Barın Özmen
2012400045

CmpE 362 – Project 2

1) Peak Finder

a) Outputs and plots

Program needs input to go on. It looks csv file as in the first project. Simple type “folder” to console to go on that folder and read the input. After it reads, it applies ***low pass*** filter first and print the number of peaks to the console. It also prints the number to the plot title.

Low Pass Filter Plots:

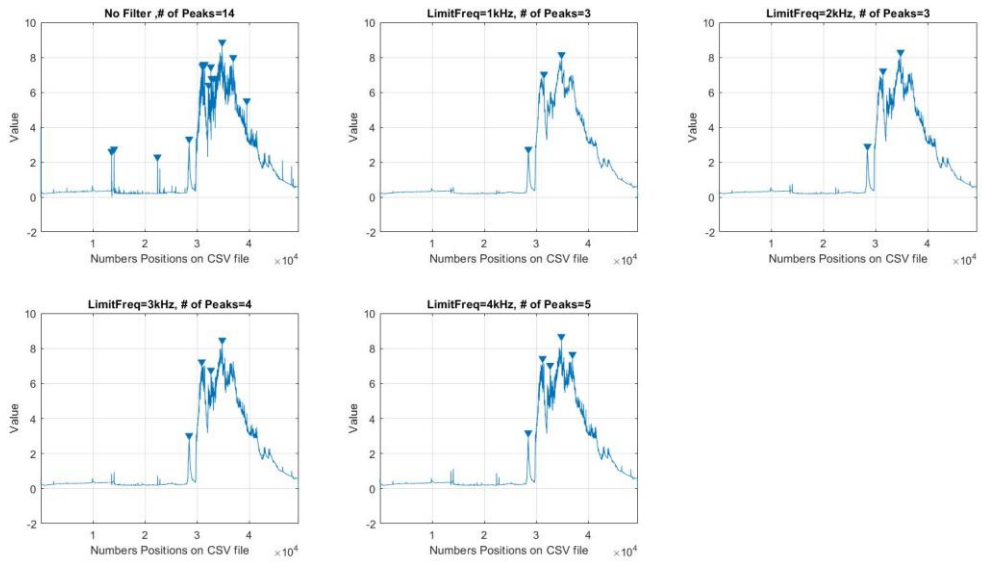
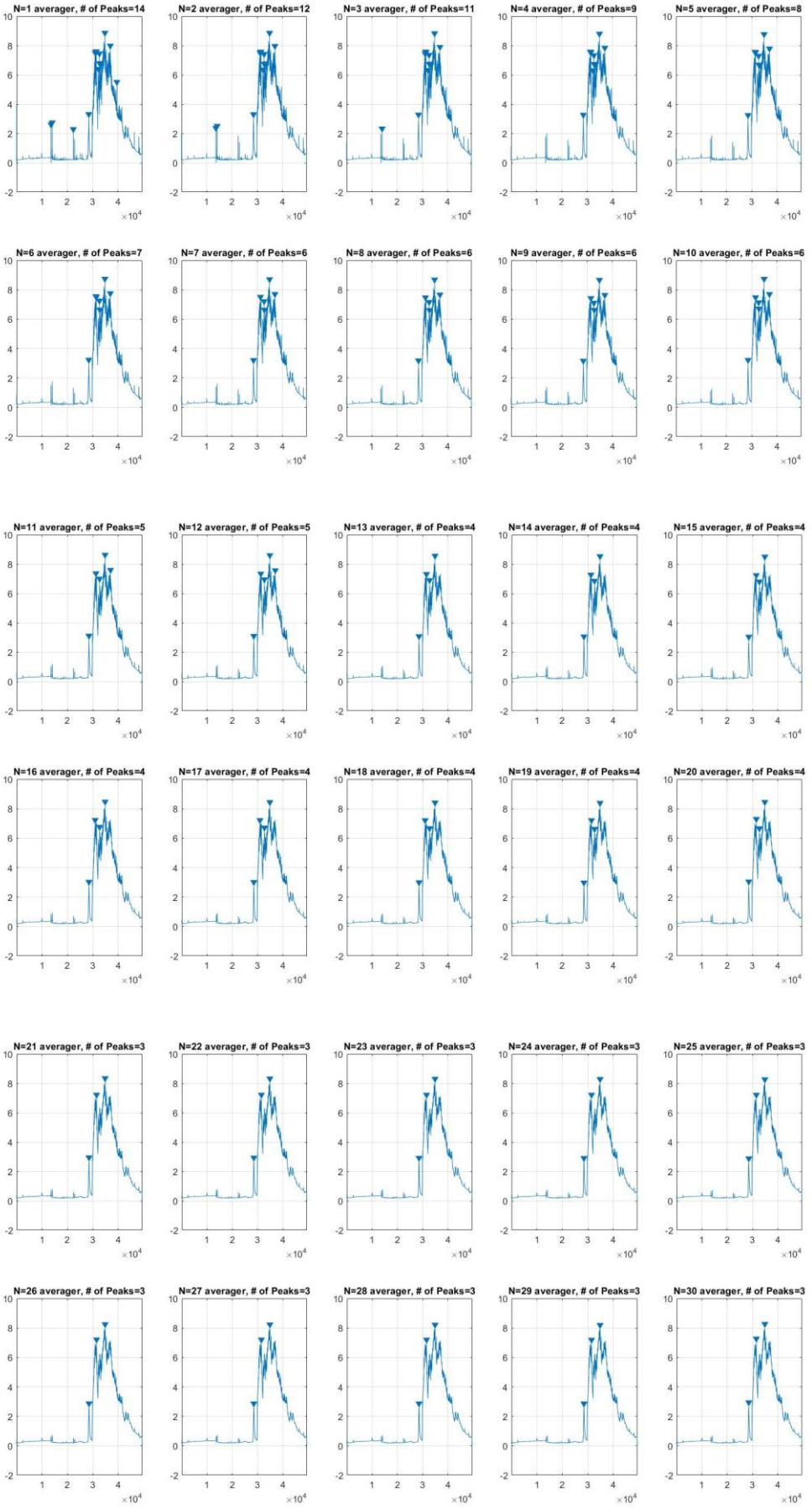


Figure a: Low Pass Filter subplots

In the second part, program applies ***moving averager*** filter N=2, to 30 on that data and print the results either to the console and to the title of the plots.

Moving-Averager Filter Plots:

Barın Özmen
2012400045



b) The differences and reasons

As frequency limit decreases, the function gets smoother in low-pass filter. On the other hand, in moving averager filter, the functions gets smotther as we increase N point. They are opposite of each other and N point averager helps to filter it more slowly and carefully by increasing N one by one. Yet, we can filter it more specific and deeper with limit frequency.

2) Frequency of a Sound

In this exercise, we are supposed to change the audio file's frequency. There suppose to be 6 sounds. First one is the original file and the second one removes half of the audio but not from it's half. It divides into pairs and remove the neighbour in each pair into halve. It halves the period and double the frequency.

I understand from the question that we need to change the original file by "re-arrange" means. So i create a 'temp.waV' and overwrite on it.

Let us say Fs: original frequency
In Exercise 1: I quadrupled the frequncy and save it as temp.waV. This one not similar to any of them because, we increase the frequency to 4Fs

In Exercise 2: Again "re-arrange" the data and half down the temp.waV file's frequency from 4Fs to 2Fs and overwrite it. This sound and the changed pitch sound's frequencies are same. Yet, they are not the same sound even if their's frequencies are same (2 Fs), because we delete some elements when we changed the pitch of a sound.

In Exercise 3: There are no "re-arrange" so we are not overwriting on temp.waV, just change the the frequency from 2Fs to 4Fs. This sound is same as the *Exercise 1.* We just undo what we did in the Exercise 2.

In Exercise 4: Take the 2Fs 'temp.waV' file again and change frequency from 2 FS to 1 Fs. This is also same as the defult sound which is 'laughter.waV'. We took the sound to the original form.

Barın Özmen
2012400045

3) Spline Interpolation

In the first figure we can understand that, the curve is changing dynamicly not in same order. As the points are vary and marked out far away from the average curve, the curve between 2 points on first figure are wider. As the 2 points are close to averager curve, it gets smoother. First figure is determine how much the point far away from the averager and how it accelerates.

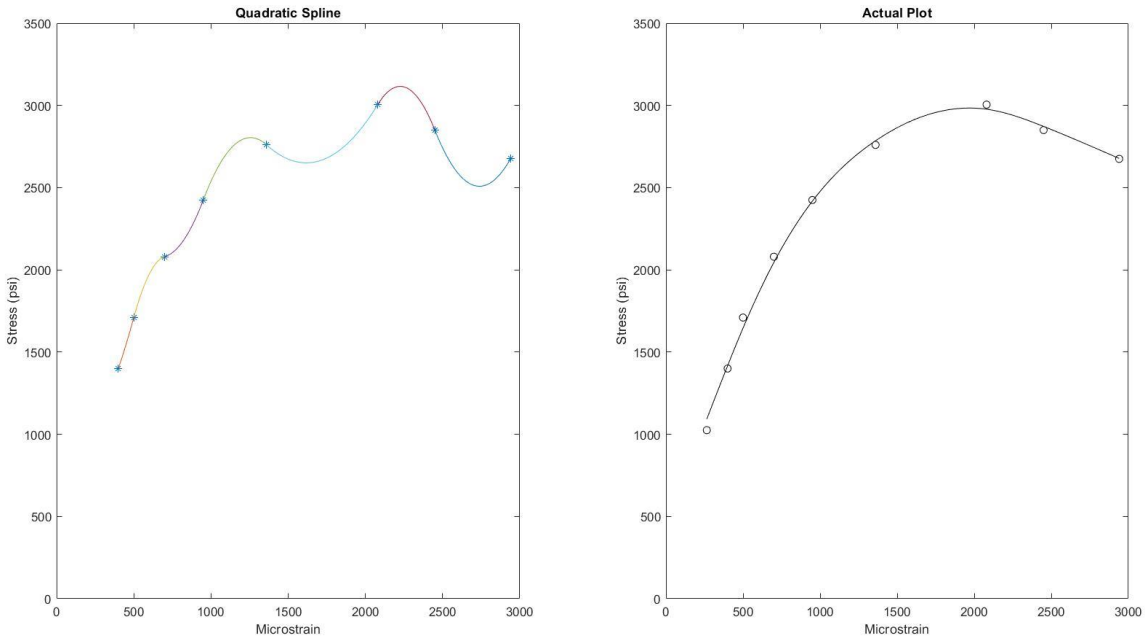


Figure 1: Quadratic Spline Interpolation vs Actual Plot

It can be understood from the actual figure that this curve is the average curve that helps to find the mean and the standart deviation. The second figure is the averager curve between these points. Actually they are same figures with different perspectif.