

Homework 2

Description

CmpE 362 Spring 2018

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Due: 9 April, 23:59, sharp

1 Introduction

In this homework, you will implement some simple time domain exercises with matlab.

1.1 Peak Finder

In this part, you will improve your Peak Detection algorithm from the first homework. You will design a low pass filter and a moving average filter. For the low pass filter, you will change the limit frequency between 1000, 2000, 3000, 4000Hz. For the moving average filter you will change number of samples taken into average ,N, from 2 to 30. You will plot the number of peaks you found vs these parameters. In other words, apply four different low pass filters with cut off frequencies (1k,2k,3k,4k) and plot number of peaks versus changing cut off frequencies. (Add no filter also) In the second part, you will plot the number of peaks versus changing N. (add no moving average number of peaks also). Add these plots to your pdf report. Explain the differences and reasons behind in the report. Name your script as AdvancedPeakFinder.m

1.2 Frequency(Pitch) of a Sound

In this part, you will do what you are asked in waveexample.m on laughter.wav and explain what you understand. You will explain which exercises play the same sound and why? Briefly explain on the report.

1.3 Spline Interpolation

In this part, you will implement Quadratic Spline Interpolation on a given data.(On Figure 1) Ignore w_i . You would not need them. You will work on x,y pairs. You will have $Ax=B$ where you are trying to find x. You can use linsolve method of MATLAB to find a solution to this equation. It uses LU factorization.

$\text{Res} = \text{linsolve}(A,B);$

You will plot your interpolated functions on the data. Plot would be like Figure 2. Actual function is like Figure 3. Briefly comment on your figure

TABLE 2.3 Stress, y_i (psi), versus Microstrain, x_i

i	y_i	x_i	w_i
1	1025	265	3.86
2	1400	400	3.50
3	1710	500	3.42
4	2080	700	2.97
5	2425	950	2.55
6	2760	1360	2.03
7	3005	2080	1.44
8	2850	2450	1.16
9	2675	2940	0.91

Figure 1: Stress vs. MicroStrain

and actual data figure. What do you infer from your figure? Are they similar?

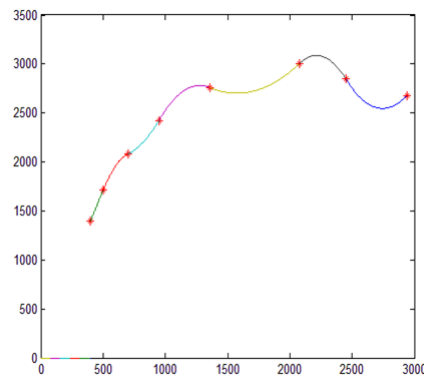


Figure 2: Quadratic Spline Interpolation Result

2 Report

Prepare a report explains your code briefly. Add the answer to the comment questions on HW to your report.

Compress the report and the code files. Name it as "YourNumber CmpE362 HW2.zip" (or rar, or 7z etc.). Send the file through canvas.

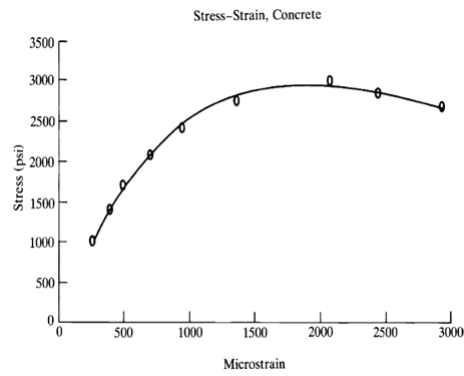


FIGURE 2.8 Stress-strain characteristic for a concrete block.

Figure 3: Actual Data Function

3 Notes

Deadline is strict. Do not send after deadline. When copying is detected, both parties will get zero. Disciplinary action will be taken.