Homework 2
Description
CmpE 362 Spring 2017

Instructor : Fatih Alagoz
Teaching Assistant : Yêkta Said Can
Due: 19 March, 23:59, sharp

March 8, 2016
1 Introduction

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

1.1 Clap Counter

In the first part, you are asked to write a program in MATLAB that counts the number of claps from the recorded sound. Detail: You can use the sent .wav files (one.wav and two.wav) to train your program. Note that your program should be generic. In other words, your program should work on different input files too (not just the sent files). When a wav file that contains a one clap or two claps is given as input to your program, it should output ’one clap’ or ’two claps’ accordingly. Everyone will send two test files with name 1-1.wav and 1-2.wav which includes one clap and two claps respectively.(Different than sent one.wav and two.wav files) Your program will take batch input. That is from the current directory, your program will read all wav files with name 1-1, 1-2, 2-1, 2-2 upto M-1 and M-2. M will be taken as input also. For all files, your program will return output in the new line.

Use time domain in your application. Your script should be named ClapCounter.m. Basically you are going to model the clap on time domain and you will set a reasonable threshold.

1.2 Frequency(Pitch) of a Sound

In this part, you will do what you are asked in waveexample.m on laugh-ter.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.

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

Figure 1: Stress vs. MicroStrain

<table>
<thead>
<tr>
<th>i</th>
<th>$y_i$</th>
<th>$x_i$</th>
<th>$w_i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1025</td>
<td>265</td>
<td>3.86</td>
</tr>
<tr>
<td>2</td>
<td>1400</td>
<td>400</td>
<td>3.50</td>
</tr>
<tr>
<td>3</td>
<td>1710</td>
<td>500</td>
<td>3.42</td>
</tr>
<tr>
<td>4</td>
<td>2080</td>
<td>700</td>
<td>2.97</td>
</tr>
<tr>
<td>5</td>
<td>2425</td>
<td>950</td>
<td>2.55</td>
</tr>
<tr>
<td>6</td>
<td>2760</td>
<td>1360</td>
<td>2.03</td>
</tr>
<tr>
<td>7</td>
<td>3005</td>
<td>2080</td>
<td>1.44</td>
</tr>
<tr>
<td>8</td>
<td>2850</td>
<td>2450</td>
<td>1.16</td>
</tr>
<tr>
<td>9</td>
<td>2675</td>
<td>2940</td>
<td>0.91</td>
</tr>
</tbody>
</table>

Figure 2: Quadratic Spline Interpolation Result

2 Report

Prepare a report explains your code briefly (not more than one page) 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 to yektaasaid.can@gmail.com before the deadline. Subject of the mail would be CmpE362 HW2.
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.