clear all; close all; clc;

forecastscale = 27; % time span

input = xlsread('input.xlsx'); %read history data from input.xlsx

[numberofcities, numberofyears] = size(input);

cumsuminput = cumsum(input')';

for i=1:numberofcities

for j=1:numberofyears-1

B(i,j) = 0.5\*(cumsuminput(i, j)+cumsuminput(i, j+1));

end

end

for i=1:numberofcities

D = input(i,:);

D(1) = [];

D = D';

E = [-B(i,:); ones(1,numberofyears-1)];

c = inv(E\*E')\*E\*D;

c = c';

a = c(1);

b = c(2);

F(i,:) = zeros(1, forecastscale);

F(i,1) = cumsuminput(i, 1);

for j=2:forecastscale

F(i, j) = (input(i, 1) - b/a)/exp(a\*(j-1))+b/a;

end

G(i, :) = zeros(1, forecastscale);

G(i, 1) = input(i, 1);

for j=2:forecastscale

G(i,j) = F(i, j) - F(i, j-1);

end

end

% plot forecast and history data

t1 = 1999:(1999+numberofyears-1);

t2 = 1999:(1999+forecastscale-1);

plot(t1, input, 'o', t2, G)

%save forecast data into result.xls

xlswrite('result.xls', G)