



Lab Report-03

Course no. ECE 4124

Course Title: Digital Signal Processing Sessional

Experiment Title: MATLAB implementation of-

1. Auto Correlation of a function with and without xcorr() Function.
2. Cross Correlation of a function with and without xcorr() Function.

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Experiment No.: 03

Experiment Name: MATLAB implementation of-

1. Auto Correlation of a function with and without xcorr() Function.
2. Cross Correlation of a function with and without xcorr() Function.

Theory: Correlation describes the mutual relationship which exists between two or more things. The same definition holds good even in the case of signals. That is, correlation between signals indicates the measure up to which the given signal resembles another signal. Depending on whether the signals considered for correlation are same or different, we have two kinds of correlation: autocorrelation and cross-correlation.

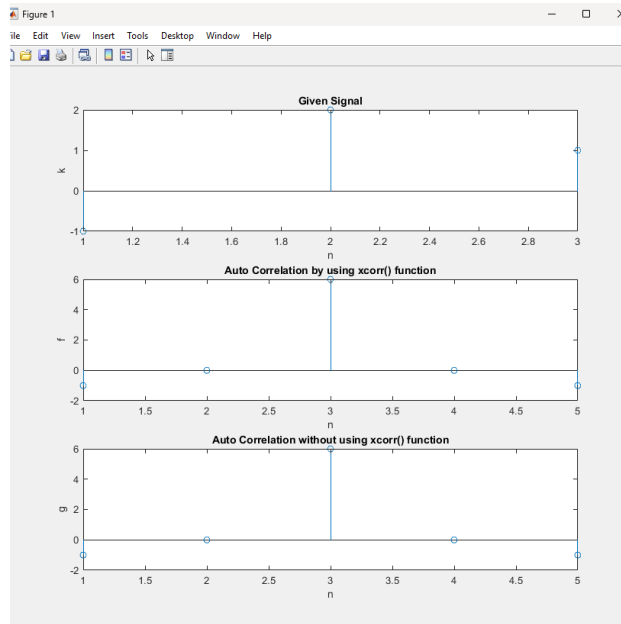
Auto correlation is a type of correlation in which the given signal is correlated with itself, usually the time-shifted version of itself. On the other hand, cross correlation is a kind of correlation, in which the signal in-hand is correlated with another signal so as to know how much resemblance exists between them.

1. Auto Correlation of a function with and without xcorr() Function.

Code:

```
Editor - G:\4-1\DSP\labautocorr.m *
corbyfunc.m  labxcorr.m  labautocorr.m *  xcorrbyfunc.m  +
1  clc;
2  close all;
3  clear all;
4  k=[-1 2 1];
5  f=xcorr(k);
6  n=length(k);
7
8  x=[zeros(1,n-1),k,zeros(1,n-1)];
9  h=[k, zeros(1,n-1),zeros(1,n-1)];
10 d=2*n-1;
11
12 for i=1:d
13     y=circshift(h,[1,i-1]);
14     for t=1:d
15         r(t)=x(t)*y(t);
16     end
17     g(i)=sum(r);
18 end
19
20 subplot(3,1,1);
21 stem(k);
22 xlabel('n');
23 ylabel('k');
24 title('Given Signal');
25
26 subplot(3,1,2);
27 stem(f);
28 xlabel('n');
29 ylabel('f');
30 title('Auto Correlation by using xcorr() function');
31
32 subplot(3,1,3);
33 stem(g);
34 xlabel('n');
35 ylabel('g');
36 title('Auto Correlation without using xcorr() function');
37
38
```

Output:

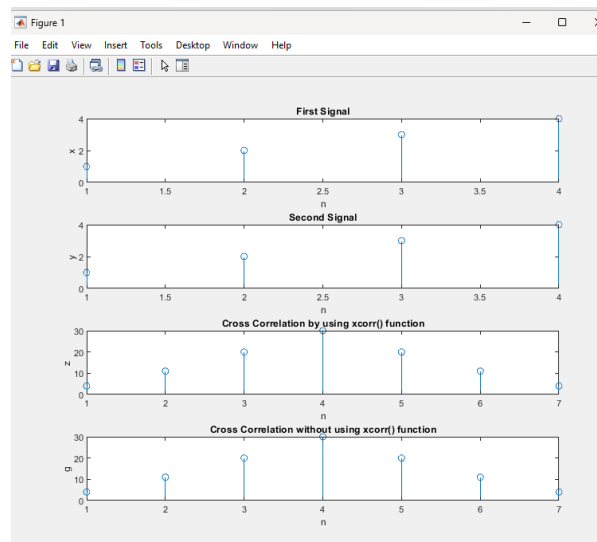


2. Cross Correlation of a function with and without xcorr() Function.

Code:

```
Editor - G:\4-1\DSP\lab3\xcorbyfunc.m
corbyfunc.m  labxcorr.m  labautocorr.m  xcorbyfunc.m  +
1  clc;
2  close all;
3
4  x=[1 2 3 4];
5  y=[1 2 3 4];
6  z=xcorr(x,y);
7  n=length(x);
8
9  s=[zeros(1,n-1),x,zeros(1,n-1)];
10 h=[y, zeros(1,n-1),zeros(1,n-1)];
11 d=2*n-1;
12
13
14 for i=1:d
15     m=circshift(h,[1,i-1]);
16     for t=1:d
17         r(t)=s(t)*m(t);
18     end
19     g(i)=sum(r);
20 end
21
22 subplot(4,1,1);
23 stem(x);
24 xlabel('n');
25 ylabel('x');
26 title('First Signal');
27
28 subplot(4,1,2);
29 stem(y);
30 xlabel('n');
31 ylabel('y');
32 title('Second Signal');
33
34 subplot(4,1,3);
35 stem(z);
36 xlabel('n');
37 ylabel('z');
38 title('Cross Correlation by using xcorr() function');
39
```

Output:



Conclusion: Thus we have successfully implemented all the signals in MATLAB. The output was found same when done with and without `xcorr()` function.