Forecasting of coronavirus COVID19 epidemic (SIR model)

DISCLAIMER: The model may fail is some situations. In particular, the model may fail in the initial phase and in when additional epidemic stages or outbreaks (not described by SIR model) are encountered. Use it at your own discretion.

Report

```
fprintf('Date: %s\n',datestr(date))
```

```
Date: 23-Mar-2020
```

```
aut = fitVirusCV19(@getDataUSA,'prn','on','maxit',1000);
```

```
Epidemic modeling by susceptible-infected-recovered (SIR) model
  Country                      USA_v2
  Day                          12
Estimated the SIR model parameters
  Contact rate (beta)          1.002 (1/day)
  Removal rate (gamma)         0.622 (1/day)
  Population size (N)           169981
  Initial number of cases (I0) 268
Basic reproduction number (R0) 1.609
Final state
  Final number of cases        110394
  Final number of susceptibles 59587
Daily forcast for 23-Mar-2020
  Total                        40203
  Increase                     7847
Estimated logistic model parameters
  Epidemic size (K)            93525 (cases)
  Epidemic rate (r)            0.380141 (1/day)
  Initial doubling time        1.8 (day)
Estimated duration (days)
  Turning day                  13
  Acceleration   phase         5 (days)
  Deaceleration  phsee         6 (days)
  Total duration               12 (days)
Estimated datums
  Outbreak                     11-Mar-2020
  Start of acceleration        19-Mar-2020
  Turning point                24-Mar-2020
  Start of steady growth       30-Mar-2020
  Start of ending phase        11-Apr-2020
Statistics
  Number of observations       12
  Degrees of freedom           8
  Root Mean Squared Error      1202.08
  R-Squared                    0.99
  Adjusted R-Squared           0.984
  F-statistics vs. zero model  267.23
  p-value                      2.33596e-08
```

```
Method
  Total cases weight              0
  Infection rate weight           1
  Objective function value        1939.83
  Exit condition (1=OK)           1
```

Coronavirus epidemic in USA_v2 (SIR model)

$R_0 = 1.609$ $\beta = 1.002$ $\gamma = 0.622$ N = 169982 $C_{end} = 110395$ $S_{end} = 59587$ RMSE = 1202

Infection rate

2