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test crosscorrelation function

this is a demo of the crosscorrelation function

```
close all;
% clear
clc
```

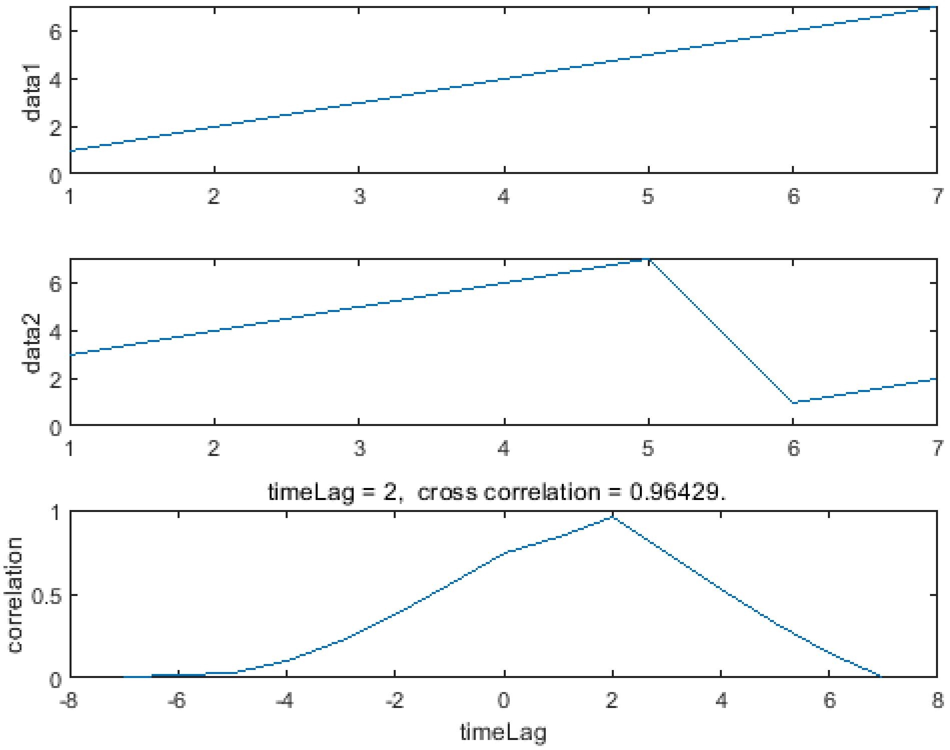
DEBUG ! ! !

```
dbstop if error;
format long
addpath(genpath('../../../include'));
%
 --------------------------------------------------------------------------------
% clear all; clc; close all;
```

# test 1

```
arr1 = [1 2 3 4 5 6 7];
arr2 = [3 4 5 6 7 1 2];
 [xcorrArray1, timeLag1, fig1] = crosscorrelation(arr1, arr2);
```

```
# the cost of  cross correlation is: 0.10701 s.
```



We can see the maximum correlation coefficient and the delay

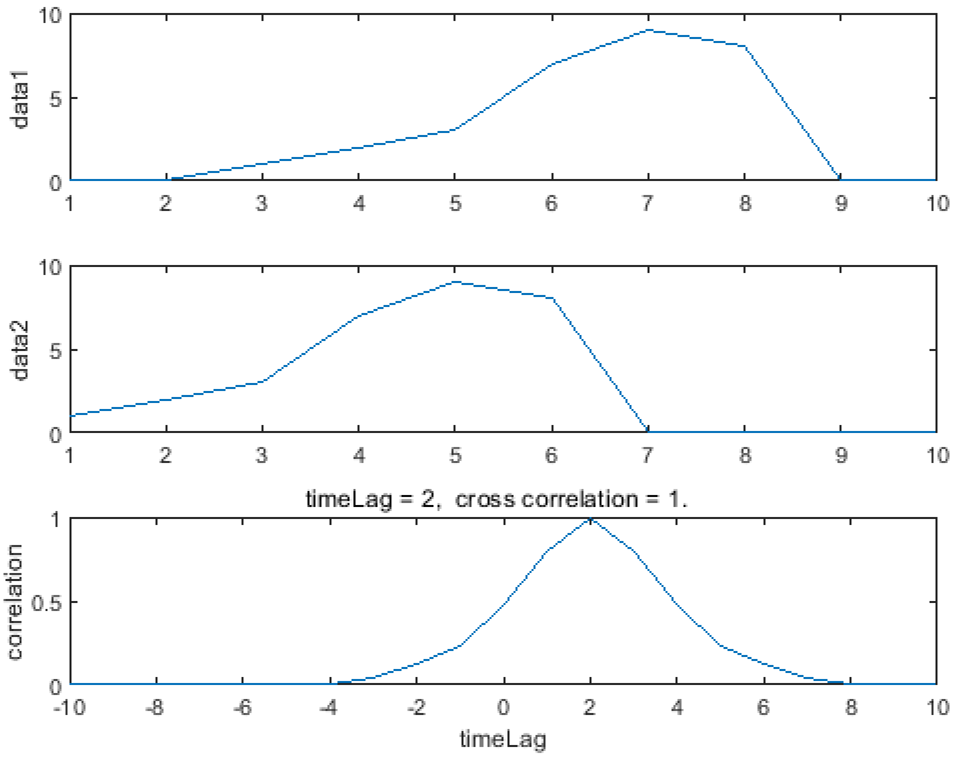
```
disp(['maxCoor1 = ', num2str(max(xcorrArray1)), ', timeLag1 = ',
 num2str(timeLag1)]);
```

```
maxCoor1 = 0.96429, timeLag1 = 2
```

# test 2

```
x1 = [0,0,1,2,3,7,9,8,0,0];
x2 = [1,2,3,7,9,8,0,0,0,0];
 [xcorrArray2, timeLag2, fig2] = crosscorrelation(x1, x2);
```

```
# the cost of  cross correlation is: 0.082753 s.
```



the maximum correlation coefficient and the delay

```
disp(['maxCoor2 = ', num2str(max(xcorrArray2)), ', timeLag1 = ',
 num2str(timeLag2)]);

xcorrTime = (1 : length(xcorrArray2)) - length(x1) - 1;
```

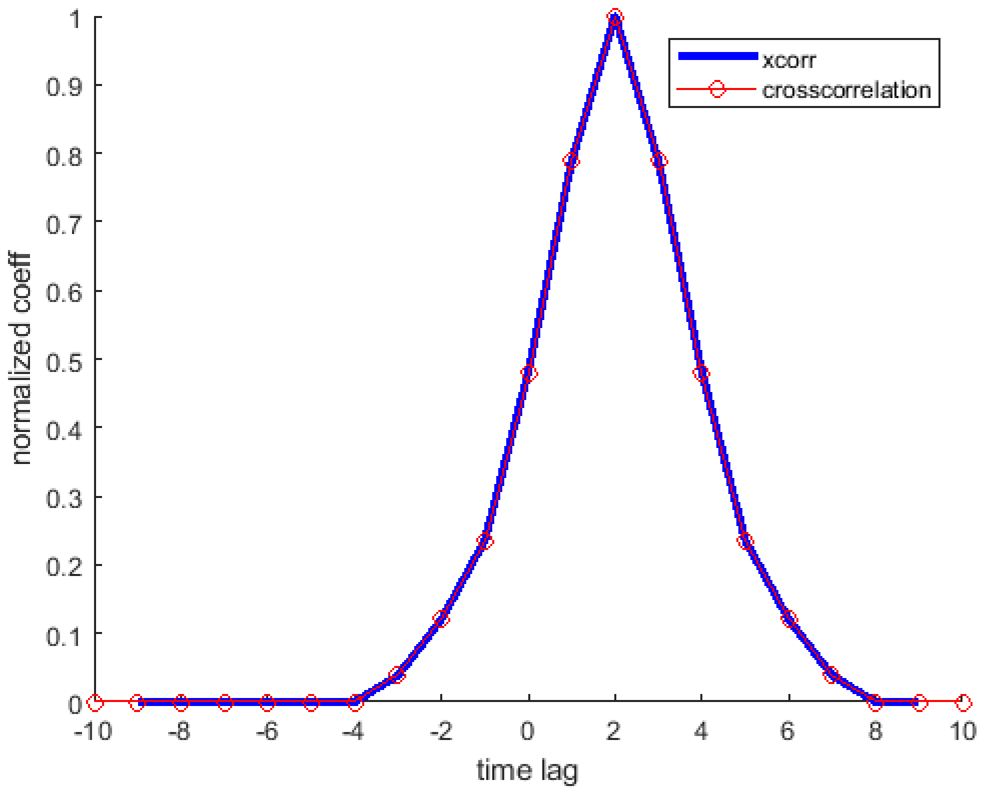
maxCoor2 = 1, timeLag1 = 2

Matlab call function xcorr

```
 [xcorrMat, lag] = xcorr(x1, x2, 'coeff');
```

plot lag-corr graph.

```
 figure; hold on;
 plot(lag, xcorrMat, 'b', 'linewidth', 3);
 plot(xcorrTime, xcorrArray2, 'ro-');
 legend('xcorr', 'crosscorrelation');  xlabel('time lag');
 ylabel('normalized coeff');
```



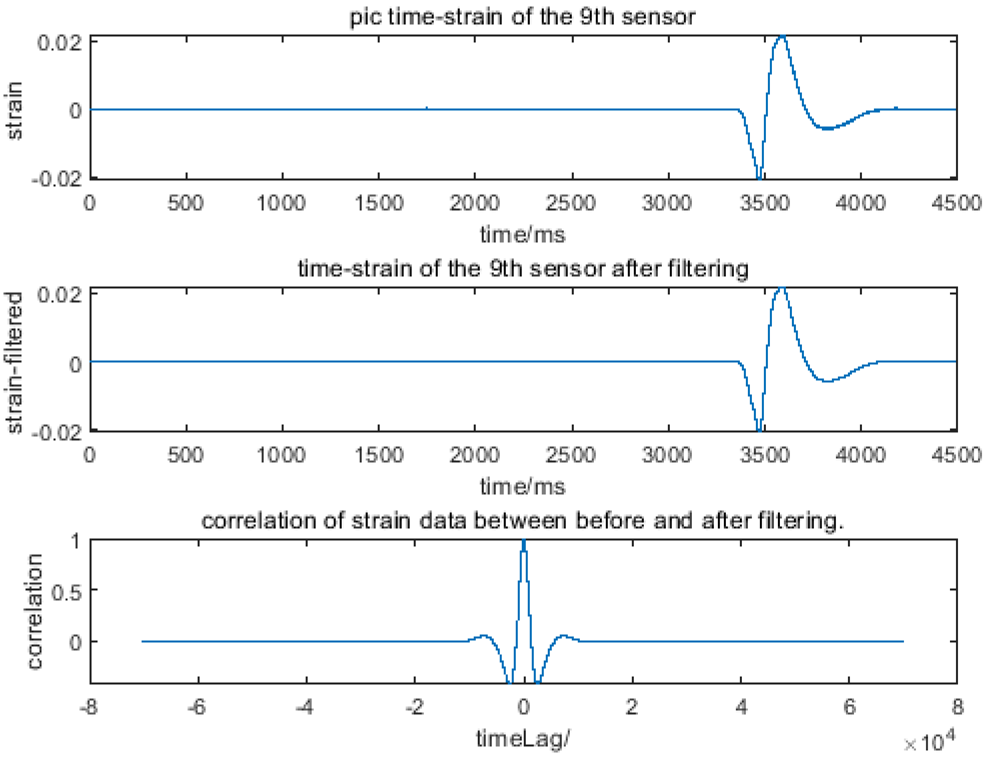
You can see two points ahead

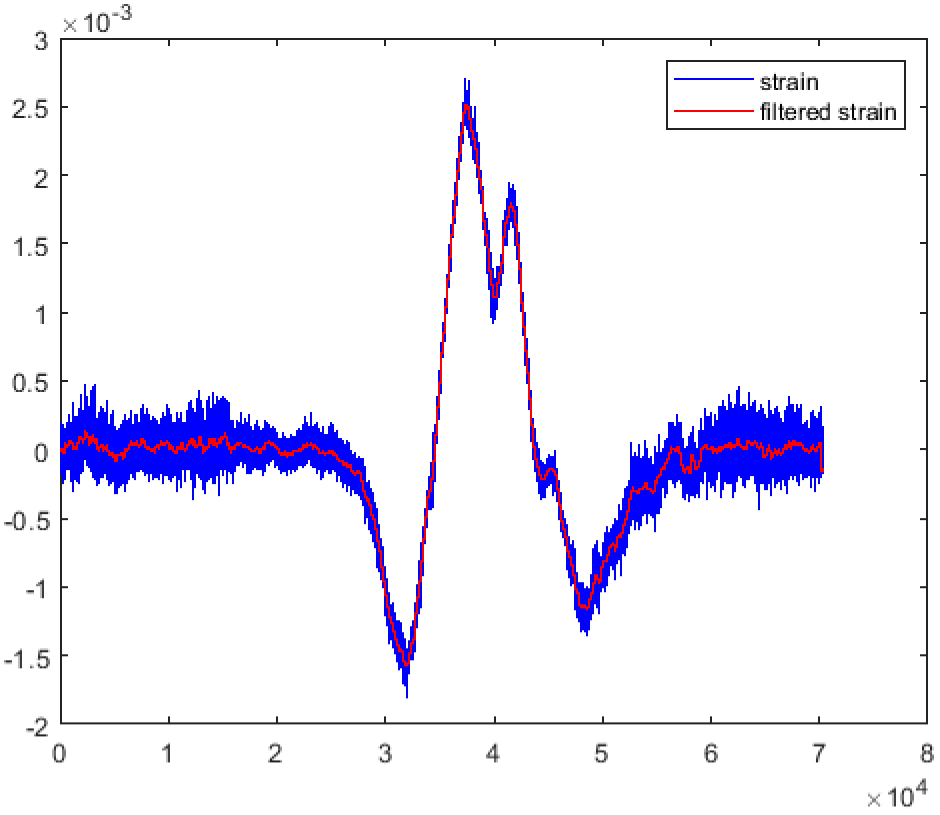
# test 3

```
filename = '..\..\testdata\strainMat17.mat';
```

filename = '..\..\testdata\strainMat61.mat'; filename = '..\..\testdata\strainMat44.mat'; filename = '..\..\testdata\strainMat103.mat';

```
strainMat0 = importdata(filename);
[lenPosition,  lenTime] = size(strainMat0);
time = (1:lenTime);  % *0.064;
[strainMat, timeLag2, maxCorr2, fig]= filteringfunc(strainMat0);
 n = lenPosition - 1; plot(axes(figure), time, strainMat0(n, :), 'b',
 time, strainMat(n, :), 'r');
legend('strain', 'filtered strain');
%{
1.######################################################PS############
2.#########triggering#################
####PS#####################PS##########60/20 ms####
####################1.9 2.0.#######################
3. #####################
4. ####################################
###########################
##################################################################
%}
```


pic time-strain of the 9th sensor
strain
0.02
0
-0.02
0
500
1000
1500
2000
2500
3000
3500
4000
4500
time/ms
time-strain of the 9th sensor after filtering
strain-filtered
0.02
0
-0.02
0
500
1000
1500
2000
2500
3000
3500
4000
4500
time/ms
correlation of strain data between before and after filtering.
correlation
1
0.5
0
-8
-6
-4
-2
0
2
4
6
8
timeLag/
×10^4



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