

Digital Signal Processing Lab

Lab 02 (Group A)

We know about how convolution is performed in Digital Signal Processing. There are basically two methods of performing convolution, which only differ in the way the samples are looped and summed. The result for both are the same. Here is an example of applying convolution using both input side and output side algorithm:

$$X = 1 \ -2 \ 3 \ 4 \ (N = 4)$$

$$H = 1 \ 2 \ 3 \ (M = 3)$$

$$Y = X * H$$

Input Side Algorithm: $\sum_0^{N-1} x[j]h[n-j]$

0	0	0	1	2	3	0	0	0
4	3	-2	1					
	4	3	-2	1				
		4	3	-2	1			
			4	3	-2	1		
				4	3	-2	1	
					4	3	-2	1
			1	0	2	4	17	12

Output Side Algorithm: $\sum_0^{M-1} h[j]x[n-j]$

0	0	1	-2	3	4	0	0
3	2	1					
	3	2	1				
		3	2	1			
			3	2	1		
				3	2	1	
					3	2	1
		1	0	2	4	17	12

1. Write two functions `convolution_input_side.m` and `convolution_output_side.m` which will create your own version of convolution. There is a built-in convolution function in MATLAB/Octave but do not use that. Your implementation of the functions should take two vectors x and h as input and return one vector y as output.
2. Run the two functions on the dataset below and show the plot of both the y values in the same graph using subplot.:

$$x = [17, 4, 13, 24, 35, 43, 31, 29, 53]$$

$$h = [2, 3, 5, 7, 11]$$