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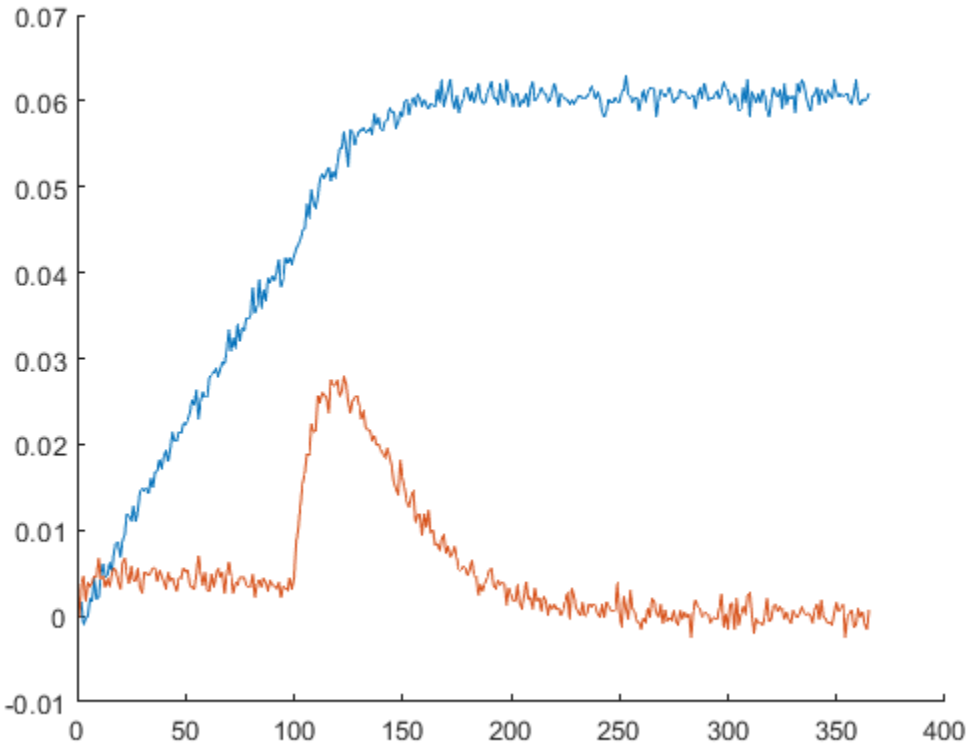
Load data and plot

```
data = load("mockdata_v2.mat");
infected = transpose(deal(data.InfectedProportion));    % Turn these from rows
 to columns
deaths = transpose(deal(data.cumulativeDeaths));
data = [infected deaths];

figure(1);
hold on;
plot(deaths);                                          % Plot actual data
plot(infected);
```



Setup

```
A = [0 0 0 .99 .99 .99 .99];
b = 1;
Af = [0 0 0 1 1 1 1];
bf = 1;
ub = [1 1 1 1 1 1 1]';
lb = [0 0 0 0 0 0 0]';
x0 = [0 0 0 1 0 0 0];
```

First Segment: Days 1-100

```
t = 100;
seg1 = data(1:100,:);

fun1= @(x)siroutput(x,t,seg1);
x1 = fmincon(fun1,x0,A,b,Af,bf,lb,ub);
Y_fit_1 = siroutput_full(x1,t);

New1(1) = Y_fit_1(100, 1);
New1(2) = Y_fit_1(100, 2);
New1(3) = Y_fit_1(100, 3);
New1(4) = Y_fit_1(100, 4);
```

Local minimum found that satisfies the constraints.

Optimization completed because the objective function is non-decreasing in feasible directions, to within the value of the optimality tolerance, and constraints are satisfied to within the value of the constraint tolerance.

Second Segment

```
t = 25;

seg2 = data(101:125, :);
fun2= @(x)siroutput(x,t,seg2);
params2 = [0 0 0 New1(1) New1(2) New1(3) New1(4)];
x2 = fmincon(fun2, x1, A, b, Af, bf, lb, ub);
Y_fit_2 = siroutput_full(x2, t);

New2(1) = Y_fit_2(25, 1);
New2(2) = Y_fit_2(25, 2);
New2(3) = Y_fit_2(25, 3);
New2(4) = Y_fit_2(25, 4);
```

Local minimum possible. Constraints satisfied.

fmincon stopped because the size of the current step is less than the value of the step size tolerance and constraints are

satisfied to within the value of the constraint tolerance.

Third Segment

```
t = 50;                                          % Next 50 days: descent from
 peak

seg3 = data(126:175, :);
fun3= @(x)siroutput(x,t,seg3);
params3 = [0 0 0 New2(1) New2(2) New2(3) New2(4)];
x3 = fmincon(fun3, x2, A, b, Af, bf, lb, ub);
Y_fit_3 = siroutput_full(x3, t);

New3(1) = Y_fit_3(50, 1);
New3(2) = Y_fit_3(50, 2);
New3(3) = Y_fit_3(50, 3);
New3(4) = Y_fit_3(50, 4);
```

Local minimum possible. Constraints satisfied.

*fmincon stopped because the size of the current step is less than
the value of the step size tolerance and constraints are
satisfied to within the value of the constraint tolerance.*

Fourth Segment

```
t = 365-175;                                       % Next 50 days: descent
 from peak

seg4 = data(176:365, :);
fun4= @(x)siroutput(x,t,seg4);
params3 = [0 0 0 New3(1) New3(2) New3(3) New3(4)];
x4 = fmincon(fun4, x3, A, b, Af, bf, lb, ub);
Y_fit_4 = siroutput_full(x4, t);
```

Local minimum possible. Constraints satisfied.

*fmincon stopped because the size of the current step is less than
the value of the step size tolerance and constraints are
satisfied to within the value of the constraint tolerance.*

Plot

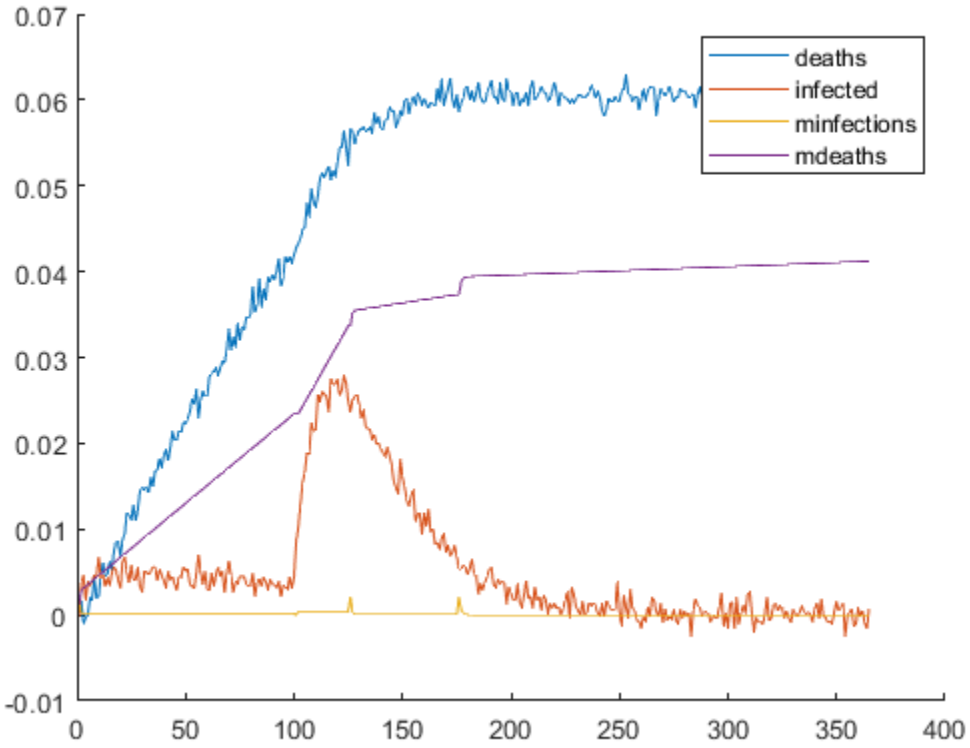
```
Y_fit = cat(1,Y_fit_1,Y_fit_2,Y_fit_3,Y_fit_4);         % Put 3 fits together

diff1 = Y_fit(100,4) - Y_fit(101,4);
diff2 = Y_fit(126,4) - Y_fit(125,4);
```

```
diff3 = Y_fit(176,4) - Y_fit(175,4);

Y_fit(101:365,4) = Y_fit(101:365,4) + diff1 * ones;
Y_fit(126:365,4) = Y_fit(126:365,4) - diff2 * ones;
Y_fit(176:365,4) = Y_fit(176:365,4) - diff3 * ones;

plot(Y_fit(:,2));                                   % Plot the stuff
plot(Y_fit(:,4));
legend('deaths','infected','minfections','mdeaths');
hold off;
```



Rob Sample

```
% %Model section for segment 1
% segment_1 = coviddata(1:100,:);
% fun1= @(x)siroutput(x,100,segment_1);
% x1 = fmincon(fun1,x0,A,b,Af,bf,lb,ub);
% Y_fit_1 = siroutput_full(x1, 100);
%
% %determine new parameters for next segment
% New1(1) = Y_fit_1(100, 1);
% New1(2) = Y_fit_1(100, 2);
% New1(3) = Y_fit_1(100, 3);
% New1(4) = Y_fit_1(100, 4);
%
% %model section for segment 2 using new parameters
```

```
% segment_2 = coviddata(101:250, :);
% fun2= @(x)siroutput(x,150,segment_2);
% params2 = [0 0 0 New1(1) New1(2) New1(3) New1(4)];
% x2 = fmincon(fun2, params2, A, b, Af, bf, lb, ub);
% Y_fit_2 = siroutput_full(x2, 150);
```

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