9. More signal processing

Here is a sample of the audio file analyzed in the script below.

Guitar playing a C major chord

0:09 / 0:09

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Finding frequency peaks (External resource) (1.0 points possible)

Finding peak frequencies

You can use the graph of the FFT of an audio signal to identify the peaks in the frequency spectrum. However, MATLAB can find these peaks for you using the function

```
[pks,locs,w,p] = findpeaks(data);
```

that find the local maxima in data, as well as the locations, widths of peaks, and prominences of peaks.

The inputs that can be given to the findpeaks function are

```
findpeaks(vector_of_amplitudes,vector_of_frequencies, 'MinPeakProminence',minpeak, 'MinPeakDistance', minpeakdist);
```

The MinPeakProminence sets a minimum value below which peaks are considered negligible. The MinPeakDistance determines the minimum allowable distance between two peaks found by the function.

The code below shows you how to use this function. Your job is to modify the variable **minpeak** so that it doesn't keep track of the small peaks at frequencies greater than 1000 hz.

You can also play around with changing **minpeakdist** to see how increasing or decreasing this value changes which peaks are discovered.

Script

Save Reset MATLAB Documentation (https://www.mathworks.com/help/)

```
[y,Fs] = audioread("Cmajor_guitar.m4a");
y = y(:,1);
L = length(y);
% Extract points from 30-40% time period of the file
y = y(round(L*0.25):round(L*0.3));
% New length of the file
L = length(y);

T = 1/Fs;
% Time vector
t = (0:L-1)*T;
% Plot the audio data
figure(1)
plot(t,y)

Y = fft(y);
P2 = abs(Y);
P1 = P2(1:floor(L/2+1));
P1(2:end-1) = 2*P1(2:end-1);
```

```
f = (Fs*(0:(L/2))/L);

%Make sure our vectors are column vectors.
f = f(:);
P1 = P1(:);

%Modify the minpeak so that very small peaks in harmonics (above 1000 hz) don't show in table
minpeak = 1000 %0.1
minpeakdist = 25
[pks, freq, w, p] = findpeaks(P1, f, 'MinPeakProminence',minpeak, 'MinPeakDistance', minpeakdist);
audioData = table(freq, pks, w, p, 'VariableNames', {'Frequency', 'PeakHeight', 'PeakWidth', 'Prominence'})


figure(2)
plot(f, P1)
title('Single-Sided Amplitude Spectrum of X(t)')
```

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Topic: Unit 1: Fourier Series / 9. More signal processing

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? i do not understand the question

when i input 235 or higher, i don't have any peaks anymore above 1000hz yet i get the wrong answer...

2

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