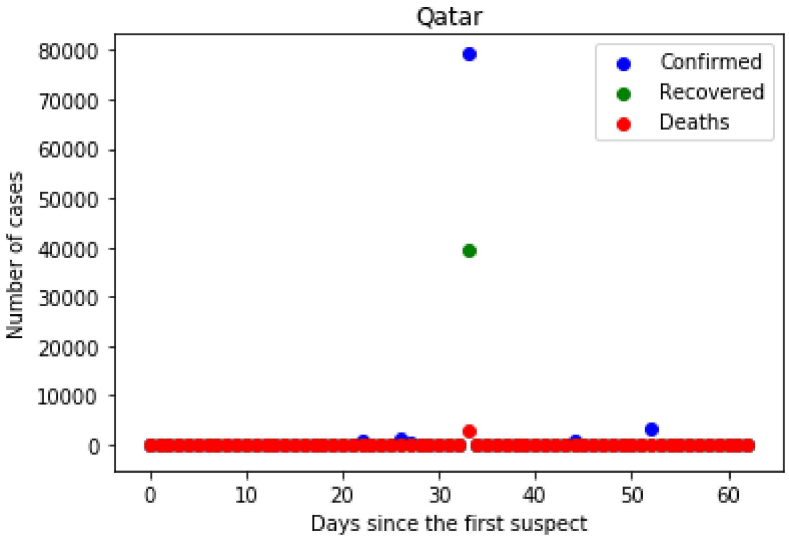

Norway
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

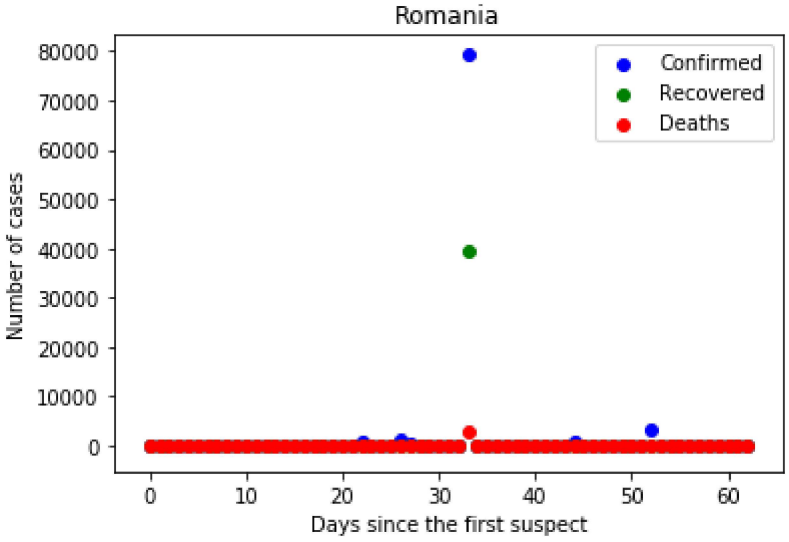

Oman
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

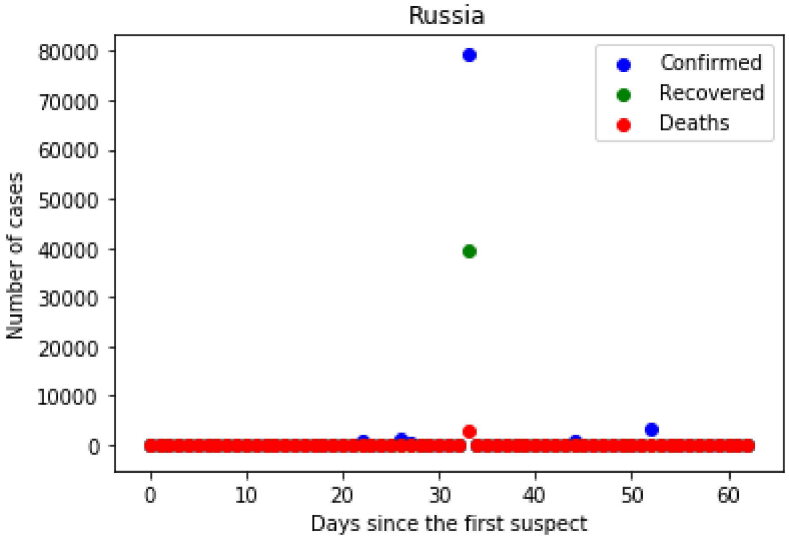

Others
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

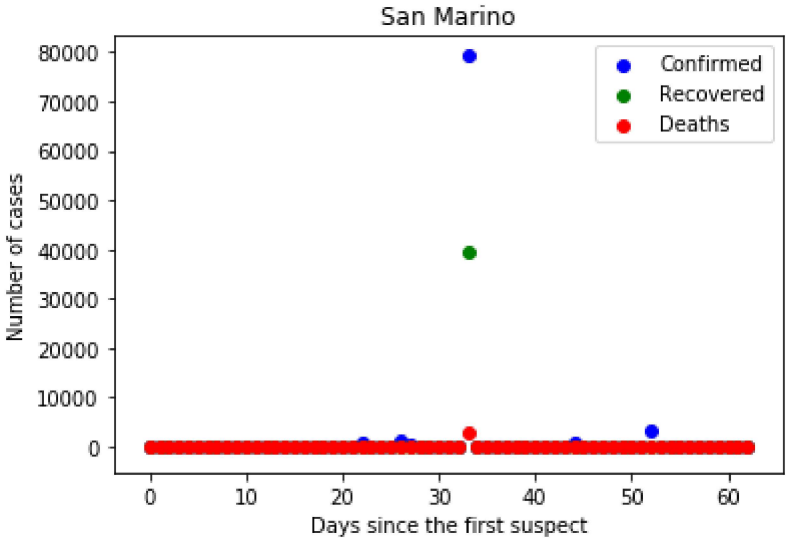

Pakistan
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

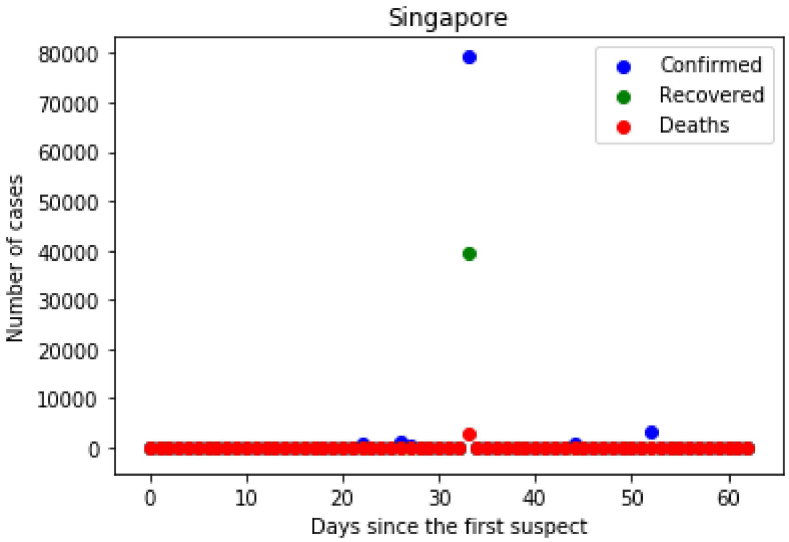

Philippines
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

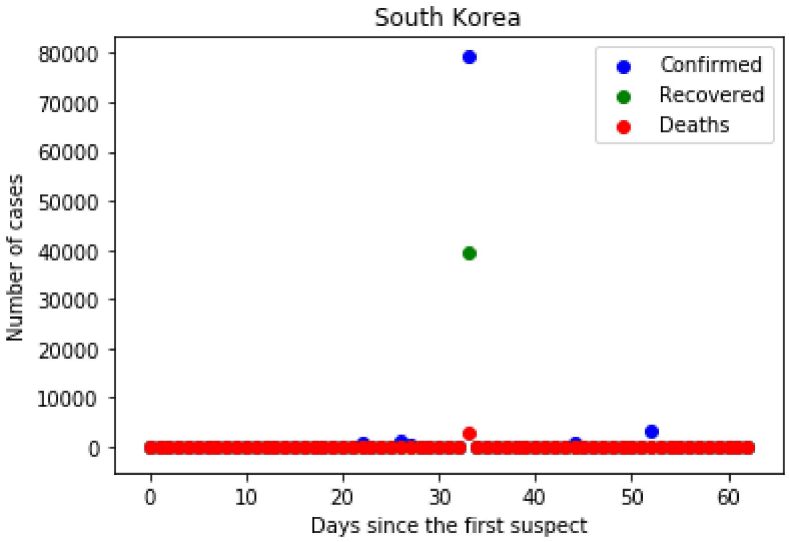

Qatar
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

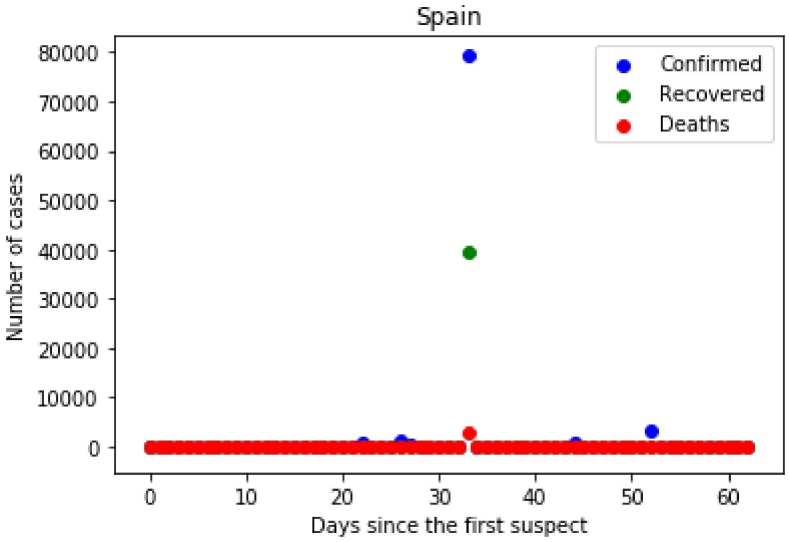

Romania
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

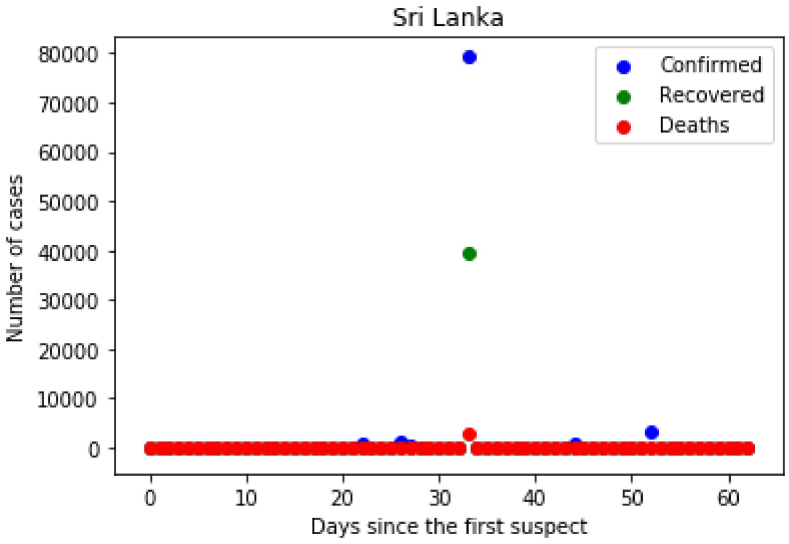

Russia
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

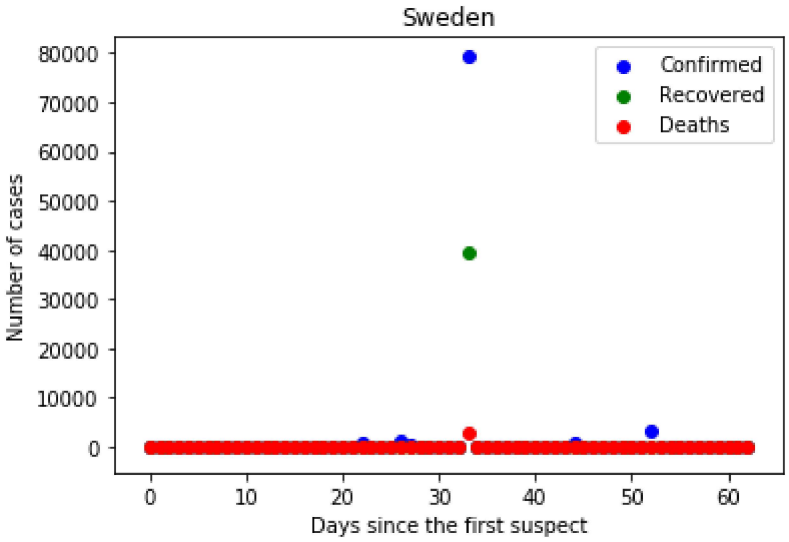

San Marino
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

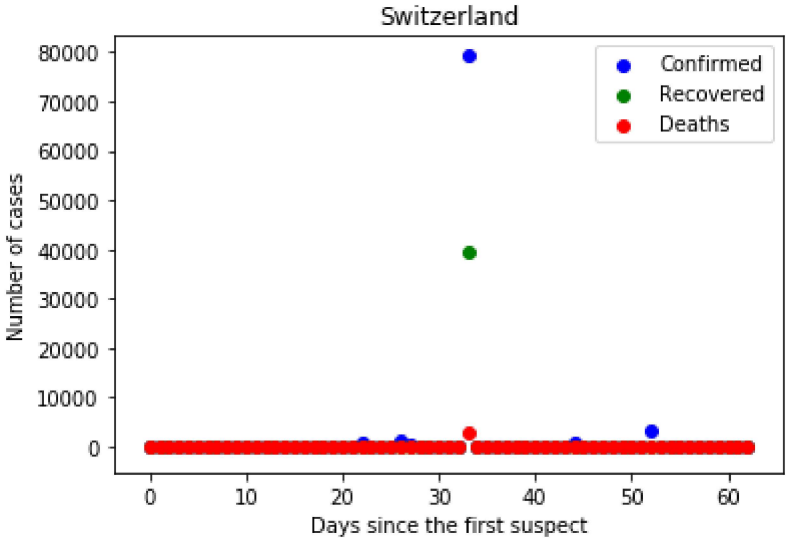

Singapore
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

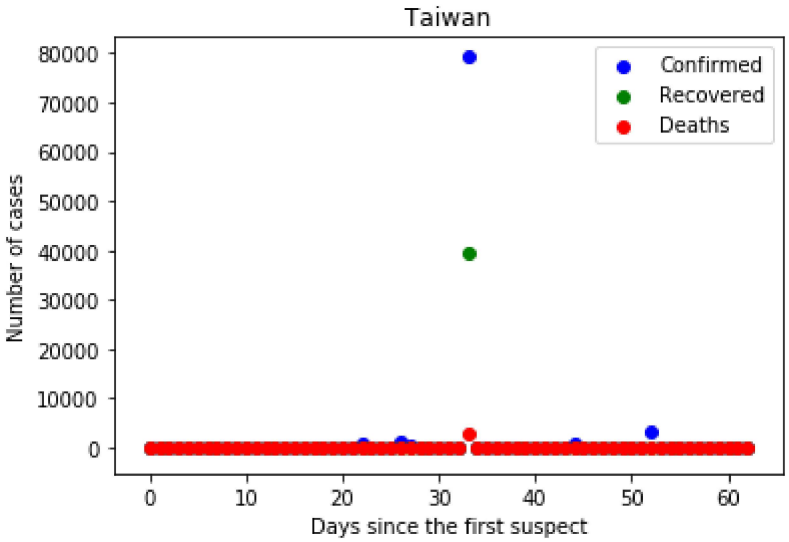

South Korea
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

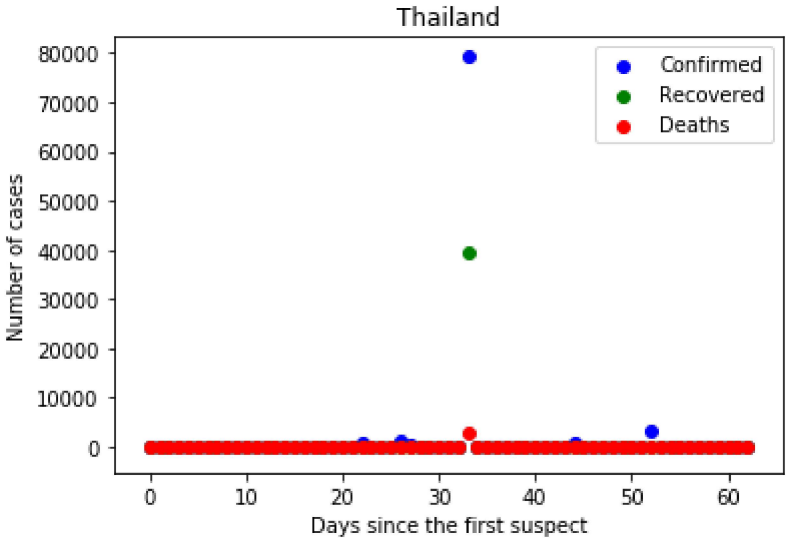

Spain
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

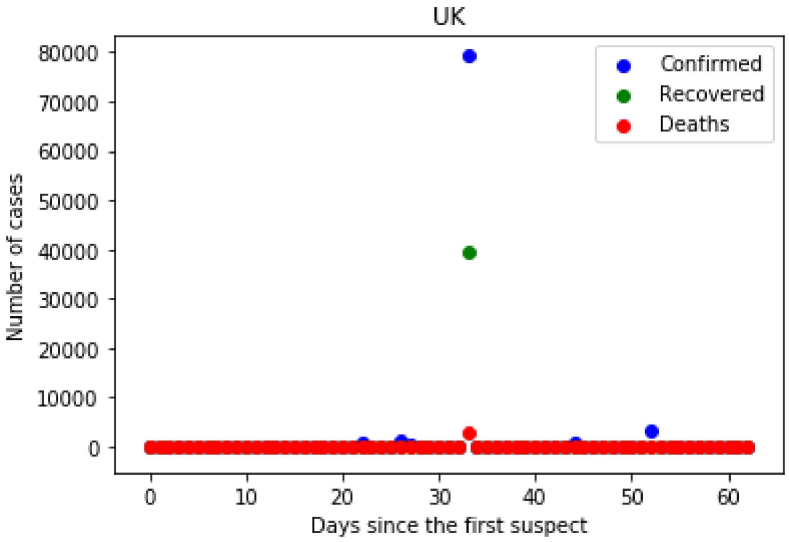

Sri Lanka
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

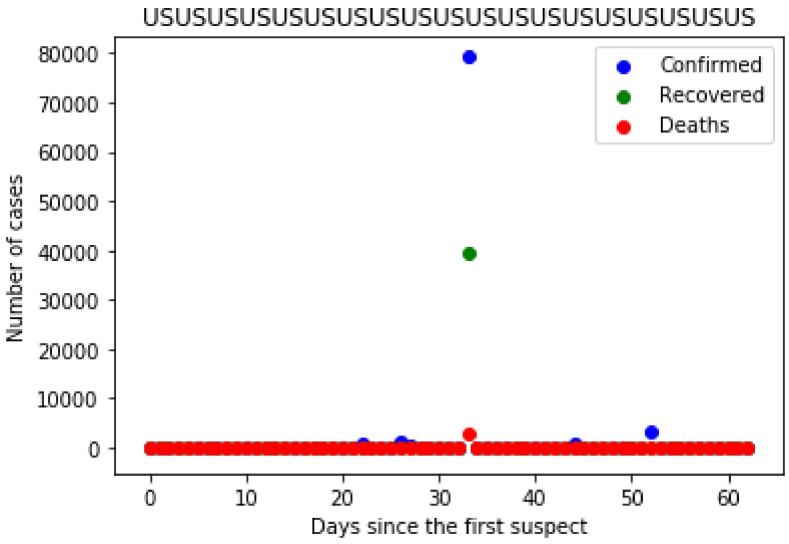

Sweden
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

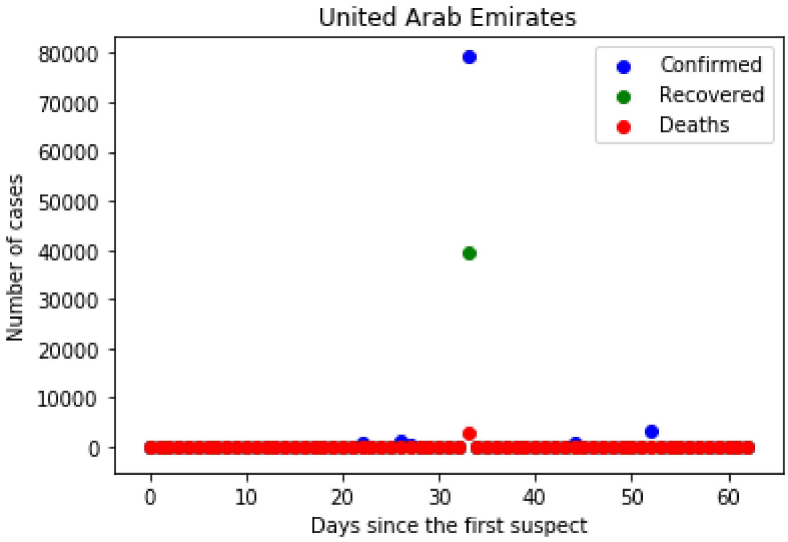

Switzerland
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect

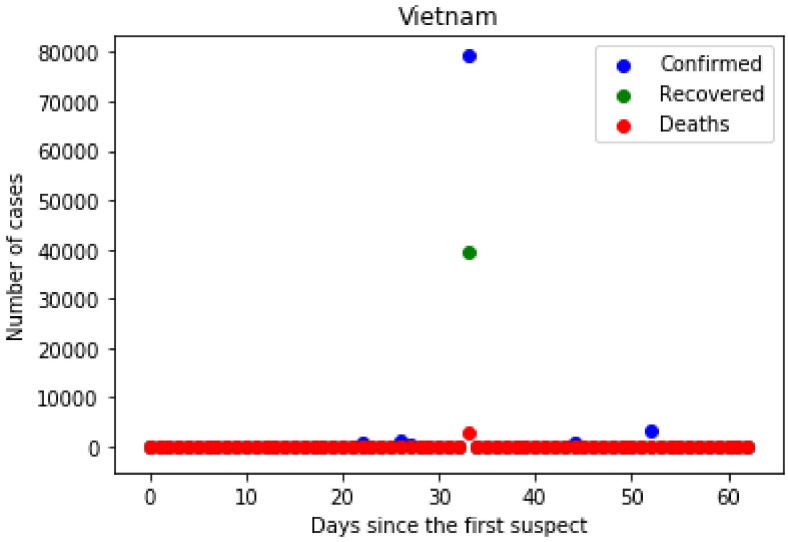

Taiwan
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect


Thailand
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect


UK
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect


USUSUSUSUSUSUSUSUSUSUSUSUSUSUSUSUSUS
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect


United Arab Emirates
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect
0
10000
20000
30000
40000
50000
60000
70000
80000
0
10
20
30
40
50
60


Vietnam
Confirmed
Recovered
Deaths
Number of cases
Days since the first suspect
0
10000
20000
30000
40000
50000
60000
70000
80000
0
10
20
30
40
50
60

In [ ]: