

Homework-2

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Due 20.04.2020 23:59

- You are asked to upload .py files and .pdf file (report) in your zip file. Give a brief explanation of your code in your report.
- Use comment outs on the necessary lines in your code.
- Put your name and number at the top of your code.
- The code you typed must WORK (as the manner of syntax). Otherwise, you will get zero points for that homework. Your code will not be fixed or debugged to work.
- In Case of Cheating and Plagiarism Strong disciplinary action will be taken.
- No late submissions will be accepted

1- Write a Python code that convolves two discrete time signals sequences where the maximum signal length will be considered as 5 samples. If the signal lengths are not equal, then zero padding can be applied to the shorter one. Test the code by finding the convolution  $y[n]=x[n]*h[n]$  for the below given signal sequences.

- a)  $x[n]=[0\ 1\ 2\ 3]$ ,  $h[n]=[1\ 1\ 1\ 1]$
- b)  $x[n]=[0\ 1\ 2\ 3]$ ,  $h[n]=[1]$
- c)  $x[n]=[0\ 1\ 2\ 3]$ ,  $h[n]=[0\ 1\ 2\ 3]$
- d)  $x[n]=[1\ 0\ 1\ 2\ 3]$ ,  $h[n]=[1\ 2]$

(all the given signal sequences start at  $n=0$ )

2- Apple Stock Price (@Nasdaq AAPL) is given in the attached .csv file. Use and modify the Python program that you prepared for Assignment #1 for this question. Choose last 400samples (days) of the data and,

- a) Draw the standardized data ( $z_i$ ) when the data is framed as the sequence of 5 consecutive values (5 days) and frames are shifted by one frame (5 days) (where  $z_i = \frac{x_i - \mu}{\sigma}$ ,  $\sigma$ : standard deviation,  $\mu$ : average of 5 days). (Totally 80data frames, 400 data points)
- b) Draw the normalized data ( $x_n$ ) when the data is framed as the sequence of 5 consecutive values (5 days) and frames are shifted by one frame (5 days) (where  $x_n = \frac{x_i - x_{min}}{x_{max} - x_{min}}$ ,  $x_{max}$  is the maximum of the framed data sequence).

c) Draw the graph of maximum convolution value between  $x[n]$  and  $h[n]$  ( $\max(x[n]*h[n])$ ) where  $x[n]$  is the normalized data sequence (5 days framed data sequences, 400 data points) in “b” and  $h[n]$  is any of below given sequences.

- $h[n]=[0.2 \ 0.4 \ 0.6 \ 0.8 \ 1]$
- $h[n]=[1 \ 0.5]$
- $h[n]=[0.5 \ 0.5 \ 0.5 \ 0.5 \ 0.5]$
- $h[n]=[0.05 \ 0.1 \ 0.2 \ 0.4 \ 0.8]$

(Graphs will have 400 data points in “a” and “b”, 80 data points in “c”)